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A STANDARD STUDY TO DETERMINE THE NATURE OF THE RELATIONSHIP BETWEEN THE INFLATION RATE AND THE UNEMPLOYMENT RATE -IN ALGERIA DURING THE PERIOD (1970-2021) USING THE ERROR CORRECTION MODEL (ECM)-

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ABSTRACT:

This study aims to analyze and measure the relationship between the inflation rate and the unemployment rate in Algeria during the period (1970-2021), using the error correction model (ECM), data obtained from specialized bodies, such as the National Bureau of Statistics, the International Monetary Fund, and the World Bank.

The study found that the relationship between the inflation rate and unemployment in Algeria during the period (1970-2021) is a one-way direct relationship, starting from the inflation rate to the unemployment rate, as An increase in the inflation rate by 1% leads to an increase in the unemployment rate by 1.98%, a result that negates the application of the Phillips curve to the Algerian economy during the study period.

Keywords: unemployment rate, inflation rate, Philips curve, error correction model (ECM).

INTRODUCTION:

The issues of inflation and unemployment are among the most important economic phenomena facing any economy in the world, and they are one of the most important basic pillars that guide government policies and programs, as the government always tries to follow economic policies aimed at avoiding these two problems and reducing the damage caused by them. Governments of countries suffering from inflation or unemployment often face many manifestations of protest denouncing the government's failure to address inflation or unemployment. The correlation between inflation and unemployment has had a clear impact on intellectual, standard and applied economic levels. In this context, the Phillips curve is the mechanism that expresses their interdependence on the one hand, and the most controversial among economic researchers on the other. Most economic policies are developed by relying on it, and it

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is a tool in the hands of different countries to counter the primary key in analyzing the Phillips curve.

The problem of the study:

Algeria has also been and continues to suffer from high rates of inflation and unemployment. Therefore, and by the above, and in an attempt to study the reality of Algeria from these two phenomena, we can identify the problem of the subject that this study answers through the following main problem:

- What is the nature of the relationship between inflation and unemployment in Algeria during the period (1970-2021)?

Under the main problem, a set of sub-questions fall, the most important of which are:

-Is there a stable relationship between inflation and unemployment in Algeria?

- Is there an inverse relationship between inflation and unemployment in Algeria?

- Is Phillips' relationship realized in the Algerian economy?

Hypotheses of the study:

In light of the problems and questions raised on this subject, the following hypotheses can be developed:

The first hypothesis: There is a one-way relationship, starting from the inflation rate to the unemployment rate in the Algerian economy during the study period.

The second hypothesis: There is a positive relationship between inflation and unemployment in the Algerian economy during the study period.

The third hypothesis: Phillips' relationship is unrealized in the Algerian economy during the study period.

Objectives of the study:

Through this study, we aim to:

1- Highlighting the theoretical aspect of inflation and unemployment and projecting them on the reality of the Algerian economy, through the analysis and measurement of the two phenomena during the period (1970-2021);
2- Investigating the nature and form of the relationship between inflation and unemployment in Algeria during the period (1970-2021);
3- Estimating the relationship between inflation and unemployment in Algeria within the framework of the Phillips curve in the period (1970-2021).

Importance of the study:

The importance of the study comes from the fact that it addresses a topic of great importance in economic thought through:

1- Algeria suffers from both phenomena: inflation and unemployment, and is striving to reduce their rates.

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2- Identifying and highlighting the relationship between inflation and unemployment in the Algerian economy during the period (1970-2021), as it is known that the two phenomena have very negative effects on development and economic growth.
3- Knowing the reality and direction of the development of inflation and unemployment in the Algerian economy during the study period.

Previous studies:

Many studies dealt with the relationship between inflation and unemployment, but most of them were in the form of articles in magazines, including:

1- A study **(Hisham Labza, Mohamed Hadi Dhaifallah, 2014)** A study of economic causality between the phenomena of inflation and unemployment in Algeria during the period (1984-2010), and this study found a causality between the phenomenon of inflation towards unemployment in the Algerian economy as well as there is causality between unemployment towards inflation according to Granger, and according to the data of the Algerian economy there is a weak impact of inflation towards unemployment.
2- A study **(Sanussi Ali, Ben Para Mohamed)** on the relationship between the monetary inflation rate and the unemployment rate in Algeria during the period 19802013 (an econometric study), in this study and by estimating the autoregressive vector model (VAR) for the relationship between the inflation rate and the unemployment rate, and through the results obtained that there is an inverse relationship between the inflation rate and the unemployment rate in Algeria.
3- A study **(Nadia Ali Ayed, 2014)** a standard study of the Phillips curve in Iraq, and it was clear through this study that the Phillips curve can be applied in the period (1991-2002) and thus certain policies can be tracked in reducing unemployment and making the inflation rate within the desired limits.
4- A study **(Noureddine Boualkour, 2017)** analyzing and measuring the relationship between the inflation rate and the unemployment rate in Algeria during the period (1970-2015) within the framework of the Phillips curve, and this study found that the relationship between the inflation rate and unemployment in Algeria during the period (1970-2015) is an inverse relationship, which allows the application of the Phillips curve to the Algerian economy during the study period.
5- A study **(Soumaya Belkacemi, 2017)** on the problem of the relationship between unemployment and inflation with statistical application to the Algerian economy, and this study found that the increase in inflation in the short and long term does not lead to any impact on the unemployment rate.

Research Methodology:

To highlight the relationship between inflation and unemployment in Algeria, we used the descriptive analytical approach to review the reality of inflation and unemployment in Algeria, as well as the statistical method to study their development

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during the study period. In addition to the economic standard approach through applied standard study using the EVIEWS10 program.

Limitations of the study:

The spatial framework has been confined to our country, Algeria, which in recent years has experienced waves of inflation as well as high unemployment rates.As for the time frame, the period (1970-2021) was chosen as sufficient and appropriate to choose the statistical method used as well as to provide data on the study variables during this period.

Structure of the study:

In order to answer the problem and sub-questions, we decided to divide this study into two parts:

First: The development of unemployment and inflation during the period (19702021).

Second: The applied aspect of the study.

First: The development of unemployment and inflation during the period (1970-2021).

1- The evolution of inflation rates in Algeria during the period (1970-2022).

During many years of the period under study, the Algerian economy faced severe inflationary pressures, and therefore we will study the evolution of inflation during the study period (1970-2021) by dividing it into 3 periods according to the developments that occurred in the economy, after independence, then the transition period to a market economy and then the current period. They are:

First period (1970-1989): The following table shows the evolution of the inflation rate during this period.

Immediately after independence, Algeria adopted the socialist approach to development, which is based on central planning, and this approach was characterized by the establishment of large public institutions in most economic sectors such as services and industry. Prices were predetermined by a system of control and a system of exploitation of previously defined resources, which artificially kept inflation at a reasonable level, allowing the continuation of the purchasing power of society. Prices were managed by three levels:

- Prices of imported goods;
- Prices of industrial goods and domestic services; - Agricultural prices.

Table 01: Evolution of the inflation rate in Algeria during the period (1970-1989)

Years (Base year 2001)	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Inflation RateINF%	4.8	2.8	4	6.9	2.8	8.6	8.3	11	15.6	10.4	9.2	14.7	6.2	6	8.2

1985	1986	1987	1988	1989
10.5	12.4	7.4	5.9	9.3

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Source: ONS data (2)

Through the previous table, it is clear that the average inflation rate reached its highest rate during the period 1973-1981 as a result of the oil crisis in 1973 and the resulting rise in import prices to return to decline during the period 1982-1984 to rise slightly during the period 1985-1989, a period in which the monetary authorities adjusted the nominal interest rates on loans starting in 1986, where the average interest rate rose to 7% in 1989 (3)

Second period (1990-2000): The following table shows the evolution of the inflation rate during this period:

Table 02: Evolution of the inflation rate in Algeria during the period (1990-2000)

Years (Base year 2001)	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Inflation RateINF%	16.6	25.9	31.7	20.5	29	29.8	18.7	5.7	5	2.6	0.3

Source: ONS

Inflation in this period witnessed a continuous increase from 1990 at a rate of 16.6% to reach 31.7% in 1992, then decreased in 1993 to 20.5% and rose again until it reached 29.8*% in 1995.* This period witnessed an increase in the decline of the economic situation, and the imbalance appeared at the macro level for several reasons, including: the devaluation of the dinar in 1994, monetary and successive expansion, as the year 1992 witnessed a complete disappearance of monetary discipline, high liquidity rates, in addition to the increase in the volume of demand with the stagnation in demand levels, and the adjustment of the exchange rate without neglecting to continue to liberalize the internal prices recorded in the structural adjustment program that began in 1989, which was fast, especially in 1993. In the years following 1995, the inflation rate declined continuously and rapidly from 18.7% in 1996 to 0.3% in 2000, due to:(4)

The structural reform program has begun to bear fruit in terms of controlling inflation and liberalizing prices, in addition to the government's implementation of strict fiscal and monetary policy, as well as controlling economic liquidity, moderate the pace of monetary expansion, the decline in the volume of domestic credit during this period, and the decline in the level of aggregate demand due to the spread of unemployment.

Third period (2001-2022): The following table is the evolution of the inflation rate during this period:

Table 03: Evolution of the inflation rate in Algeria during (2001-2021)

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Years (Base year 2001)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Inflation RateINF%	4.2	1.4	2.6	3.6	1.6	2.5	3.5	4.8	5.7	3.9

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
4.5	8.5	3.3	2.9	4.8	6.4	5.6	4.3	2	2.4	4.5

Source: ONS data

In this period, compared to 2000, the inflation rate quickly returned to rise, recording a rate of 4.2% in 2001, then declining again to 1.42% in 2002 and then rising to 2.58% in 2003. This is due to the Central Bank's devaluation of the dinar by between 2%. And 5% in order to limit the development of the money mass circulating in the parallel markets and the continuation of excessive liquidity in the money market, in addition to the movement of the currency demand structure for instant payment methods such as credit currency and demand deposits with a more important tendency towards demand deposits.

In 2004, which marked the end of the five-year plan, it witnessed an increase in the inflation rate to 3.56% due to the expansion of public spending, and then a relative decline between 2005 and 2006 due to the strict application of monetary policy to stabilize within 2.53%. The year 2006, which means price stability, and the year 2005 witnessed a qualitative period in the field of allocating a large fiscal envelope within the framework of supporting growth, which led to the inability of aggregate supply to meet the aggregate demand concerned for an expansionary monetary policy and appeared in the form of a tangible inflationary tendency in 2007 and 2008, where inflation rates of 3.5% and 4.8% , respectively, and then this inflation continued until 2009 (5.7%) This is due to the rise in imported inflation since 2008, as the global financial crisis led to the rise in the exchange rate of the euro against the dollar, which caused a rise in the prices of imported goods, and according to the Bank of Algeria, the causes of inflation during the decade 20002010 were due to the high prices of imported agricultural materials, and the significant expansion of the monetary mass.

As for the years 2013-2014, the inflation rate declined compared to 2012 (8.9%), where it recorded 3.2% and 2.9%, respectively, and this decline reflects the new direction of Algeria's monetary policy, whose goal has become to target inflation and the target rate is 3%.

Inflation continued to slow to 2014 at a rate of 2.9%, which represents a gain to push for monetary stability, especially in the context characterized by low budget revenues resulting from low oil prices, which will reduce the severity of Algeria's financial difficulties.

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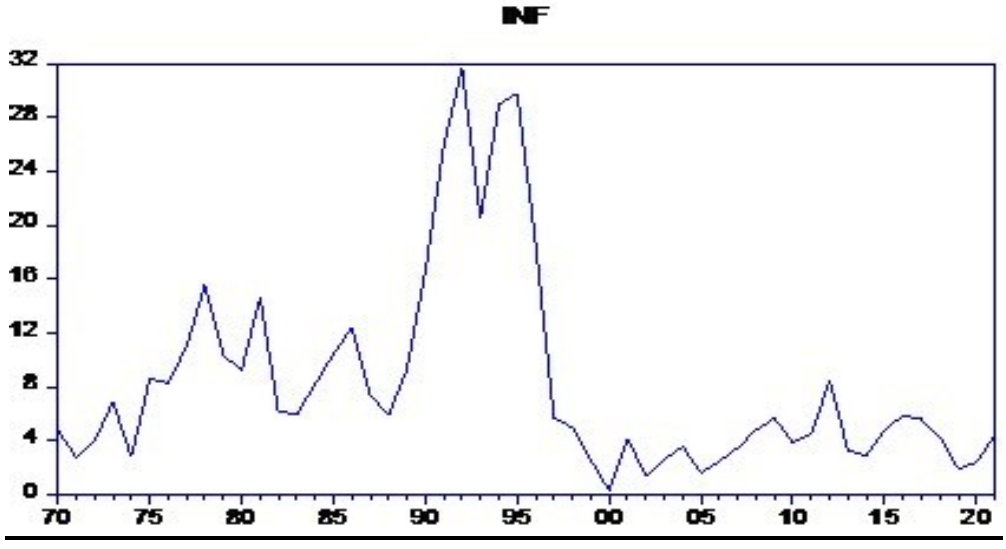
As for the year 2015, with the decline in oil prices and the continuation of this decline, which reached at the end of 2015 to $ 35 per barrel, which is less than the reference price programmed in the 2016 Finance Law, which is $ 37 per barrel, Algeria will be affected by the decline in the price of oil below the reference price on the one hand, and the approach of the expected price to the price of the cost of extraction on the other hand, which will increase the budget deficit further. This significant drop in oil prices is closely related to the value of the national currency, especially since the government has deliberately reduced this value further in order to achieve greater oil levies.

This decline in the currency would raise inflation rates, which is what happened as the inflation rate rose in 2015 to 4.8%, and with the entry into force of the Finance Law of 2016, which included significant increases in some articles, the most important of which is fuel, which was reflected in the prices of almost all goods and services, the inflation rate in 2016 reached 6.4 %.

Through the above, we note that the inflation rate in Algeria during the study period (1970-2021) fluctuates sometimes in high and sometimes in decline, this fluctuation has always been positive, which means that the general level of prices is always increasing, which we noticed if we compare between 1970 and 2021 and the following figure shows the evolution of annual inflation rates in Algeria during the study period (1970-2016) through a graph.

Figure 01: Evolution of inflation rates in Algeria during the period (19702021)).



Source: Prepared by the researcher based on tables (01-02-03) and the EVIEWS11 program

2. The evolution of unemployment rates in Algeria during the period (1970-2012)).

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For the purpose of tracking the evolution of unemployment in Algeria during the study period (1970-201) we will also divide this period into three (03) periods as in the case of inflation as follows: - First period: (1970-1989);
- Second period (1990-2000); -
Third period: (2001-2021).

First period (1970-1989): The following table shows the evolution of the unemployment rate during this period:

This period witnessed high unemployment rates, as in 1970 an unemployment rate of 22.05% was recorded and began to rise until it reached 23.59% in 1973. Then it decreased slightly and began to fluctuate until 1983 and reached 14.29%, and then returned to rise until it reached an average of 21.80% and 20.68% in 1988 and 1989 respectively.

Table 04: Evolution of the unemployment rate in Algeria during the period (1970-1989).

Years	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Unemployment rate (%UN)	22.05	23.01	23.25	23.59	21.00	20.05	19.02	20.87	18.94	16.30	15.79

1981	1982	1983	1984	1985	1986	1987	1988	1989
15.39	15.00	14.29	16.54	16.90	18.36	20.06	21.80	20.68

Source: ONS data.

This period witnessed high unemployment rates, as in 1970 an unemployment rate of 22.05% was recorded and began to rise until it reached 23.59% in 1973. Then it decreased slightly and began to fluctuate until 1983 and reached 14.29%, and then returned to rise until it reached an average of 21.80% and 20.68% and
1989 respectively. During this period, the Algerian state tried to reform the industrial and agricultural sectors by adopting tripartite and four-year economic programs in order to boost economic growth and control unemployment rates and then sought structural reforms during the period after the oil crisis in 1986, which showed the great fragility that characterizes Algerian economy and its great link to the hydrocarbon sector. Despite these efforts made by the state to alleviate the high unemployment rates during this period, the level of unemployment rates in Algeria remained high, ranging between 23.59% and 14.29%. These rates are considered high compared to the size of the efforts made by the Algerian state during this period, and the reason for this increase is due to a significant decline in the volume of investments, and a decrease in Oil prices has led to a major imbalance in the labour market, with job opportunities significantly reduced at the same time as job seekers were increasing even more.

Second period (1990-2000): The following table shows the evolution of the unemployment rate in Algeria during this period:

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Table 05: Evolution of the unemployment rate in Algeria during the period (1990-2000).

Years	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Unemployment rate (%UN)	19.76	20.26	21.37	23.15	24.36	28.11	27.99	27.96	28.02	29.29	29.50

Source: ONS data.

In this period, Algeria witnessed a continuous increase in the unemployment rate, as it moved from 19.76% in 1990 to 29.50% in 2000, and this escalation is explained by the decline in development activity as a result of the financial hardship that the country went through during this period due to the decline in oil prices, in addition to the deficit of public institutions due to the decline in the dinar, which witnessed a decrease of 27.8%. In 1994, for example, and 6% in 1995, which led to the closure or privatization of these enterprises, resulting in the layoffs of a large number of workers and high unemployment rates. In addition to the above reasons, the structural reforms adopted by Algeria in that period had a significant impact on increasing unemployment rates, as the forced recourse to the International Monetary Fund for loan requests led to the acceptance of several conditions dictated by the latter, the most important of which are the following:

- Monitoring the expansion of the monetary mass by reducing cash flow;
- Price liberalization, wage freeze and application of positive interest rates;
- Reducing inflation and depreciating the dinar;
- Liberalization of foreign trade and the flow of foreign capital;
- Reducing the public budget deficit by reducing public expenditures.

The condition of reducing public spending was one of the most important conditions that the IMF focused on, and we know the importance of spending in raising aggregate demand and thus creating jobs, especially in such recessions that prevailed at that time.

Third period (2001-2022): The following table shows the evolution of the unemployment rate during this period:

Table 06: Evolution of the unemployment rate in Algeria during the period (2001-2022).

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Unemployment rate (%UN)	27.31	26.66	23.72	17.66	15.27	12.51	13.79	11.33	10.17	9.96	9.97

2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	9.83	10.60	11.76	10.50	11.7	11.7	11.4	10.5	12.7	11,6

Source: ONS data

In this period, unemployment rates witnessed a significant decline, as they moved from 27.31% in 2001 to 9.83% in 2013, a positive indicator that Algeria has not

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known since independence, and this is primarily due to the high prices of fuel, which was reflected in the financing of economic development. More than 728,000 jobs were created during the period 2000-2004 (the period of economic recovery programs), and the volume of employment during the period 2005-2010 (the period of economic growth support programs) increased by about 12.5%.In 2014, the unemployment rate increased slightly and was estimated at 10.60% compared to 2013, mainly due to the high unemployment rate among university graduates. Due to the significant decline in oil prices and the devaluation of the national currency, most ministries have frozen employment, which affects unemployment rates, as the unemployment rate in 2015 reached 11.76%, recording an increase compared to 2014 (1).While in 2016, the inflation rate witnessed a slight decrease of 10.5%. I attribute this decline to the recruitment competitions held in the education sector, which, in my opinion, contributed to absorbing a good percentage of unemployment in Algeria.

Through the above, we note that the unemployment rate in Algeria during the study period (1970-2021) was very high at the beginning of the study period, which is considered a period after independence, which was characterized by widespread structural unemployment, as the labor force at that time was unqualified and highly concentrated in the countryside, and with the beginning of rural displacement towards cities, unemployment worsened very significantly, which greatly affected for a long time the labor market and employment policies followed in Algeria. By the eighties of the twentieth century, the Algerian economy witnessed a new trend that relied on restructuring large institutions and giving priority to the completion of the remaining planned development projects, which produced an increase in job opportunities and led to a decrease in the unemployment rate, but the oil crisis since 1985 re-emerged the specter of unemployment and rose again.

With the recovery of oil prices, unemployment began to decline thanks to the policies and measures taken by the state to revive the Algerian economy. This is explained in the second chapter on the policies to treat unemployment in Algeria. However, despite all these efforts to eliminate and reduce unemployment, it still records high rates for many reasons, including The length of the transitional phase of privatization of public enterprises, lack of investments, discouraging of private investment, and failure to provide an appropriate climate to attract foreign direct investment. The following trend shows the evolution of the unemployment rate in Algeria during the study period (1970-2021):

Figure 02: Evolution of unemployment rates in Algeria during the period (1970-2021).

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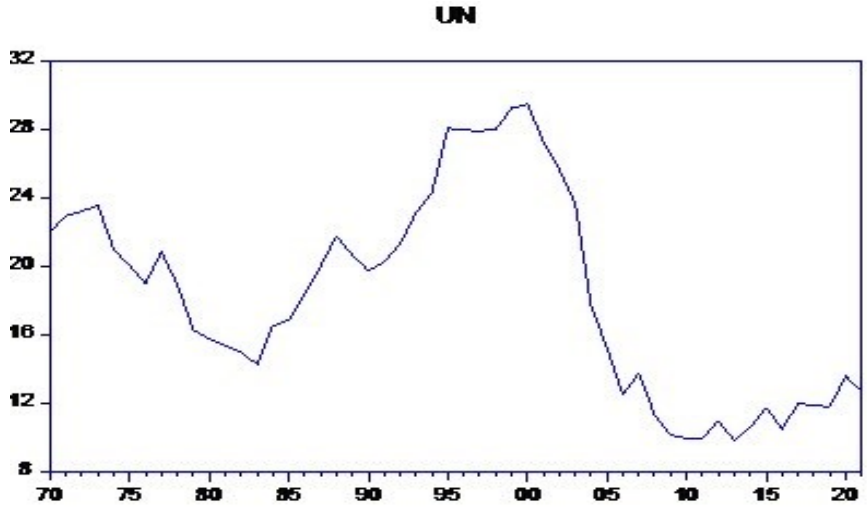

Source: Prepared by the researcher based on tables (04-05-06) and the EVIEWS10 program

Second: The applied aspect of the study.

1-Procedural definitions of study variables:

In this study there are two main variables: inflation and the unemployment rate. **A -study variables:**

Inflation rate (INF): Inflation is defined as the continuous rise in the general level of prices from one period to another, and it is reflected in the effects that affect all levels of the state, at the level of consumers, inflation affects their purchasing power, which reflects negatively on their standard of living, and similarly for industrial companies, where the prices of raw materials also rise at the state level, where the purchasing power of their currencies decreases against other currencies. (**Al-Ayed, 2014, 165)**

Unemployment rate (UN): It is defined as the ratio of the number of unemployed workers to the total number of workers participating in the labor force, if this rate is small, this is an indication that the labor market is close to full employment, and if it is large, it means that the labor market is in a state of imbalance and instability..

B The relationship of the unemployment rate to the inflation rate according to economic logic: The correlation between inflation and unemployment has had a clear impact on the intellectual, standard, applied and economic levels, and in this context the Phillips curve is the mechanism that expresses their interdependence, which explains the nature of the relationship between them. Correct.

2- Limitations of the study:

This study was limited to two indicators of the Algerian economy, which are the unemployment rate (UN), and inflation rate (INF), and the study was limited to the data of these two indicators during the period (1970-2021).

3-Study Methodology and Procedures:

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A. Data sources: Research data were collected on the two variables of the study (unemployment rate:(UN), inflation rate (INF) from specialized bodies such as the Arab Monetary Fund, the Algerian National Center for Statistics (ONS), reports of the Bank of Algeria, the Ministry of Finance. These data covered the period (19702021).
B Data : The computer has been relied upon using the (EVIEWS10) program to process the published data in order to estimate the study model.

4-Study Model:

In this study, we will use the error correction model, or what is termed as ECM, in order to study the dynamic relationship between the unemployment rate and the inflation rate in the Algerian economy during the period (1970-2021).The model takes the following mathematical formula:

$$\boldsymbol{UN = F(INF)}$$

The form of the form takes the following form:

$$\mathbf{UN=\alpha+\beta INF+\mu\ \Delta UN=\beta\Delta INF+\delta\Delta Z_{(t-1)}=\mu}$$

5 Study model estimation results:

A test of time series stability:

As a first stage, we test the stability of time series, which is a condition of cointegration. Unit root tests are the most important way to determine the stability of time series, to know the statistical characteristics as well as to know the characteristics of the time series under study in terms of their degree of integration. The developer **Dickey-Fuller** test and **PhilipS.Perron** have been used.To test the presence of the unit root or stability in the two variables under study, this test examines the null hypothesis that the variable in question contains the unit root, i.e. it is unstable, versus the alternative hypothesis that the variable in question does not contain the unit root : it is stable..

Table 07: Results of the unit root test for the study variable

characteristics / Variables	P.P		intercept	Pr	Trend and intercept	Pr	None	Pr
UN	I(0)	t	1.351976-	0.5983	1.626064-	0.7687	0.927871-	0.3099
	I(1)	t	5.050895-	1 0.000	4.999595-	0.0009	5.041950-	0.0000
INF	I(0)	t	-2.341837	0.1633	2.450469-	0.3505	-1.462897	0.1325
	I(1)	t	6.841532-	0.0000	6.814527-	0.0000	6.912848-	0.0000

Source: Prepared by the researcher based on the EVIEWS10 program

It is clear from Table (07) that it is not possible to reject the null hypothesis that for the two variables under study that it has the root of the unit and this hypothesis can be rejected for the first difference of these two variables, which means that these two variables are complementary ofrank I(1), and from it the joint integration test can be performed using the Angel Granger method. .

B- Identification of delay bikes in the VAR model :

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From Table (08) it is clear that four criteria chose one slowdown period: LR, FPE, AIC, HQ, so we will choose one slowdown period.

Table 08: Results of selecting the number of decelerations in the VAR model)

VAR Lag Order Selection Criteria
Endogenous variables: UN INF
Exogenous variables: C
Date: 07/10/23 Time: 19:11
Sample: 1970 2021
Included observations: 48

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-317.4789	NA	2071.191	13.31162	13.38959	13.34108
1	-226.9180	169.8016*	56.23223*	9.704918*	9.938818*	9.793309*
2	-224.2345	4.807958	59.47371	9.759772	10.14961	9.907090
3	-219.8065	7.564553	58.57873	9.741937	10.28770	9.948183
4	-217.0784	4.433173	62.06347	9.794933	10.49663	10.06011

Source: Prepared by the researcher based on the EVIEWS10 program

C- Granger's causality test between the two variables:

The aim of the causality test is to find out whether there is a significant relationship in the short term between the unemployment rate and the inflation rate in Algeria. Table (0) shows the results of the causal relationship test between the variables under study: inflation rate (INF) and unemployment rate (UN).

Table 09: Results of the causal relationship test between the unemployment rate and the inflation rate in Algeria during the period (1970-2021)

Pairwise Granger Causality Tests
Date: 07/10/23 Time: 19:16
Sample: 1970 2021
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
UN does not Granger Cause INF	51	0.16800	0.6837
INF does not Granger Cause UN		9.38552	0.0036

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Source: Prepared by the researcher based on the EVIEWS10 program

The results of the estimation of the causal relationship between the variables of the study in Table (08) between:

Inflation rate (INF), unemployment rate (UN), that F reached 9.38552with a probability of 0.0036Therefore, we reject the hypothesis that the inflation rate (INF) does not According to Granger's concept, we accept the hypothesis that the inflation rate (INF) causes, according to Granger's concept, changes in the unemployment rate (UN).

Unemployment rate (UN) and inflation rate (INF), that F is 0.16800 with a probability of 0.6837Therefore, we accept the hypothesis that the unemployment rate (UN) According to Granger's concept, it does not cause changes in the inflation rate (INF).

D -Cointegration test using the Angel-Granger methodology :

Angel Granger's methodology for testing cointegration contains two basic steps, the first step is to estimate the relationship between the two variables of the study by the ordinary least squares method, and the second step is to derive the residual series and test its stability in the level without a conclusive and without a general trend, and the following table summarizes the estimate of the relationship between the unemployment rate and inflation in the long term:

Table 10: Estimation of the long-term relationship between the unemployment rate and the inflation rate in Algeria During the period (1970-2021)

Dependent Variable: UN
Method: Least Squares
Date: 07/10/23 Time: 19:31
Sample: 1970 2021
Included observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	0.223990	0.108659	2.061396	0.0445
C	16.47822	1.215510	13.55663	0.0000

R-squared	0.078330	Mean dependent var	18.35000
Adjusted R-squared	0.059897	S.D. dependent var	6.009806
S.E. of regression	5.827043	Akaike info criterion	6.400599
Sum squared resid	1697.722	Schwarz criterion	6.475647
Log likelihood	-164.4156	Hannan-Quinn criter.	6.429370
F-statistic	4.249354	Durbin-Watson stat	0.113939
Prob(F-statistic)	0.044484		

Source: Prepared by the researcher based on the EVIEWS10 program

We can see from the above table that the elasticity of the unemployment rate relative to the inflation rate in the long term is equal to 0.22 where its sign is positive

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and is acceptable from an economic point of view, as well as it is statistically significant because its p-value is less than 5%.

After estimating the relationship between the unemployment rate and the inflation rate, we now obtain (derivation of the residual series) the remainders of the relationship or equation and test their stability in the plane using a model without a conclusive and without a general trend, as follows:

Table nº 11: Results of the unit root test for the residue series

characteristics	ADD		None	Prob
Variables				
Residue Series (Z)	I(0)	t	-2.352788	0.0194

Source: Prepared by the researcher based on the EVIEWS10 program

We can see from the above table that the residual series is stable in the plane, when we use the model without a conclusive and without a general trend, it appeared to us that the probability of the expanded Dickie Fuller statistic is less than 5%, as evidence that the residual series is free of the unit root in the plane. The domain to use the error correction model (ECM) is as follows: **E -Error Correction Model (ECM) Estimation:**

At this stage, we will use the residual series resulting from equilibrium regression to estimate the error correction model, and we will also test the significance of the error correction coefficient, which is the residual deceleration limit coefficient for the long-term relationship between the inflation rate and the unemployment rate, as follows:

Table 12: ECM Estimation Results

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Dependent Variable: UN
Method: Least Squares
Date: 07/12/23 Time: 00:14
Sample (adjusted): 1971 2021
Included observations: 51 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	1.977248	0.276994	7.138240	0.0000
Z(-1)	-1.895434	0.289242	-6.553099	0.0000
C	-27.54322	5.095566	-5.405330	0.0000

R-squared	0.515805	Mean dependent var	8.426275
Adjusted R-squared	0.495630	S.D. dependent var	7.566929
S.E. of regression	5.373957	Akaike info criterion	6.258028
Sum squared resid	1386.212	Schwarz criterion	6.371665
Log likelihood	-156.5797	Hannan-Quinn criter.	6.301452
F-statistic	25.56681	Durbin-Watson stat	1.262590
Prob(F-statistic)	0.000000		

Source: Prepared by the researcher based on the EVIEWS10 program

Through the above table, the error correction form (ECM) can be written as follows:

$$\Delta UN=1.98\Delta INF-1.9\Delta Z_{(t-1)}=\mu$$

Conclusion:

Through the results of estimating the error correction model, we note the significance of the error correction coefficient at the level of 5% with a negative sign, and this is a strong evidence of the existence of a long-term equilibrium relationship between the inflation rate and the unemployment rate in Algeria during the study period, the value of the error correction coefficient of (-1.9) indicates that the unemployment rate in Algeria adjusts towards its equilibrium value after being exposed to the imbalance resulting from a shock (positive or negative) due to changes in the inflation rate, and that the speed of adjustment towards the equilibrium value in the unemployment rate takes about six months.

The results of the study:

-The results of stability tests using the unit root test showed that the variables of the study is unstable in level, but it became stable when taking its first difference, and its joint integration opened the way for us to use the ECM error correction model. -There is a one-way causal relationship between inflation to unemployment, which shows that high inflation leads to higher unemployment in Algeria.

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-Our study proved that there is no two-way causal relationship between the unemployment rate and the inflation rate, i.e. the unemployment rate does not cause the inflation rate.
-Our study showed that the speed of correcting the error in the unemployment rate equation is significant and negative –1.895434 that is, almost every long-term imbalance in the unemployment rate is corrected in six months.
-Through our study, we found that increasing the inflation rate by: 1% leads to an increase in the unemployment rate by 1.98% in Algeria during the period (19702021).
-Through our study, we concluded that the Phillips curve does not apply to the Algerian economy during the period (1970-2021).

Recommendations:

-Achieving efficiency and effectiveness in the use of available public resources, and not leaving room for the emergence of inflationary pressures, requires subjecting the relevant macroeconomic indicators to financial, investment and economic feasibility criteria.
-Work to diversify the sources of economic growth by paying attention to the agricultural sector to reduce internal and external risks, as the latter is responsible for the phenomenon of inflation in developing countries.
-Reviewing monetary policy in Algeria to ensure monetary, price and economic balance, to curb inflation.
Activating national production and working to support the break with foreign imports that provoke inflation, in order to raise the level of employment in the local labor force and reduce unemployment rates. **Bibliography:**

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