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Causality between budget revenues and expenditures and GDP in the Algerian Economy during the period (2000-2020)

السببية بين إيرادات ونفقات الميزانية والناتج المحلي الإجمالي في الإقتصاد الجزائري خلال الفترة (2000–2020)

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Abstract:

This study aimed to address the problem of causation between the total budget revenues, grants, budget expenditures and GDP in Algeria during the period (2000-2020), by analyzing the development of these indicators throughout the study period, as well as conducting a standard applied study based on Granger's causality and conducting appropriate statistical tests.

The importance of the research is shown by addressing the study assessing the evolution of the total budget revenues, grants and budget expenditures on the gross domestic product in the Algerian economy during the period (2000-2020). A group of official reports and periodicals issued by national and international official bodies was also used. EViews 7.1 econometric solution in standard model.

The study concluded that there is a causal relationship in one direction only, heading from GDP to budget revenues during the study period, and this is due to the nature of the Algerian economy, which is characterized by dependence on the extent of improvement in fuel prices in international markets.

Keywords: budget revenue and endowments; budget expenditures; gross domestic product; Algeria's economy; Granger's Causation Model.

JEL Classification Codes: H61 ؛H72 ؛P24 ؛E62 ؛C53

ملخص: هدفت هذه الدراسة إلى معالجة إشكالية اتجاه السببية بين إجمالي إيرادات الميزانية والهبات ونفقات الميزانية و الناتج المحلي الإجمالي في الجزائر خلال الفترة (2000–2020م)، وذلك من خلال تحليل تطور هذه المؤشرات طيلة فترة الدراسة، وكذا إجراء دراسة تطبيقية قياسية بالإعتماد على السببية لجرانجر وإجراء الإختبارات الإحصائية المناسبة. تظهر أهمية البحث من خلال التطرق إلى دراسة تقييم تطور إجمالي إيرادات الميزانية والهبات ونفقات الميزانية على الناتج المحلي الإجمالي في الإقتصاد الجزائري خلال الفترة (2000–2020م)، وقد تم الإعتماد على مجموعة تقارير ودوريات رسمية صادرة عن هيئات رسمية وطنية ودولية، كما تم استخدام برنامج القياس الإقتصادي EViews 7.1 في حل النموذج القياسي.

وقد خلصت الدراسة إلى وجود علاقة سببية في اتجاه واحد فقط يتجه من الناتج المحلي الإجمالي إلى إيرادات الميزانية خلال فترة الدراسة، ويعود ذلك إلى طبيعة الإقتصاد الجزائري الذي يتميز بالتبعية لمدى تحسن أسعار المحروقات في الأسواق الدولية، وكذا دور الدولة

الكلمات المفتاحية: إيرادات الميزانية والهبات؛ نفقات الميزانية؛ ناتج محلي إجمالي؛ إقتصاد الجزائر؛ نموذج السببية لجرانجر.

تصنيفات JEL: H61؛ H72؛ P24؛ E62؛ C53

Introduction:

The study of the causal relationship between budget revenues and expenditures and GDP (economic growth) is one of the topics of great interest in many financial and economic studies and the writings of specialists, and it has taken multiple dimensions and forms in dealing with this subject, and in this study we used two revenue tools and the expenditures of the general budget in order to study and analyze the causal relationship between them and the extent of the effect that exists between them, and the dominant characteristic of most of the studies that we relied on in this research indicates that this relationship between politics

Budget revenues and expenditures and GDP can extend from budget revenues and expenditures to GDP and can be the opposite, which gives us the opportunity to study the causal relationship between indicators of budget revenues and expenditures and GDP.

The importance of the research: The importance of the research comes from the importance of the budget revenues and expenditures tools in order to achieve the objectives of the financial policy as a whole, as well as to achieve economic stability, by addressing the study of the evolution of budget revenues and expenditures in Algeria during the period (2000-2020) by evaluating and measuring its impact on the gross domestic product through the use of the Granger index model, as well as the use of appropriate standard tests.

Research methodology:

We will try, through this research, and by following the analytical method, to study the evolution of budget revenues and expenditures in Algeria during the period (2000-2020) in the gross domestic product, and to propose in the last a set of recommendations.

Study problem:

Budget revenues and expenditures are among the most important financial policy tools owned by the state to manage the national economy, whether developed or developing countries. Through this policy (in addition to other policies), the state achieves the desired economic goals (growth, stability, full employment ... etc.).

Algeria has used during the period under study (2000-2020) many of the tools of that policy, which in their entirety aimed at increasing the growth rates of the national product as a main entrance to increase the aggregate supply and what it requires of increasing the levels of investment and employment, hence the problem of this study revolves around the direction of the financial policy tools (Public expenditure and public revenue) on the one hand and the growth in GDP On the other hand, the main question that revolves here in this study is:

Are budget revenues and expenditures causes the changes for the GDP in Algeria, or is the GDP causes the changes for the budget revenues and expenditures in Algeria during the period (2000-2020)?

Study hypotheses:

To answer the main question above, we will rely on the hypothesis of the study, which is based on two parts:

1-Both budget revenues and expenditures in Algeria cause causes the changes of GDP; That is, the causality is directed from the budget revenues and expenditures towards the Gross Domestic Product during the period (2000-2020);

2-GDP causes both budget revenues and expenditures in Algeria; That is, the causality is directed from the Gross Domestic Product towards the budget revenues and expenditures during the period (2000-2020).

Study Methodology:

In order to achieve its objectives, the study relied on two approaches:

1- The descriptive analytical approach: Through the development of both revenues and public expenditures, as well as the study of the development of the output, we will rely on reports issued by official national and international bodies: the International Monetary Fund (IMF), the National Office of Statistics (ONS), the Bank of Algeria.

2- The empirical standard approach: by analyzing, testing and measuring the trend of the causal relationship between oil and ordinary taxation on economic growth, and using the standard program Eviews 7.1.

1- Evolution of budget revenues and expenditures and growth in GDP in Algeria during the period (2000-2020):

Since independence (1962), The most important feature of the Algerian economy that have contributed greatly to changing concepts, ideologies[1], as well as strategies, and thus changing decisions and regulations. Therefore, the factors of financial policy development in Algeria can be reduced to three overlapping and integrated determinants, namely: the economic and doctrinal determinant represented in the inevitability changing the economic structure, the social determinant represented in the pressure of demand for public services, and the financial determinant represented by the financial ease resulting from the hydrocarbon sector[2].

-The good conduct of budget revenues and expenditures and the stability of public debt rates and the budget deficit is contingent first on public revenues, especially petroleum taxation, and therefore the ability to withstand the fiscal policy and the budget deficit (Sustainability of Fiscal Policy and Deficit) remains in turn dependent on fluctuations in oil prices in global markets, and this gives the advantage of vulnerability to financial policy in Algeria, and in order to further clarify this situation and the development of performance indicators for financial policy tools during the period (2000-2020); Where, after Algeria was liberated from its obligations according to economic reform programs with the end of May 1998, however, Algeria continued to pursue the same deflationary policy until 2001, especially with the return of fuel prices to rise starting from the last three years of 1999 , which gave a kind of financial comfort to this period that was exploited In reviving economic activity through a development financial policy, where huge development programs were launched; The first program is the Economic Recovery Support Program, which spanned over four years In the years (2001-2004)[3], financial credits estimated at about 7 billion dollars were allocated to him, as well as the second program, which is the supplementary program to support economic recovery in the period (2005-2009), for which an amount of more than 150 billion dollars was allocated. As for the third and final program, it is the program of the five-year period (2010-2014), which is considered one of the largest development program applied in Algeria since independence, with allocations amounting to about 286 billion US dollars. By stimulating investment projects, the main objectives of the economic recovery policy are to raise the rate of economic growth as well as reduce high unemployment rates.

Table No. (1): The evolution of budget revenues and expenditures and GDP in Algeria during the period (2000-2020)

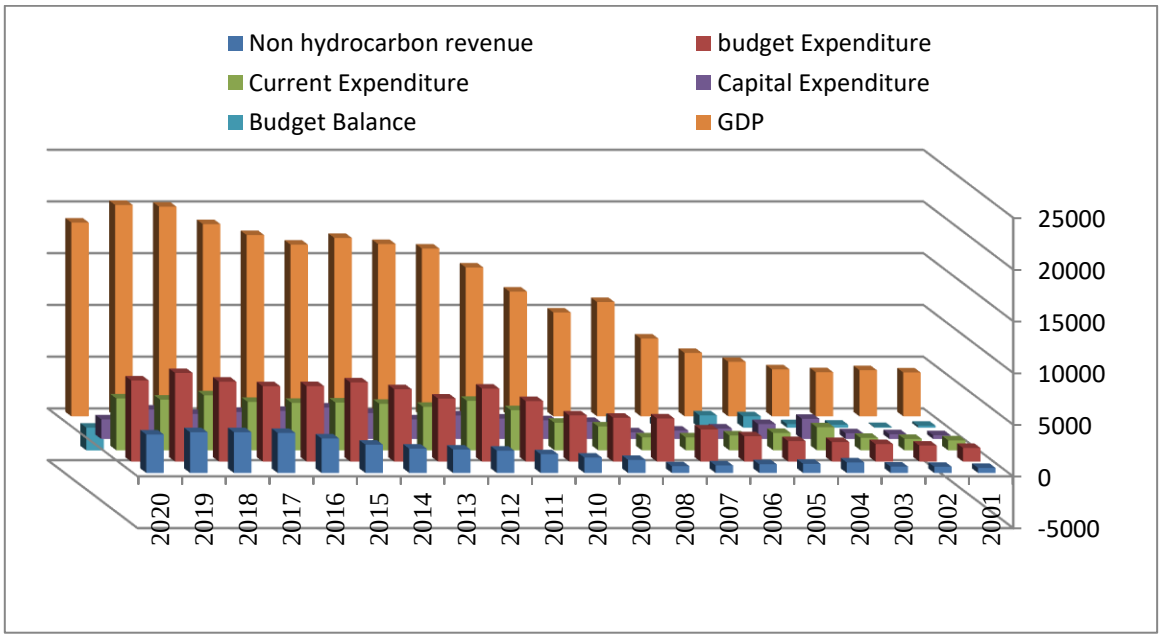
years	Total revenue Budget and gifts	Hydrocarbon revenue	Non hydrocarbon revenue	budget Expenditure	Current Expenditure	Capital Expenditure	Budget Balance	GDP	budget balance/ GDP	crude oil export price (US$ /barrel)
2000	1578.1	1213.2	364.9	1178.1	856.2	321.9	400	4098.8	9.76	28.5
2001	1505.5	1001.4	488.5	1321	963.6	357.4	184.5	4235.6	4.36	24.85
2002	1603.2	1007.9	595.1	1550.6	1097.7	452.9	52.6	4455.3	1.18	25.24
2003	1974.4	1350	616.6	1690.2	1199	553.7	284.2	4260.8	6.67	28.96
2004	2229.7	1570.7	1022.1	1891.8	2227.3	1948.4	337.9	4537.7	7.45	38.66
2005	3081.7	2352.7	883.1	1985.9	1673.9	1434.6	1095.8	5264.2	20.82	54.64
2006	3639.8	2799	840.5	2453	1437.9	1015.1	1186.8	6126.7	19.37	65.85
2007	3687.8	2796.8	724.1	3108.5	1245.1	806.9	579.3	7519	7.7	74.95
2008	5111	4088.6	652.5	4175.7	1251.1	640.7	935.3	11042.8	8.47	99.97
2009	3676	2412.7	1263.3	4246.3	2300	1646.3	-570.3	10034.3	-5.68	62.25
2010	4392.9	2905	1487.8	4466.9	2659	1807.9	-74	12049.5	-0.61	80.15
2011	5790.1	3979.7	1810.4	5853.6	3879.2	1974.4	-63.5	14384.8	-0.44	112.94
2012	6339.3	4184.3	2155	7058.1	4782.6	2275.5	-718.8	16208.7	-4.43	111.045
2013	5957.5	3678.1	2262.8	6092.1	4204.3	1887.8	-151.2	16650.2	-0.91	109.55
2014	5738.4	3388.4	2349.9	6995.7	4494.3	2501.4	-1257.3	17242.5	-7.29	100.23
2015	5103.1	2373.5	2729.6	7656.3	4617	3039.3	-2553.2	16591.9	-15.39	53.06
2016	5110.1	1683	3329	7297.5	4586	2712	-2187.4	17514.6	-12.49	45.5
2017	6047.9	2177	3871	7282.7	4677	2605	-1234.8	18575.8	-6.65	54.1
2018	6751.4	2887	3940	7726.3	5314	2418	-974.9	20259	-4.81	71.2
2019	6602	2668	3933	8566	4895	2846	-1965	20428	-9.62	64.5
2020	5641.1	1922	3719	7839	5009	1894	-2199	18724	-11.74	42.1

Source:
(IMF, 2021, p. 36)
(Bank of Algeria, 2018, p. 155)
(Bank of Algeria, 2013, p. 219)
(Bank of Algeria, 2008, p. 238)
(Bank of Algeria, 2005, p. 181)
(Bank of Algeria, 2002)

-The fiscal policy has contributed significantly to the improvement of some macroeconomic indicators on the surface, perhaps the most important of which is the decrease in the volume of the external debt to the limits of 4.88 billion dollars in 2007, to decrease significantly to about 2.068 billion in 2013, as well as the high rates of economic growth, reaching 6.9% In 2003 and +5.3% in 2005, to decrease slightly in 2013, where it recorded a growth rate of 2.8%, and the same thing was known by the employment levels, where the unemployment rate in Algeria decreased significantly (according to Official statistics) from 29.5% in 2000 to about 9.8% in 2013, which is the period that coincided with the authorities' implementation of development programs that depend in their reference on the Keynesian theory in solving the problem of unemployment, and this is by activating effective aggregate demand, and by activating investment , by reducing interest rates to approach the state of full employment, as for inflation rates, they reached their lowest levels, reaching 0.33% in 2000 and 1.64% in

2005, to record a rate of 3.26% in 2013 , and this can be seen through the following table, which shows the development Study variables during the period (2000-2020)

Fig No.(1) : The evolution of budget revenues and expenditures and GDP in Algeria during the period (2000–2020)



Source: Table No. (1)

1-1- The evolution of financial revenues for the period (2000-2020):

budget size; The total value of the budget increased by 6751.4 billion dinars, compared to 6074.9 billion dinars in 2017, an increase of nearly 11.6% (+703.5 billion dinars), and this increase resulted in an increase in the collection of fuels (+710.1 billion dinars). billion dinars), and, in part, the profit holders of the Bank of Algeria (+80 billion dinars) (Bank of Algeria, 2018, p. 59); Whereas, revenues outside hydrocarbons experienced a slight decrease in defense of 6.6 billion dinars, while they amounted to 1578.1 billion dinars in the year 2000 ; That is, an increase of 328% between the years 2000 and 2018.

- Relative to the gross domestic product (GDP), total revenues increased very slightly in 2018 to reach 33.2% of the annual flow of produced wealth (compared to 32.5% in 2017, a rate similar to that witnessed in 2014 (32.2%), where the average price of a barrel of oil was close to 100$, while the highest rate was in 2006, reaching 59.41% due to the increase in oil prices compared to previous years (65.85 dollars per barrel compared to 28.5 dollars per barrel in 2000);
- The continued improvement of the average oil price in 2018 led to an increase in hydrocarbon revenues by 32.6% (22.2% in 2017), to reach 2887.1 billion dinars, compared to 2177.0 billion dinars in 2017, despite a decrease in the value added of the hydrocarbons sector by 6.4% compared to (- 2.4% in 2017);
- The ratio of Hydrocarbon revenue to the total budget revenues in 2018, increased to 42.8% compared to 36.0% in 2017, and the same observation can be made with regard to the

percentage of coverage of total budget expenditures by fuel revenues, which rose to 37.4% in 2018 compared to 29.9 % in 2017, while the rate was recorded at 76.88% in the year 2000. -We can observe the same situation with regard to covering current expenditures and capital expenditures. These developments reflect the various ratios of public finance, the high fragility of budget balances towards oil price fluctuations (a significant and significant decline between the years 2000 and 2018).

- In 2018, Non hydrocarbon revenue amounted to 3864.3 billion dinars, a very slight decrease of 0.17%, compared to 3870.9 billion dinars in 2017 compared to 364.9 billion dinars in 2000; Its share in the total budget revenues decreased from 64.0% in 2017 to 57.2% in 2018 after it was recorded at only 23.22% in 2000, due to its almost total stability and the rise in fuel revenues, between the years (2017-2018), and it finances only 50.0% of total expenditures, and +53.2% in 2017 compared to 30.97% in 2000, and it covers current expenditures only at 83.1% and 82.7% in 2017 compared to
- Only 42.61% in the year 2000, as for the year 2020, it decreased to 3719 billion dinars due to the Corona virus crisis and its significant effects on the decline in economic activity in general;
- Coverage rates for total and current expenditures were weaker during the years prior to 2016; That is from 35.7% and 59.1% in 2015, respectively; These rates did not rise until after the depreciation of the dinar in 2015 and 2016 against the dollar and the euro led to gaining significant profits in the exchange and, in the end, to exceptional profits paid by the Bank of Algeria to the public treasury (non-tax revenues).
- Despite recording an economic growth outside hydrocarbons (in volume) of 3.3%, tax revenues (outside hydrocarbons) have been almost stable (0.7%) by 2648.5 billion dinars in 2018 (2630.0 billion in 2017). This quasi-stability in tax revenues resulted from significant decreases in customs rights (-14.1%) and slight (-1.87%) in tax on income and profits. While the tax on goods and services increased by 7.1%.
- The slight decline in direct tax is entirely due to the decrease in corporate taxes (-8.4%); While the taxes on other incomes (wages and others) increased by 1.6 percent, as for the increase in the indirect tax, it resulted, by more than 70 percent, from the fee on petroleum products.

1-2- The evolution of budget expenditures during the period (2000-2020):

- Since the beginning of the 2000s, and in a circumstance characterized by a weak productive investment in the market sectors (excluding hydrocarbons, water, energy), and due to the significant rise in public expenditures, especially through their income, it constituted a catalyst for economic activity, and thus public spending appeared as an important channel in allocating the strong increase resources, mainly derived from the hydrocarbon sector (Bank of Algeria, 2018, p. 77), as for budget expenditures, they have been increasing continuously throughout the two decades; where the rate of increase amounted to 565% between the years 2000 and 2020;
- In terms of amounts, public expenditures in 2018 were estimated at 7726.3 billion dinars, compared to 4466.9 billion dinars in 2010 and 1178.1 billion in 2000, an increase of 85% between the years (2000-2018), and this rise in total expenditures resulted entirely from the sharp increase in capital expenditures by 89.5% during the period (2000-2020) as well.

- Relative to the gross domestic product, total expenditures decreased slightly in 2018, to 38.0%, compared to 39.2% in 2017, while in 2000, it was recorded at 28.74%.
- In the year 2018, the current expenditures were almost stable at 4648.3 billion dinars, compared to 4677.2 billion in 2017. In detail, the expenditures of employees and the pensions of the mujahedeen, as well as the support directed to hospitals and public institutions of an administrative nature and interests on the public debt, witnessed a slight decrease, while transfers increased Current increased by 13.8% to reach 1144.4 billion dinars.
- As for capital expenditures, after they fell sharply in 2016 (-10.8%), and more moderately in the following year (2017), where they recorded (-3.9%), we recorded an increase again in 2018 to reach 3078.0 billion dinars (+18.1%), This increase in processing expenses resulted exclusively from the increase in capital related operations (allocations to special accounts, interest rate subsidies, Payment of arrears, contribution to the budget of the Social Security Fund), which doubled by more than 8 times, moving from 64.0 billion dinars in 2017 AD to 528.6 billion in 2018, while the most important actual expenditures for equipment decreased by sector, these expenditures developed on as follows, and the table shows the evolution of the structure of total equipment expenditures (%) during the period (2014-2018):

Table No. (2) Structure of total equipment expenditures (%) during the period (2014-2018)

Statement / years	2014	2015	2016	2017	2018
Mines and energies	4.5	3.8	0.99	0.98	1.11
Electricity and gas distribution	4.5	3.8	0.99	0.98	1.11
Agriculture - Water Resources	11.6	10.0	8.7	10.44	6.29
Economic and Administrative Infrastructure	32.7	34.0	41.5	38.25	18.75
Education-Training	7.7	7.5	7.1	6.06	4.40
Social and Cultural Infrastructure	4.5	4.5	5.7	5.06	4.04
Living	17.1	20.3	16.5	20.33	15.24
Other expenses	16.3	13.1	12.9	8.34	29.05
capital operations	-	-	1.15	2.46	17.17

Source: (Bank of Algeria, 2018, p. 67)

- Agriculture and irrigation: a decrease of 28.9% (from 271.9 billion dinars in 2017 to 193.5 billion dinars in 2018);

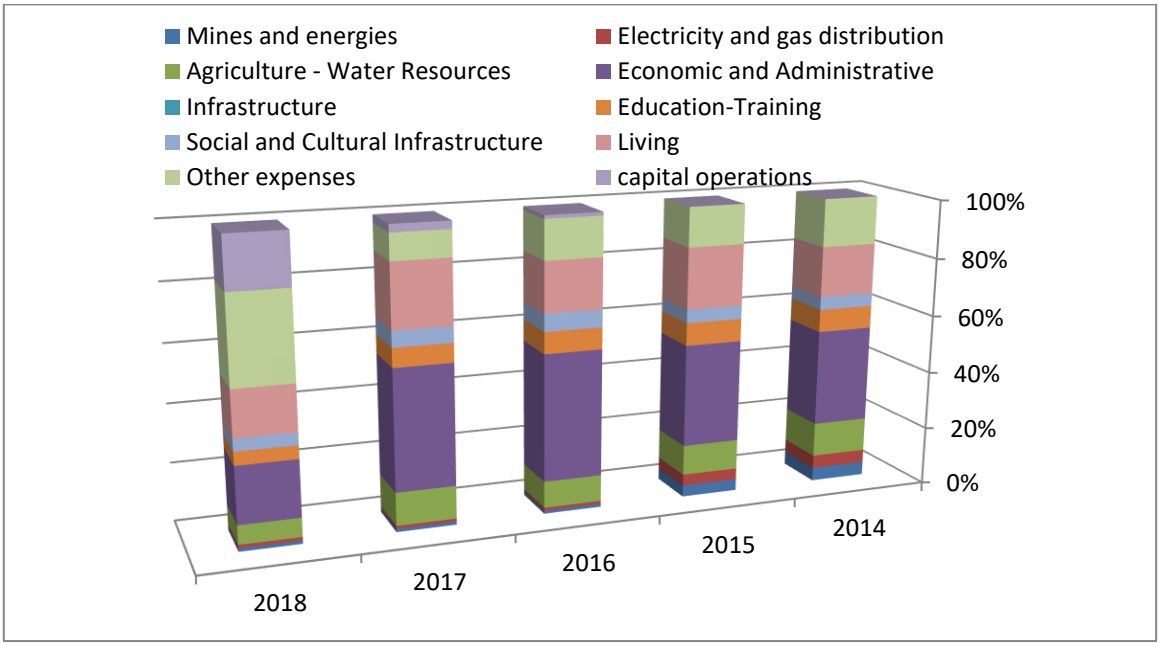
Infrastructure (economic and administrative): a decrease of 72.7% (996.5 billion dinars in 2017 to 135.3 billion dinars in 2018);

- Education and Training: a decrease of 14.3% (from 157.9 billion dinars in 2017 to 135.3 billion dinars in 2018);

Infrastructure (socio-cultural): a decrease of 5.6% to 124.3 billion dinars;

- Housing: a decrease to 469.2 billion dinars (-11.4%), representing 18.4% of the actual equipment expenditures;
- Various expenditures: a strong increase (181.8%) to reach 894.3 billion dinars.

Fig (2): Structure of total equipment expenditures (%) during the period (2014-2018)



Source: Table No.(2)

1-3- Funding capacity during the period (2000-2020):

- Regarding the balance deficit, it fluctuates during this period. A positive balance was recorded from 2000 until 2009, which recorded the first budget deficit (570.3 billion dinars) in the range of 7.1% of the total GDP, while 2010 recorded a decline in this budget deficit due to the significant increase in hydrocarbon revenues compared to public expenditures.
- This balance deficit continued to increase year after year until the year 2018; the budget deficit narrowed to 974.9 billion dinars (4.8% of the total GDP), compared to a deficit of 1234.8 billion dinars in 2017 (6.6% of the total GDP), which is less than the deficit recorded in 2014 (7.3%). This significant decrease in the budget deficit resulted from the increase in the total budget revenues, mainly hydrocarbon revenues and the profits of the Bank of Algeria, despite the increase in total expenditures:

The flow of public savings in 2018 (total revenues minus operating expenses) amounted to 2103.1 billion dinars, compared to 1370.7 billion dinars in 2017, which represents a saving of 31.2%, compared to 22.7% in 2017 and 10.3% in 2016;

- In 2018, this public saving financed the state's capital expenditures by 68.3%, compared to 52.6% in 2017, which resulted in a request for funding for the budget balance of 974.9 billion dinars.
- The worst rate recorded during the period related to the budget deficit in relation to the gross domestic product was recorded in 2015, and this is due to the significant decline in hydrocarbon revenues, mainly caused by the decline in oil prices in international markets (only 53.06$ per barrel as an annual average).

2-Granger's causal framework theory:

The GRANGER, C.W. (GRANGER, 1969, pp. 424-438) 1969 test of the causal relationship between two variables aims to reveal the existence and direction of this relationship through

Fisher's immediate test of the null hypothesis that states that the first variable does not cause the second variable, and that the second variable does not cause the first variable with a certain moral degree, as opposed to the following two alternative hypotheses: The first variable causes the second variable and the second variable causes the first variable, after estimating a model known as the "Vector Autoregressive Model" at a slowing point (P) and given as follows:

$$\begin{cases} Y_t = \alpha_0 + \alpha_1.Y_{t-1} + ... + \alpha_p.Y_{t-p} + \beta_1.X_{t-1} + ... + \beta_p.Y_{t-p} + \varepsilon_t \\ X_t = \alpha_0 + \alpha_1.X_{t-1} + ... + \alpha_p.X_{t-p} + \beta_1.Y_{t-1} + ... + \beta_p.Y_{t-p} + \varepsilon_t \end{cases}$$

2-1- Concept of Granger Causality: (Gourieroux & Alain , 1990, pp. 442-446)

We say about a random variable X that it causes a random variable Y if there is information in the past of X that is useful in predicting Y, and this information does not exist in the past of Y Whereas:

Causality applies only to random variables;

The past and the present can cause the future and the opposite is not possible.

If we denote the information contained in the past of the random context X and Y, respectively, as follows:

$$\tilde{X}_t = \{X_t, X_{t-1}, ...\}$$

$$\tilde{Y}_t = \{Y_t, Y_{t-1}, ...\}$$

We symbolize the error in predicting the reliance on available information as follows:

$$e(X/inf) = X - E(X/inf)$$

$$e(Y/inf) = X - E(Y/inf)$$

Granger relies on the variation of the prediction error $V_{[e]}$ to study causation, seeing that the weaker the variability, the better explained the variable, and accordingly distinguishing between four types of causation:

One-way causation: We say about X causes Y if the following swing is achieved:

$$V[e(Y_t / \tilde{Y}_{t-1}, \tilde{X}_{t-1})] < V[e(Y_t / \tilde{Y}_{t-1}]$$

That means X's past improves Y's prediction in moment t, which is better than just relying on Y's past.

Causality in both directions: means that X causes Y and Y causes X, and we have the following swings:

$$V[e(Y_t / \tilde{Y}_{t-1}, \tilde{X}_{t-1})] < V[e(Y_t / \tilde{Y}_{t-1}]$$

$$V[e(X_t / \tilde{Y}_{t-1}, \tilde{X}_{t-1})] < V[e(X_t / \tilde{Y}_{t-1}]$$

This means that X's past improves Y's prediction, and Y's past improves X's prediction.

Real-time causation means that the present value of X causes the present value of Y, and the next swing is achieved.

$$V[e(Y_t / \tilde{Y}_{t-1}, \tilde{X}_t)] < V[e(Y_t / \tilde{Y}_{t-1}, \tilde{X}_{t-1})]$$

Slowing causation (futures): The past values of X cause the present values of Y, hence the following swing is achieved:

$$V[e(Y_t / \tilde{Y}_{t-1}, \tilde{X}_{t-m})] < V[e(Y_t / \tilde{Y}_{t-1})]$$

2-2-Steps to conduct a causation test: (LARDIC & MIGNON, 2002, pp. 99-101)

- ✓ We estimate the following equation using the Ordinary Minor Squares (OLS) method:

$$Y_t = \Phi_1(B)Y_t + \Phi_2(B)X_t + \varepsilon; \text{Whereas}: \Phi_1(B) = \sum_{i=1}^{p} \phi_{1i}.B^i \quad \text{and} \Phi_2(B) = \sum_{i=1}^{p} \phi_{2i}.B^i \quad ;$$

Then we calculate the sum of the actual value deviations from the estimate and symbolize them SCR1;

- ✓ We estimate the next equation: $Y_t = \Phi_1(B).Y_t + \varepsilon_t$; Then we calculate the sum of the actual value deviations from the estimate and symbolize them SCR2;
- ✓ We calculate the test statistic F_C Whereas:.

$$F_C = \frac{(SCR2 - SCR1)/P}{SCR1/(M-N)}; \quad \text{Whereas } M = T - MAX(p,q) \;\; N = p + q + 2 \;\; :\text{و}$$

T: Number of views; P: Number of time slowdowns of internal variables;
q: Number of time slowdowns of external variables.

- ✓ We put the Null hypothesis H_0 that it X_t doesn't cause Y_t ,and then compare F_{cal} (calculated) with F_{tab} (tabular) at the level of significance $\alpha\%$ and accept the null hypothesis if: $F_c < F_{\alpha(P,(M-N))}$, We reject the null hypothesis if: $F_c \geq F_{\alpha(P,(M-N))}$

3-Applied study:

This study aims to analyze and measure the impact of Budget revenue and grants (BRG) and Total Budget Expenditures (BEXP) and their impact on Gross Domestic Product(GDP), and for the applied analysis of this effect, we will follow the following methodology:

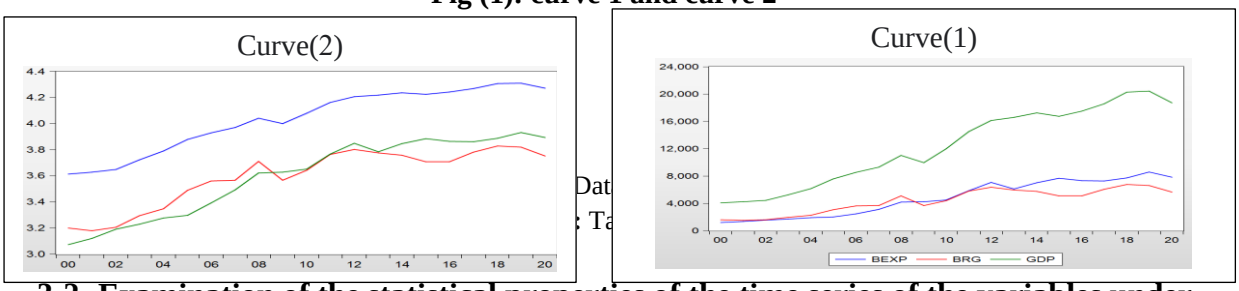
- In the first stage we will analyze the time series of the study variables based on the unit root test, and then in a second stage we test the existence of a long-term relationship between the two fiscal policy tools: total budget revenues and grants (BRG), budget expenditures (BEXP) and gross domestic product (GDP) on The methodology of joint integration, and in the third and final stage we move to identify and determine the direction of the relationship of the three variables on the other hand.

In our study, we relied on the annual data issued by official bodies: the Bank of Algeria, the World Bank, and the International Monetary Fund during the period (2000-2020).

3-1- Presentation of time series:

To study and analyze the impact of Budget revenue and grants and Total Budget Expenditures on Gross Domestic Product in Algeria between 2000 and 2020 from a statistical point of view, we applied the above-mentioned methodology, and by looking at a clear picture of the instability of the two series, but it does not show whether this instability is due to the presence of the unit root or not, and then we must test the unit root to find out the level of the series' inactivity as well as the degree of its integration (see curve (1) and the curve (2).

Fig (1): curve 1 and curve 2



3-2- Examination of the statistical properties of the time series of the variables under study:

Examining the statistical properties of the time series of the variables under study is the first and necessary methodological step in all applied studies that study the existence, pattern and direction of relationships between variables; As the test of co-integration and causation between the various variables requires knowing the level of the chain's inactivity as well as the degree of its integration.

In this study, we tested the stability of the time series of the variables under study, based on the Unit Root Test methodology; In order to test the existence of the unit root in a time series, there are many statistical tests that we relied on in our study on only two of them due to the quality of their results and their frequent use; They are: the Augmented Dickey-Fuller test: ADF. 1981) and the Phillips-Perron test: PP. 1988.

In this study, we will rely on the extended Dickey-Fuller test (ADF) and test the unit root null hypothesis (ie, the instability of time series).

Table No. (3) shows the results of unit root tests for the variables under study, budget revenues and grants Log(BRG) ,budget expenditures Log(BEXP) and gross domestic product Log(GDP), and it is clear from the table that the time series of all variables under study are not static in their levels, as That all the estimated values of (t) values using the (ADF) test are less than the tabular (critical) values in their absolute values, which means that they are not statistically significant, and therefore the null hypothesis that the variables under study are not at their levels is accepted, However, when calculating the first differences of these variables under study, we found them to have stabilized, and this is by using the (ADF) test, and this is either in the categorical model and a general trend or in the categorical model only; But after testing the significance of the parameter of the categorical model and the general trend, it turned out that it is not significant at the level of statistical significance $(\alpha = 5\%)$ Which means that the variables of our study: budget revenues and grants log(BRG) and budget expenditures log(BEXP) and gross domestic product log(GDP) are stable at the level of statistical significance and follow the categorical model as shown in table No.(3). from the above, it can be said that the unit root test by (ADF) test for the variables Budget

Revenue and Endowments log(BRG) and Budget Expenditures log(BEXP) and Gross Domestic Product log(GDP) proved to us that these variables are all unstable at the level, but they are stable at the first differences , means the possibility of rejecting the null hypothesis that the variables are not static in their levels and contain a unit root, which means that they

are integral of the first degree I(1), and this allows us to conduct co-integration tests between them.

Table No.(3): Unit root test for variables at current prices at the time-series level, as well as the first differences

	Properties	significance level and tests $\alpha\%$	INTERCEPT	TREND AND INTERCEPT	NONE
Variables	Critical Values ADF	$\alpha = 1\%$	-3.808546	-4.498307	-2.685718
		$\alpha = 5\%$	-3.020686	-3.658446	-1.959071
		$\alpha = 10\%$	-2.650413	-3.268973	-1.607456
LOG(GDP)	t . value	the level	-2.125062	-0.130564	3.644054
	t . value	first differences	-3.054805	-4.097829	-2.135068
LOG(BEXP)	t . value	the level	-2.052901	-0.427482	3.395295
	t . value	first differences	-3.506725	-4.354926	-0.895003
LOG(BRG)	t . value	the level	-1.762742	-1.179098	1.577586
	t . value	first differences	-4.283564	-3.801085	-3.744922

Source: Eviews version 7.1

3-3- Determining the number of Lag Inteval periods:

From the table and using the different criteria HQ, SC, AIC, FPE, LR, they indicate the need to take two time gaps in order to test the previous hypotheses. We will divide the tests into two parts; The first involves the application of the Granger causality test on the variables of the model to identify the nature of the causal relationship between the variables, and later we will measure the effect of the functional relationships of the variables. lag, which gives the best results is the fourth lag as follows:

Table No.(4): Choosing the number of slowdown times

VAR Lag Order Selection Criteria
Endogenous variables: LOG_GDP_ LOG_BRG_ LOG_BEXP_
Exogenous variables: C
Date: 01/17/22 Time: 13:43
Sample: 2000 2020
Included observations: 17

Lag	LogL	LR	FPE	AIC	SC	HQ
0	66.87679	NA	1.09e-07	-7.514916	-7.367878	-7.500300
1	114.5815	72.96008*	1.18e-09	-12.06841	-11.48026	-12.00994
2	120.5948	7.074528	1.91e-09	-11.71704	-10.68777	-11.61472
3	133.2660	10.43507	1.79e-09	-12.14894	-10.67856	-12.00278
4	158.0183	11.64815	7.15e-10*	-14.00215*	-12.09066*	-13.81215*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Eviews version 7.1

3-3- Testing the causal relationship between the gross domestic product, government spending and total revenue:

- Applying Granger's methodology to the relationship between gross domestic product log(GDP) and budget revenues and grants Log (BRG), and through Fisher's test (F), and after comparing F_{cal} (calculated) with F_{tab} (tabular), we find that: $[F_{cal} \geq F_{tab}]$ With probability $(p = 0.04)$, this means that there is a causal relationship It tends from $Log(GDP) \rightarrow Log(BRG)$ at the level of statistical significance of $(\alpha = 0.05)$. As for the inverse relationship that tends from $Log(BRG) \rightarrow Log(GDP)$, it is an unrealized relationship because $[F_{cal} < F_{tab}]$; where $(F_{cal} = 2.759)$ with probability $(p = 0.0977)$; That is, it is not statistically significant at the level of statistical significance of $(\alpha = 0.05)$.

-To test the causal relationship between Gross Domestic Product log(GDP) and budget expenditures log(BEXP), and after comparing F_{cal} (computed) with F_{tab} (tabular), we find that: $[F_{cal} < F_{tab}]$ With probability $(p = 0.143)$, this means that there is no causal relationship that goes from $Log(GDP) \rightarrow Log(BEXP)$ at the level of statistical significance of $(\alpha = 0.05)$, and the inverse relationship that goes from $Log(BEXP) \rightarrow Log(GDP)$ It is also unrealized because $[F_{cal} < F_{tab}]$ whereas $(F_{cal} = 1.29)$ with probability $(p = 0.305)$; That is, it is not statistically significant at the level of statistical significance $(\alpha = 0.05)$.

- When testing the causal relationship between budget revenues and endowments log(BRG) and budget expenditures log(BEXP), and through Fisher's test, and after comparing F_{cal} (calculated) with F_{tab} (tabular), we find that: $[F_{cal} < F_{tab}]$ With probability $(p = 0.143)$, this means that there is no causal relationship in trending from $Log(BRG) \rightarrow Log(BEXP)$ at the level of statistical significance $(\alpha = 0.05)$. As for the inverse relationship that is trending $Log(BEXP) \rightarrow Log(BRG)$ it is also not achieved because a statistic $[F_{cal} < F_{tab}]$ with a probability $(p = 0.555)$; That is not statistically significant at the level of statistical significance $(\alpha = 0.05)$.

Table No.(5): Granger's causality test

Pairwise Granger Causality Tests
Date: 01/17/22 Time: 13:55
Sample: 2000 2020
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG_BRG_ does not Granger Cause LOG_BEXP_	19	2.23994	0.1432
LOG_BEXP_ does not Granger Cause LOG_BRG_		0.61427	0.5550
LOG_GDP_ does not Granger Cause LOG_BEXP_	19	2.65192	0.1055
LOG_BEXP_ does not Granger Cause LOG_GDP_		1.29149	0.3057
LOG_GDP_ does not Granger Cause LOG_BRG_	19	3.98761	0.0426
LOG_BRG_ does not Granger Cause LOG_GDP_		2.75910	0.0977

Source: Eviews version 7.1

3-4- VAR Model Estimation:

Looking at the results of the causality test in Table (5), and the values of the criteria for determining the number of time lags in Table (4), and in order to reconcile them, we choose two time gaps when estimating the VAR model, as indicated by the previous criteria, and the following table (6) shows us VAR Model Estimation Results:

-We chose the first equation as the best model based on the results of the Akaike Information Criterion (AIC) criterion, which achieved the lowest value of (-3.72), as well as the Likelihood Log criterion that achieved the largest value of (42.37), and that the explanatory power of the model amounted to 98.34%, meaning that Changes in the explanatory variables were able to explain 98.34% of the changes in the gross domestic product (the dependent variable). (Table No.(6) Bellow).

- If we take the autoregressive vector with a degree of slowness (P=2) between the two variables, the raw internal product log(GDP) and the budget revenues and grants log (BRG), then we find the equation of the autoregressive vector model as follows:

VAR Model - Substituted Coefficients:

==========

LOG_GDP_ = 2.45109882003*LOG_GDP_(-1) - 1.36727651274*LOG_GDP_(-2) - 0.789277071521*LOG_BRG_(-1) + 0.621299672593*LOG_BRG_(-2) + 0.270697350758

LOG_BRG_ = 3.47373580575*LOG_GDP_(-1) - 2.92031943776*LOG_GDP_(-2) - 0.929207899189*LOG_BRG_(-1) + 1.228462369*LOG_BRG_(-2) + 0.251114992839

Source: Eviews version 7.1

-In the same work, we performed the autoregressive vector with a degree of slowing (P=2) between the two variables, the raw internal product log(GDP) and budget expenditures log(BEXP), and we found the equation of the autoregressive vector model as follows:

VAR Model - Substituted Coefficients:

==========

LOG_GDP_ = 1.030589018 41*LOG_GDP_(-1) - 0.316379391274*LOG_GDP_(-2) - 0.164825906883*LOG_BEXP_(-1) + 0.319487000707*LOG_BEXP_(-2) + 0.634738057941

LOG_BEXP_ = 0.689420083376*LOG_GDP_(-1) - 0.0938436211522*LOG_GDP_(-2) + 0.468373139886*LOG_BEXP_(-1) - 0.0269296959599*LOG_BEXP_(-2) - 0.357352292046

Source: Eviews version 7.1

Table No.(6): Estimated Coefficients of the VAR Model

Vector Autoregression Estimates
Date: 01/18/22 Time: 15:53
Sample (adjusted): 2002 2020
Included observations: 19 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LOG_GDP_	LOG_BRG_	LOG_BEXP_
LOG_GDP_(-1)	2.185650	3.435096	1.604130
	(0.76855)	(1.44593)	(1.04629)
	[2.84388]	[2.37570]	[1.53315]
LOG_GDP_(-2)	-1.330923	-2.790981	-1.048339
	(0.64620)	(1.21576)	(0.87974)
	[-2.05960]	[-2.29567]	[-1.19165]
LOG_BRG_(-1)	-0.608027	-0.833439	-0.454453
	(0.40278)	(0.75778)	(0.54834)
	[-1.50958]	[-1.09984]	[-0.82878]
LOG_BRG_(-2)	0.559381	1.206498	0.551120
	(0.31442)	(0.59155)	(0.42805)
	[1.77909]	[2.03957]	[1.28751]
LOG_BEXP_(-1)	-0.128376	-0.279601	0.462583
	(0.23677)	(0.44546)	(0.32234)
	[-0.54219]	[-0.62767]	[1.43507]
LOG_BEXP_(-2)	0.219646	0.140121	-0.049694
	(0.23234)	(0.43712)	(0.31630)
	[0.94538]	[0.32056]	[-0.15711]
C	0.447053	0.131891	-0.459900
	(0.33966)	(0.63904)	(0.46242)
	[1.31616]	[0.20639]	[-0.99456]
R-squared	0.983370	0.926744	0.980094
Adj. R-squared	0.975055	0.890116	0.970141
Sum sq. resids	0.012858	0.045512	0.023831
S.E. equation	0.032734	0.061584	0.044563
F-statistic	118.2626	25.30160	98.47327
Log likelihood	42.37348	30.36532	36.51181
Akaike AIC	-3.723524	-2.459507	-3.106506
Schwarz SC	-3.375573	-2.111556	-2.758555
Mean dependent	4.079158	3.635684	3.649737
S.D. dependent	0.207251	0.185782	0.257894

Determinant resid covariance (dof adj.)	7.94E-10
Determinant resid covariance	2.00E-10
Log likelihood	131.2819
Akaike information criterion	-11.60862
Schwarz criterion	-10.56477

Source: Eviews version 7.1

4-Results:

Through this study, we analyzed and measured the relationship between the gross domestic product log(GDP), budget revenues and grants log(BRG) and budget expenditures log (BEXP) in Algeria during the period (2000-2020); Where we touched on analyzing the process of its development during this period, and measuring the relationship between them through Granger's causal model Here are the main results:

- After the Algerian authorities adopted the first economic recovery plans (2001-2004) and the supplementary program to support growth (2005-2009), as well as the five-year program (2010-2014), it appears that the Algerian authorities intend to abandon the policies of pressure on aggregate demand according to the classic perspective of recovery policies. Demand and

supply improvement according to the Keynesian perspective by increasing public spending and then giving priority to reducing the unemployment rate while accepting a slightly high rate of inflation. Increasing public expenditures in order to consolidate national production did not have any effect that serves this perspective, and the reason for this is due to the weakness of the productive apparatus and its limited capabilities, which led to the absence of the impact of the government multiplier on economic growth in Algeria (weak growth rates compared to the huge allocations that exceeded 430 billion US dollars);

-These statistical results are consistent with the nature of the Algerian economy in general during the study (2000-2020)

- The study showed that the time series of the variables under study are all unstable at the level, but they are stable at the first differences;

- The statistical results of the Granger causal relationship test showed that there is a causal relationship in only one direction that goes from the raw GDP to the total budget revenue and grants at the level of statistical significance $(\alpha = 0.05)$, and the inverse relationship is not achieved.

5-suggestions:

The spending policy must be redirected by the authorities and directed to areas that encourage productivity growth and the exploitation of the resulting large financial boom (the huge exchange reserves) to stimulate and stimulate aggregate supply and encourage and direct government investment towards real production and achieving economic profitability;

Adjusting the tax policy and the Algerian tax system and its laws on the basis of tax justice and investing in Islamic jurisprudence tools through Islamic financing means such as zakat and endowments because they store an important financial proceeds instead of financing with loans, as well as to enable the government to have more effective tools to reduce tax evasion to control in prices and inflation;

-Work to modernize and strengthen the public and private industrial instrument, by providing the necessary regulatory conditions for a strong investment recovery, so that the growth recorded in these recent years, which is mainly driven by budget expenditures, helps to better benefit the national industry, which is what It requires directing the industrial strategy towards building and developing an intensive industrial fabric, based mainly on mobilizing internal savings and transferring it towards financing small and medium enterprises and financing large and structured industrial projects;

Rationalizing the various tax and customs exemptions in order to expand their base, as well as rationalizing the semi-generalized support for interest rates, which was not

has virtually no effect on private investment, in addition to its positive impact on public finances, these rationalizations will, in the end, lead to

To form a relative price structure that reflects the economic costs and will contribute to a more rational allocation of resources. This will expand

The scope of the marketed investment to include different activities and thus achieve profitability;

-On the public expenditure side, rationalization should include both operating expenses (user expenditures and current transfers) and processing expenditures in relation to user expenditures;

-The relationship between the development of labor productivity and wages must be the basis for the development of wages in the public office;
-Likewise, the high weight of these expenditures in the public service calls for rationalizing human resources management in most public administrations in terms of current transfers;
-Re-formulation of the funding pattern of local groups, which would reduce the costs of transferring to these groups and would involve the citizen more in local public life.
- Budget reforms should concern both tax revenues outside hydrocarbons and public expenditures, as these amendments are intended to reduce the financing needs of the public treasury for internal sources of financing, which reduces the resources available for financing institutions, and budget reform is a necessity to control inflation, as the amounts spent by a bank Algeria, within the framework of unconventional financing allocated to finance the investment program (FNI) and (AADL), and some amounts allocated to repay the public debt (CNAS/CNR) will be injected into the channels banking in the coming years.
-For processing costs; Particular attention should be paid to project completion deadlines, in order to avoid waste and additional costs and to follow standards in the field of cost control over benefits, social cost-effectiveness.

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7- Footnotes

[1] After independence, Algeria adopted a development strategy that relies on central planning as a means of economic planning, and on a capital-intensive public sector that constitutes the lion's share of economic activity. On the other hand, work on the gradual liberation of the mechanisms of dependency by establishing an economy that would expand human and financial capacity and solve the problem of employment.

[2] Among the most important reforms that the fiscal policy witnessed in the period after the year 2000 is the

Establishment of what is known as the Revenue Control Fund in accordance with the Supplementary Finance Law of the year 2000. A reference price for a barrel of oil, and this fund was established to meet any emergency that occurs on changes in oil prices in international markets, as well as to avoid external sources of borrowing with high costs.

[3] One of the most important reforms that the fiscal policy witnessed in the period after the year 2000 is the establishment of what is known as the Revenue Control Fund in accordance with the Supplementary Finance Law of 2000. As a reference for the oil barrel, this fund was established to meet any emergency that occurs on oil price changes in international markets, as well as to avoid high-cost external sources of borrowing.