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Impact of inflation on Economic growth - Standard Study - Algeria (1990-2018)

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Abstract :

The study aims to demonstrate the impact of inflation on Algerian economic growth through a standard study based on annual data for the period from 1990 to 2018 It has been relied upon by economic variants: The rate of per capita GDP growth as a dependent variable represents economic growth and the rate of inflation measured by the consumer price index representing the independent variable.

The results indicate that the fixed impact model is relevant to the study, and we have found a long-term, negative impact of the inflation index on the growth rate, and a long term, one-way causal relationship, based on the experience of common integration and causality.

Key words: *economic growth, inflation, the joint integration, Causality, time series , Algeria*

JEL classification codes: *O1*, *E31*, *C32*, *G22*, *C22.*

الملخص :

تهدف الدراسة إلى توضيح تأثير التضخم على النمو الاقتصادي الجزائري من خلال دراسة معيارية تستند إلى بيانات سنوية عن الفترة من 1990 إلى 2018، وقد اعتمدت عليها المتغيرات الاقتصادية: ويمثل معدل نمو نصيب الفرد من الناتج المحلي الإجمالي كمتغير يعتمد عليه النمو الاقتصادي ومعدل التضخم الذي يقاس بمؤشر أسعار المستهلك الذي يمثل المتغير المستقل.

تشير النتائج إلى أن نموذج التأثير الثابت ذو صلة بالدراسة، ولقد وجدنا تأثيراً سلبياً وطويل الأجل لمؤشر التضخم على معدل النمو، وعلاقة سببية طويلة الأجل أحادية الاتجاه، استناداً إلى تجربة التكامل المشترك والعلاقة السببية.

الكلمات المفتاحية:*النمو الاقتصادي، التضخم ،التكامل المشترك ، العلاقة السببية، السلسلة الزمنية الجزائر*

تصنيف JEL: *O1، E31، C32، G22، C22.*

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1. Introduction:

Economic growth and inflation are among the most important topics that have preoccupied economists in different countries of the world, including Algeria, considering economic growth as an important tool for measuring their development, and inflation is one of the most important effects of economic growth, so we can ask the following question: What is the impact of inflation on the economic growth of Algeria?

To answer this problem, we have formulated the following assumptions:

- There is long-term statistical relationship between inflation and economic growth in Algeria.
- There is a direct correlation of the impact of inflation on economic growth.
- The relationship between inflation and economic growth is a two-way relationship.

The study aimed at demonstrating the importance of both the inflation and economic growth phenomena in Algeria, and determining the impact of inflation on growth and the nature of the relationship they have with standard analysis using time-series models.

We have adopted in our study on the descriptive analytical approach in the theoretical side of the study, and the quantitative approach in the standard study through time-series models using the study tools which consisted of: Excel, Eviews

Among the most important studies in this topic are:

Study: Fawaz Jarallah, Haitham Akram said : "the impact of stagnant inflation on Economic growth in developing countries, future Research magazine, 25th issue, Iraq, 2009, The study aimed to illustrate the path of inflation in developing countries, and the extent to which this variable is related to economic growth, the study concluded that the stagnant inflation at the beginning was not a positive impact on economic growth in the countries of the study sample, which consisted in developing countries in Latin America, The vulnerability was at decreasing rates.

Study: Ali Yusefat: Inflation and growth in Algeria: Researcher magazine, No. 11, University of kasdi merbah, Ouargla, 2012; The study aims at knowing the relationship between inflation and

economic growth in Algeria during the period 1970-2009, using the Khan and Senhadji model to set the inflation threshold , The result of the study was that the inflation threshold in Algeria is 6% and inflation rates that exceeded this limit may cause damages to the Algerian economy.

Study: Mahassin osman hadj noor : Impact Of The Cash Supply On Inflation Rates In The Sudan For The Period From2010-2018, Financial Economic Research Journal ,number6, university of oum el-bouaghi, Algeria, 2016, The Study Aimed To Learn The Impact Of The Cash Supply On Inflation Rates In Sudan For The Period From 2010-2018، knowledge Of The Basic Concepts Of The Cash Supply And Inflation Rates And Of Their Relationship. Following The Analytical Descriptive Approach To The Hypotheses Of The Study That There Is A Statistically Significant Relationship Between Cash Supply And Inflation Rates. There Is A Statistically Significant Relationship Between The Cost Of Financing And Inflation Rates. The Study Found A Number Of Results, Including A Direct Correlation Between The Money Supply And The Inflation Rate،the More Money Offered, The Higher The Inflation Rate. The 80.6 Changes In The Rate Of Inflation Caused By The Change In The Money Supply, The Cost Of Financing. The Study Concluded With Recommendations, Including The Need To Reduce The Cash Supply To Reduce Inflation. Work To Increase The Reserve Ratio To Reduce The Cash Supply Thereby Reducing Inflation.

Study: safir mohammed, moulai boualam: Inflation and Economic Growth in Algeria - A Standard Study – ecomomic secience, management and commercialscience review, Mohamed boudiaf university of m'sila, number 2, 2008, The study aims to build a model of economic measurement of the relationship between inflation and economic growth in Algeria. In theory, the inflation index may have a positive or negative relationship with the index of economic growth depending on the results and effects of the followed economic policy. In the case of the Algerian economy, we found a positive correlation between the rate of inflation and economic growth, which means that the inflation rate positively affects economic growth in Algeria. Changes in the rate of economic growth are often due to the dynamic growth of the hydrocarbon

sector, particularly related to the evolution of the global market. As a result, the positive environmental development affecting the oil and gas sector often results in higher wages and investment allocations in other sectors of activity, offset by increased imports to answer to the increase in demand.

2. General entrance to the economic growth and inflation:

2.1. Definition of economic growth: There are a range of definitions of economic growth, including:

Economic growth is defined as: "The increase in GDP, usually the result of a combination of population growth and increased production for individuals, so any increase in GDP is usually accompanied by economic growth known as the process of rising GDP per capita**. (Mohareb , 2012:p148)**

And know that: the expansion in real output or expansion in income per capita real gross domestic product (GDP), and thus reduce the burden of the resources and generate the gross national product, which bears the face of the economic problems. **(Khalifa , 2001:p10)**

Economic growth is also defined as a continuous increase in the average real per capita income, with the passage of time.

Average per capita income = national product/population

That is, it refers to the average per capita gross domestic income of society, which means:

Economic growth rate = GDP growth rate - Population growth rate.

Consequently, this rate will be positive only if the rate of growth of GDP is greater than the rate of population growth. **(Atia, 2003:p10)**

2.2.Types of economic growth:

Economists distinguish three types of economic growth, which are **(Herbi , 2013:p134):**

Automatic growth: which happens automatically without any economic plan, without State intervention, but emanates from strong self-any efforts of the private sector, or economic institutions at the level of the capitalist states.

Transit growth: It is marked by the demise and instability, due to external factors that are being created and soon will be accompanied by the demise of growth, especially in developing countries and Arab oil countries, whose investments are rising with high oil prices and their investments are falling as oil prices fall.

Planned growth: It is the result of a comprehensive planning process for the resources and requirements of society, called comprehensive national planning for all sectors, and the Government has a central role in this type of growth in the socialist countries, i.e. based on the policy of collective ownership of the means of production. Here comes the importance of economic and social justice in the country, and the success of this pattern depends on the ability of planners and realistic plans and effectiveness of implementation and follow-up and participation by the masses of the people in the planning process and at all levels.

2.3.Determinants of economic growth:

There are several key factors that affect the growth process, the most important of which are **(Ouel, 2014:p10):**

Savings, physical and human capital. Many applied studies and research indicate that savings and material investment are positively and morally linked to the growth rate, and human capital levels play an important role as determinates of individual internal growth.

Public expenditure: recent studies confirmed that public investment in infrastructure in transport and communications was a positive moral effect on growth.

Inflation and macroeconomic instability: Empirical research has addressed the impact of inflation and macroeconomic stability on long- and short-term growth and has revealed a negative relationship between inflation and economic growth, as inflation reflects government's loss of macroeconomic monitoring and monitoring.

Openness and external exchange. Many studies have suggested that trade openness has a positive impact on economic growth, and have concluded that more open economies grow more rapidly than other economies.

3.Definition of inflation:

Inflation means any increase in monetary trading that results in an increase in effective aggregate demand over the aggregate supply of goods and services over a certain period of time leading to an increase in the overall price level. **(Alan, 1997 :p468)**

The quantitative theory suggests that there is a relative relationship between the amount of money in circulation and the price levels, therefore, inflation is a function of changes in monetary supply. **(Samuels, 2000:p16)**

3.1.Types of inflation: Economists often distinguish between three types of inflation:

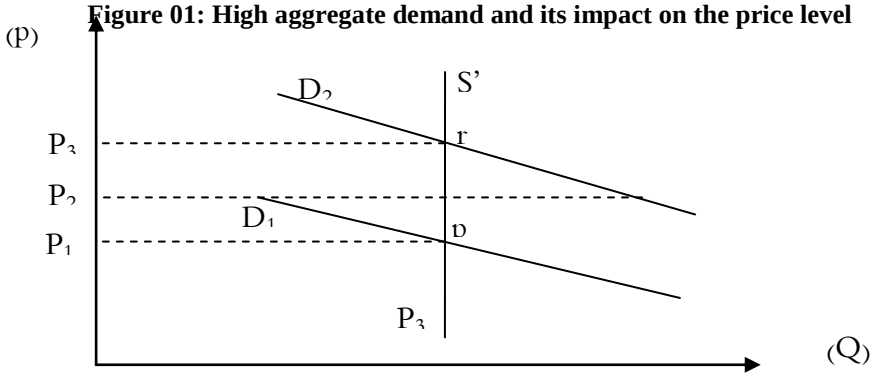
Moderate inflation: Moderate inflation is characterized by slow, predictable prices, and can be defined as a one-digit annual inflation rate, when prices are relatively stable, people trust money because their value after months or six will remain the same as it is today , People are willing to link to long-term cash contracts because they are confident that the prices and costs of the goods they buy or sell will not far from their current situation.**(hishem, 2006:p611)**

Rapid inflation: two or three-digit inflation, 50, 100 or 200 percent, classified as rapid inflation, and when rapid inflation increases, serious economic deviations occur, Contracts are generally regulated by a special price index or linked to a stable foreign currency, such as the dollar, and in such cases cash is quickly lost, so people keep only the least money needed for daily transactions, While financial markets wither away capital, people start storing goods, buying homes, and not lend money at rock-bottom interest rates at all. **(hishem, 2006:p612)**

Unbridled inflation: It is inflation, with a rise in the general price level exceeding 50% per month, This rate is slightly higher than 1% per day, and this rate represents that the general price level doubles more than 100 times per year only, and more than 2 million times in three years. **(Gregory N , 2012:p152)**

3.2.Causes of inflation: Among the most important causes of inflation are, High aggregate demand and low aggregate supply: The increasing demand for various goods and services increases their prices, which contributes to a certain degree to the high rate of inflation, as indicated in the following format:

Figure 01: High aggregate demand and its impact on the price level



Source: (National Institute of Planning and Statistics, 1999)

Through the figure, the line (SS'), which represents the quantities displayed and which are fixed, is for the lack of production flexibility in the case of full operation, and if line D1 is the quantities required, point P is the point of balance, When the demand curve is moved from D1 to D2, the inflationary gap that reflects the excess of overhead on aggregate supply .

Increase of monetary mass: The monetary mass contributes to the growth of the inflationary gap, The rise in prices results from the increase in income associated with the increase in the amount of cash and the speed of its turn, In addition, increasing the amount of money contributes to reducing the interest rate, which in turn contributes to the rise in investment and thus unwelcome rise in aggregate demand, which is considered one of the causes of the inflationary gap. **(Chemri, 1994:p391)**

High productivity costs: Inflation by theory is due to factors that affect the cost of production by affecting the cost of production components, Inflation, it is seen, is due to institutional, non-monetary factors related to the structural structure of the economy and the uneven evolution of its sectors, as well as to the conflict over the distribution of wealth and its implications for the cost of production components and thus at the general price level. **(Abd el-alaoui, 2007:p96)**

3.3.Impact of inflation on economic growth:

Inflation is one of the key instruments that can contribute to economic growth, although the views differ on the relationship between inflation and economic growth, However, it has not been conclusively resolved about the effects that varying inflationary rates can have on the form of uneven economic growth rates as well, with different effects on the standard of living of individuals. **(Hafid, 2012:p31)**

The theoretical analyzes and empirical studies of the relationship between inflation and economic growth have shown three major outcomes:

- There is no moral relationship between inflation and real output growth, as the theory of demand withdrawal emphasized in classical theory.

- The existence of a positive relationship between inflation and the rate of economic growth, known as the Tupin effect (1965).
- There is a negative relationship between inflation and GDP growth, known as the anti effects of Tupin..

Despite different views on the relationship between inflation and economic growth, However, it has not been conclusively resolved about the effects that varying inflationary rates can have on the form of uneven economic growth rates as well, with different effects on the standard of living of individuals. **(El-machhedan, 2013:p81)**

4.Methods and Materials:

4.1. Study variables:

The variables used to estimate the model can be defined as follows:

a.Dependent variable: Economic growth:

Per capita income is the most widely used and honest measure of economic growth in most countries of the world, as it is the basis for measuring economic growth. **(Toumi , 1999:p37)**

The World Bank projected 1.9% growth in the Algerian economy in 2020, up 0.2 points from its recent forecast, indicating a 1.5% rise in domestic crude output in 2018.

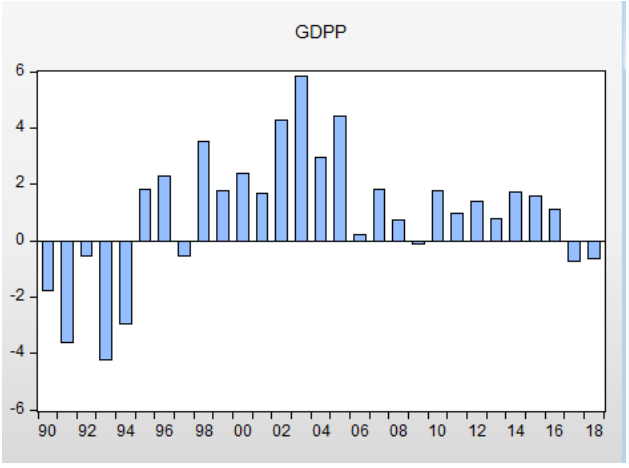
In its recent report on the follow-up to the economic situation in Algeria (October 2019), the World Bank reported growth in Algerian domestic crude output by 1.5% in 2018 versus 1.4% in 2017.

This growth remained at 1.5% during the first trio of 2019, mainly due to the "slow" growth of the fuel sector in addition to the contraction of economic activity, which led to the decline of growth in sectors outside of fuels. "The growth of the fuel sector has been slow, with economic activity having shrunk by 6.5%, 7.7% in 2018 and 3.9% during the first trio of 2019," the World Bank said.

By contrast, investments rose by 4.9% during the first trio of 2019, according to the report, which indicated that a "significant development" was recorded compared to 0.2% recorded during the first trio of 2018. This development recorded during the first triplet of 2019 is due to public investments in the construction, public works and irrigation sectors as social housing programs are expanded according to the World Bank. The sectors of commercial services, industry, construction, public works and agriculture continue to drive growth outside of fuels at an increase of 5.6%, 4.6%, 3% and 2.7% during the first trio of 2019. **(news, 2019)**

The following is a curve for the evolution of Algeria's average per capita GDP between 1990-2018.

Figure 02: A curve in the evolution of Algeria's average per capita GDP between 1990-2018.



Source: Prepared by researchers based on World Bank data - Annex 1

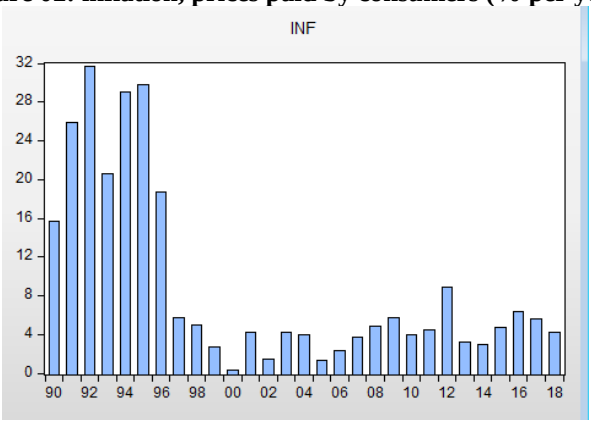
In this way, we find that average per capita GDP has been a growth fluctuation, as it saw a decline in the early 1990s to below zero, which rose from the beginning of 2000 and is known as a rise of 5.84%, the highest value recorded in 2003. He then subdued back to -0.62% in 2018, after the country's economic and political volatility.

b.Independent variable: Inflation:

The process of measuring the phenomenon of inflation in the Algerian economy depends on measuring changes in price levels, i.e. using price indices known as the CPI, the main inflation index, or the rate of price change in a given country. CPI reports show the change in the index, which measures the total price of a specific commodity of products and maids that the public usually buys, The CPI is also called the cost-of-living index, based on the use of a particular year of comparison called the base year, where developments in money and prices are compared to the base year, and the indices are time figures because they reflect changes in price levels over a given period of time. **(bouri, 2013:p119)**

The next is a graph of inflation in Algeria from 1990 to 2018.

Figure 02: inflation, prices paid by consumers (% per year)



Source: Prepared by researchers based on World Bank Data - Annex 2

It is clear that inflation rates were very high in the 1990s, which were characterized by economic reforms, as the inflation rate reached its highest rate in 1992 by 31.67%, because of the price liberalization on the one hand and Algeria's application of all the provisions of the IMF agreement on the other. This would be a drop of 0.34% in 2000, the lowest rate of inflation in Algeria, due to the measures taken by Algeria and the strict operation of the monetary bloc, However, at the beginning of the second decade of reforms, inflation rose to its highest level in 2012 by 8.89%, which is due to the fiscal policy of the economic recovery program as well as the rise in foodstuffs in the international markets, which negatively affected the record of consumption. To bring down inflation in 2018, to 4.27%, compared to 5.59% in 2017.

According to the World Bank report, Breton Woods said that the arrest of heads of institutions for their involvement in corruption cases has created "disturbance" in the Algerian economy, and regarding the current account deficit, it is supposed to reach 8.1 % of the raw internal output. This is mainly due to a significant trade deficit as expected by the bank. However, "the recent discovery of a

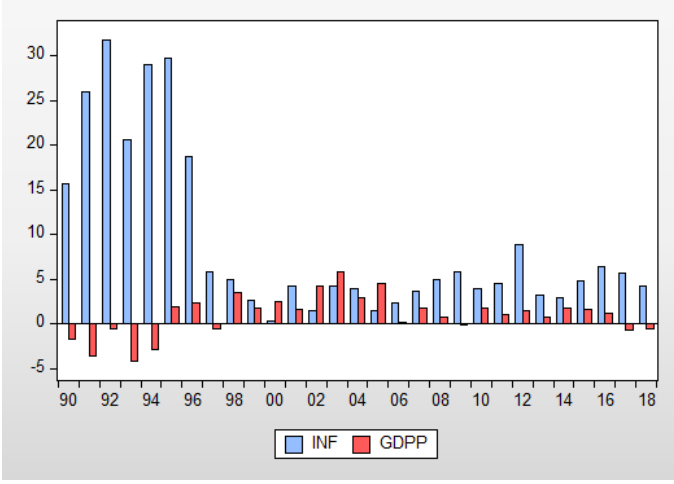
new gas field suggests a rise in gas production and export", according to the report.

In terms of inflation, the World Bank believes that it remained stable at 4.3% in 2018, but fell to 4.1% at the end of March 2019. This is "despite the expansionary monetary policy pursued under the CBE's unconventional financing procedures, which represent 32% of the crude internal output, half of which was injected into the economy".

The World Bank, which said that "the Algerian economy remains heavily dependent on fuel and the international oil and gas prices", called for devoting the fiscal policy on the operational level in the medium term with the aim of protecting the economy from oil prices fluctuation. (news, 2019)

The following figure shows the effects of inflation on Algerian economic growth in 1990-2018.

Figure 03: Evolution of inflation rates and economic growth in Algeria (1990-2018).



Source: Prepared by researchers based on World Bank Data - Annex 3.

The author of the article in this section explains clearly how to select the sample, determine the variables and how to measure them, how to collect the data and describe how the data are summarized (average, percentage, …), Statistical and standard tools used in data analysis, hypothesis testing and statistical significance. Sometimes it may be necessary to mention the programs used in the calculation.

When using a method previously used and published by another researcher, must be referred to as marginalization without being re-described, Though There are changes in the method, which must be explained and explained[1].

These methods and tools must be presented precisely and clearly without exaggeration so that other researchers can re-examine or verify them. The author can describe the tools and methods used in the form of a scheme, table or diagram to explain methods used[2], This section is divided into sub-sections, where its contents vary according to the subject matter of the article.

5. Results and discussion :

5.1. Testing the extrapolation of time series for study variables:

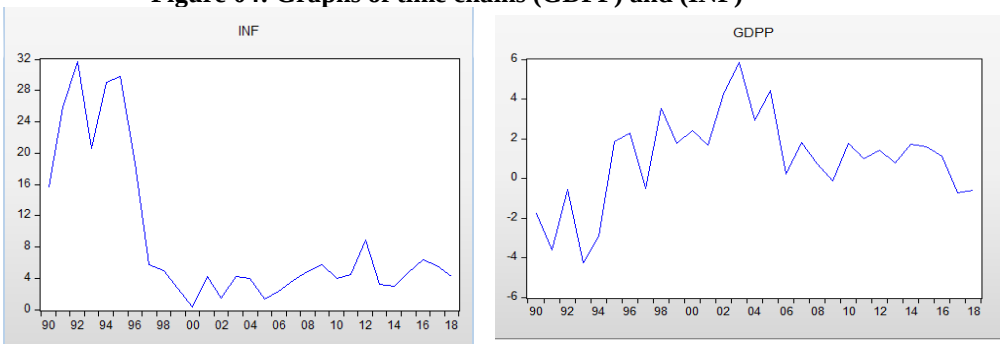
The unit root tests are fundamental to dynamic time series analysis, where you are interested in determining the degree of integrity (recursive) of the time series of the variables for the study model, so that the string (YT) is stable when you are not experiencing a unit root problem. Among the most notable tests are the advanced test of Dickey Fular (ADF) and Philip Peron (PP), and the main hypotheses in these tests are the following:

H0: The time series has a unit root problem.

H1: The time chain is not experiencing the unit root problem.

Graphs of time series of study variables:

Figure 04: Graphs of time chains (GDPP) and (INF)



Source: Prepared by researchers based on E-Views 9.

Previous graphs show that time series are not stable (sleep) at the level, either because they have a general trend in each other, or do not fluctuate within a constant average. Statistical tests can confirm the individual grade of each series that determines whether or not the time series in question is silent. (See Annex 1 and 2)

Results of the time Series Sleep Tests (GDPP): The resulting table shows the results of the series Sleep Tests (GDPP) and through the results of the unit root tests the series (GDPP) is stable first Class (I(1)).

Table No. 01: Module root Tests for Series (GDPP) Results:

Serie	Test		Level		1st difference		Résult
			intercept	Trend and intercept	intercept	Trend and intercept	
GDPP	ADF	t-statistic	-2.891746	-2.747630	-8.289984	-8.618048	I(1)
		prob	0.0590	0.2268	0.0000	0.0000	
	PP	t-statistic	-2.807617	-2.665572	-8.823526	-10.28039	I(1)
		prob	0.07	0.2570	0.0000	0.0000	

Source: Prepared by researchers based on E-Views 9.

Results of the time Series Sleep Tests (INF): The resulting table shows the results of the series Sleep Tests (INF) and through the results of the unit root tests the series (INF) is stable first Class (I(1)).

Table 02: Results of Unit root Tests for series (INF):

Serie	Test		Level		1st difference		Résult
			Intercept	Trend and intercept	intercept	Trend and intercept	
INF	ADF	t-statistic	-1.492260	-1.873598	-5.420163	-0.422164	I(1)
		Prob	0.5227	0.6412	0.0001	0.0008	
	PP	t-statistic	-1.492322	-2.049899	-5.547109	-5.722964	I(1)
		Prob	0.5227	0.5499	0.0001	0.0004	

Source: Prepared by researchers based on E-Views 9.

Through the results obtained from tables 1 and 2, we can judge that time chains are not at the level and therefore accept the test hypothesis (chains have a unit root problem). Sleep tests (ADF) and (PP) showed that all time series (GDPP) and (INF) suffered from the

unit root problem because the calculated T-static values are less than tabular values, and are not significant, whether the weighted model is fixed or fixed and time-bound

When taking the first differences of these chains, they become stable, as the test results indicate that the test hypothesis is rejected and that the alternative hypothesis (there is no unit root problem in the first series of differences) is accepted, and it is significant whether it includes only the fixed or fixed model and the time trend together. Time series can therefore be considered as first-class integral (I(1)).

5.2. Testing common integration:

The idea of common integration mimics a long-term equilibrium that is the basis of the economic system, and that one of the most important standard approaches used to test the common integration of time series is:

- Granger's methodology
- Johansen and Juselius methodology

The Angel-Granger methodology is one of the most important methods used in testing common integration, relying on a zero-hypothesis test.

H0: There is no common integration between variables, by estimating the slope of one variable over the other using the normal least squares method, and then testing the unit root in the chain of the filter. If the chain of protection has an unstable root, the zero hypothesis can be accepted, there is no common integration in the equation, and in the case of the contrary, the alternative hypothesis that there is a common integration relationship between the two variables is accepted.

First severity: These include estimating the decline in co-integration through the long-term relationship between the XT and YT using the (OLS)method.

$Y_t=B_0+B_1X_t+e_t$ ……..

Provided that the variables are of the same degree and are verified, the series in question are first-class integrated (I(1)).

The stability of the Protector (ET) is tested if the hypothesis of lentil (H0:B=0) is accepted: As shown in Table 03.

The results of the sleep tests for the time series of the Protector (U): The following table shows the results of the sleep tests for the

series (U) and through the results of the unit root tests, the series (U) is stable first degree (I(1)).

Table No. 03: U root test results:

Serie	Test		Level			Résult
			intercept	Trend and intercept	None	
U	ADF	t-statistic	-4.320114	-4.362943	-4.398395	LEVEL
		prob	0.0021	0.0091	0.0001	

Source: Prepared by researchers based on E-Views 9.

With results from Table 03, we can judge the silence of the time series at the level and therefore not accept the test hypothesis (the series has a unit root problem), since the ADF tests showed that the calculated T-static values are greater than the tabular values. It is intended to be either fixed-only or fixed-time-bound form and time-direction.

Therefore, the time chain of the guard can be considered stable at the level. (See Annex 3.)

Therefore, there is a common integration between the time series variables (GDPP) and (INF) in the model, meaning that the time series in question have a balanced relationship over the long term, and according to the usual least squares method the following equation is estimated. From E-Views 9 and Annex (04), the model equation is as follows:

GDPP = 2.18 - 0.14*INF

Step 2: Correct the ECM error form:

The model is estimated if two variables (XT and YT) are mutually complementary to demonstrate the relationship in the short term and then we introduce the estimated residuals in the long-term slope as a single-term independant variable in the short-term relationship model along with the differences for other variables that are unstable as in the following equation:

$$\Delta y_t = \alpha_1 \Delta x_1 + \alpha_2 e_{t-1} + e_t$$

The results shown in Appendix 05 show that the GDPP coefficient is significant at 0.0072 and is less than the relevant level 5% and therefore there is a relationship between the short-term study variables and its coefficient is negative at -0.70 so there is a relationship between the dependant variable (GDPP) and the independant variable (INF) in the long term.

Also given the value of F, which is significant at 0.011, which is less than 0.05, there is a relationship between the study variables and we can extract the error correction equation as follows:

DGDPP = 0.078 - 0.045*DINF - 0.70*U(-1)

5.3 Testing standard problems for simple linear regression:

The following tests are performed:

a.Test the normal distribution of the guard (Histogram-Normality test):

Through Appendix 07 we notice that the probability value is 0.58 greater than the level of morale 0.05 so that the residue is distributed naturally, and we can see this through the graphs as well.

b.Contrast Test (Heteroskedasticity test): By adopting Arch testing, we note that the probability value is 0.75 and is greater than the level of morale 0.05 as shown in Appendix 08, so we accept the equation of nihilism that there are no standard problems with the model being studied and the model is not experiencing a problem of variability

c.Self-correlation Test (LM): With Appendix 09, Fisher's probability value and the probability value of the LM test were 0.39 and 0.33 respectively, which is greater than the value of morale 0.05 so we accept the hypothesis of nihilism and what confirms that the result of normal minor squares was correct.

5.4. Causation test:

The Granger model is used in most time series studies and the causal relationship between economic variables is called the change in current and past values of a variable that causes change in another variable, and to determine the direction of the causal relationship between study variables must:

First determine the degree of VAR delay, based on the Akaike and Schwatz criteria and using E-Views9, we found that the delay is 2 for the two straight-line (GDPP) and (INF) as shown in Appendix 06, We test the causal relationship by testing the numerical hypothesis that there is no causal or short-term effect between GDPP and INF represented by the self-regression by estimating the model equation, and table 04 summarizes the test results:

Table No. 04: Results of Garinger's test of causation for the two variables

Null Hypothesis :	F-Statistic	Prob
DGDPP does not Granger Cause DINF	3.51230	0.0483
DINF does not Granger Cause DGDPP	0.94317	0.4053

Source: Prepared by researchers based on E-Views 9.

We accept causality if the corresponding probability value (Prob) is less than 0.05, so note from the table that the first difference (dinf) does not cause the first difference (DGDPP) because the probability level is 0.40 greater than the level of morale 0.05. We note that the difference (DGDPP) causes or affects difference (DIF) because the probability level 0.048 is less than the level of morale 0.05.

Thus, we can say that: The test of causation concludes that growth affects inflation in the short term and that inflation does not affect growth in the short term.

6. Conclusion:

The phenomenon of economic growth is one of the most important phenomena that countries, including Algeria, seek to overcome obstacles, and among the most important obstacles is the phenomenon of inflation, which we exposed to in this study, as we presented the phenomenon of economic growth, its types and determinants, as well as the nature of inflation, its causes and its effect on the economic growth in the theoretical aspect. The practical side used statistical methods in time series data, presentation of their results and discussion, which enabled us to produce the following results:

- The study found a negative mental effect of inflation on economic growth in Algeria.
  The results of the joint integration tests have shown a long-term relationship between the inflation rate and Algeria's economic growth in 1990-2018, underscoring the first hypothesis.
- The results of the standard study have also shown that there is no correlation between the impact of inflation on Algerian economic growth.
- The relationship between inflation and Algeria's economic growth between 1990 and 2018 is one-way only, as rising economic growth enables the state to specialize in the production and export of goods and services, leading to a rise in the growth rate, which in turn affects the level of inflation Through the country’s monetary-policy instruments, this denies the latter hypothesis.

We can also see the following perspectives:

- Expansion of the sample of the study to include neighboring countries such as Tunisia, Morocco and developing countries.
- Standard study of the impact of economic growth on Algeria's inflation and unemployment.
- Study of the impact of the determinants of economic growth in the Arab countries.
  A standard study on the impact of macroeconomic variables on the monetary policy of Arab countries.

Comparing the results of this study with the studies based on it, we found that:

- The absence of a direct relationship between inflation and Algerian economic growth, unlike the study of inflation and economic growth in Algeria by saffir Mohamed.
- Inflation did not positively affect economic growth in a study: The impact of stagflation on economic growth in developing countries by fouaz djar Allah and haithem said is confirmed by our study.

- Appendices:

Annex No. 1: Growth in GDP per capita (% per year) - Algeria from 1990 to 2018

Year	GDPP	Year	GDPP	Year	GDPP	Year	GDPP
1990	-1,75	1997	-0,52	2004	2,93	2011	0,98
1991	-3,6	1998	3,53	2005	4,44	2012	1,4
1992	-0,56	1999	1,75	2006	0,21	2013	0,76
1993	-4,25	2000	2,4	2007	1,81	2014	1,71
1994	-2,93	2001	1,66	2008	0,74	2015	1,6
1995	1,84	2002	4,26	2009	-0,13	2016	1,1
1996	2,29	2003	5,84	2010	1,75	2017	-0,75
						2018	-0,62

Source : world bank data:
https://data.albankaldawli.org/indicator/NY.GDP.PCAP.KD.ZG?end=2018&locations=DZ&start=1990

Annex No. 2:Inflation, prices paid by consumers (% per year) - Algeria from 1990-2018

Year	INF	Year	INF	Year	INF	Year	INF
1990	15,65	1997	5,73	2004	3,96	2011	4,52
1991	25,89	1998	4,95	2005	1,38	2012	8,89
1992	31,67	1999	2,65	2006	2,31	2013	3,25
1993	20,54	2000	0,34	2007	3,68	2014	2,92
1994	29,05	2001	4,23	2008	4,86	2015	4,78
1995	29,78	2002	1,42	2009	5,74	2016	6,4

1996	18,68	2003	4,27	2010	3,91	2017	5,59
						2018	4,27

Source : world bank data:
https://data.albankaldawli.org/indicator/FP.CPI.TOTL.ZG?end=2018&locations=DZ&start=1990

Annex 03: The Protective Table for the original Model

Modified: 1990 2018 // makeresids u

1990	-1.812278
1991	-2.275037
1992	1.547996
1993	-3.649816
1994	-1.176943
1995	3.691952
1996	2.638204
1997	-1.926168
1998	2.018163
1999	-0.073425
2000	0.263633
2001	0.050622
2002	2.269944
2003	4.236041
2004	1.284045
2005	2.444525
2006	-1.659485
2007	0.126112
2008	-0.784030
2009	-1.534814
2010	0.097271
2011	-0.590090
2012	0.421926
2013	-0.982141
2014	-0.076847
2015	0.065133
2016	-0.215402
2017	-2.175135
2018	-2.223959

Source: E-Views 9 Program outputs.

Annex 05: Equation for correcting the error form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.077544	0.363638	0.213244	0.8329
DINF	-0.045355	0.086561	-0.523969	0.6049
U(-1)	-0.700269	0.239377	-2.925387	0.0072

R-squared	0.298066	Mean dependent var	0.040357
Adjusted R-squared	0.241911	S.D. dependent var	2.203079
S.E. of regression	1.918184	Akaike info criterion	4.241592
Sum squared resid	91.98573	Schwarz criterion	4.384328
Log likelihood	-56.38228	Hannan-Quinn criter.	4.285228
F-statistic	5.307939	Durbin-Watson stat	2.054800
Prob(F-statistic)	0.011987		

Source: E-Views 9 Program outputs

Annex 04: Prototype equation:

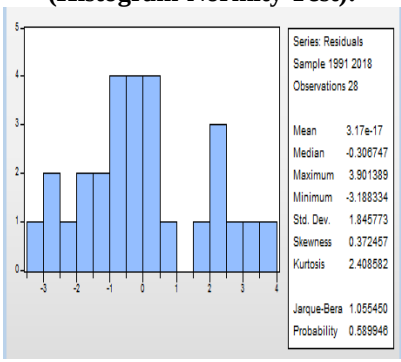
Dependent Variable: GDPP
Method: Least Squares
Date: 02/17/20 Time: 14:02
Sample: 1990 2018
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.182427	0.501846	4.348803	0.0002
INF	-0.135473	0.038756	-3.495551	0.0017

R-squared	0.311556	Mean dependent var	0.961724
Adjusted R-squared	0.286058	S.D. dependent var	2.297032
S.E. of regression	1.940879	Akaike info criterion	4.230631
Sum squared resid	101.7093	Schwarz criterion	4.324928
Log likelihood	-59.34416	Hannan-Quinn criter.	4.260164
F-statistic	12.21888	Durbin-Watson stat	1.621010
Prob(F-statistic)	0.001652		

Source: E-Views 9 Program outputs

Annex 07: Testing the normal distribution of the Protector (Histogram-Normity Test):



Source: E-Views 9 Program outputs

Annex 06: The degree of VAR delay, based on the Akaike and Schwatz criteria

VAR Lag Order Selection Criteria
Endogenous variables: DINF DGDPP
Exogenous variables: C
Date: 02/17/20 Time: 16:20
Sample: 1990 2018
Included observations: 24

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-118.6108	NA*	79.45909*	10.05090	10.14907*	10.07694*
1	-115.3534	5.700408	84.74612	10.11279	10.40730	10.19092
2	-110.5864	7.547799	80.27772	10.04887*	10.53972	10.17909
3	-109.4410	1.622581	104.1550	10.28675	10.97395	10.46907
4	-103.0212	8.024744	88.78913	10.08510	10.96864	10.31951

* 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: E-Views 9 Program outputs

Appendix 09: Self-Link Test (LM):

F-statistic	0.963522	Prob. F(2,23)	0.3964
Obs*R-squared	2.164607	Prob. Chi-Square(2)	0.3388

Source: E-Views 9 Program outputs

Appendix 08: Heterogeneity Test:

Heteroskedasticity Test: ARCH

F-statistic	0.099728	Prob. F(1,25)	0.7548
Obs*R-squared	0.107278	Prob. Chi-Square(1)	0.7433

Source: E-Views 9 Program outputs

Referrals and references:

Books:

- Gregory N. Mankiw. (2012). **Macroéconomie**. traduction par Jihad c. El Naboulsi. de boeck. Bruxelles. Belgique .
- Mohareb abd aziz kassem. (2012). Sustainable development under the challenges of reality from the Islamic perspective. New University House. Alexandria.
- Khalifa, mohemed nadji hecen.(2001). Economic growth: Theory and concept. Cairo Publishing House. Cairo.
- Atia, abd kader mohamed abd kader. (2003). Recent trends in development. University publishing house. Alexandria.
- Herbi, hamad mousa arikat. (2013). Development and economic planning (concepts and experiences).First Edition.Home Publishers and distributors. Oman.
- Chemri, nadhem Mohamed nouri. (1994). Money and banks. Dar Zahran. Jordan.
- Abd el-alaoui, mofid.(2007). Monetary Economy and Monetary Policy. El-ouadi. Mazouar Printing. Algeria.

- Paul A. Samuelson and William D. Norhouse.(2006). Economy. Translation: hishem abdallah, Second Arab Edition. House of el-ahlia. Jordan.
- El-machhedani, khold. (2013). Privatization, its effect on inflation rates and their effects on economic growth rates. First Edition. Wael Publishing House. Jordan.
- Toumi, salah. (1999). Theory entry Economic measurement. Part one..University Publications Office. Algeria.
- Alan Griffith, Stuart Wall .(1997). Applied economics an introductory course, Seventh Edition, Longman. London and New York..
- Samuelson P, Nordhams W.(2000). Economics, Economica edition, Paris, France.

Terms:

- National Institute of Planning and Statistics. (1999). Macroeconomics, lessons for second-year students.
- Ouel, miloud. (2014). Modern determinants of economic growth in Arab countries and ways to activate them. Term doctorat in economic science. university of abou bakr bel kaid.telemcen.
- Hafid, Fatima. (2012). Economic reforms and economic growth in Arab Maghreb countries. Doctor's Message in Economic Sciences. Term doctorat in economic science. Batna: university hadj lakhder. Algeria
- Bouri, mahi dine. (2017-2018). The role of fiscal policy in achieving economic balance - the case of Algeria between 2000 and 2010. Term doctorat in economic science.sidi belabbas: university djillali ilias. Alger.

Websites :

- Elkhabar news : money and business :(11-10-2019) : https://www.elkhabar.com/press/article// date : 14/01/2020.