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The Impact of Wage Mass Changes on the Inflation Rate in Algeria during the Period 1989-2023. A standard study using the Nonlinear Autoregressive Distributed Lag (NARDL) model

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Abstract:

This study aims to determine the impact of wage growth on the inflation rate in Algeria during the period 1989-2023. This was done through a standard regression analysis using the Nonlinear Autoregressive Distributed Lag (NARDL) methodology, applied to annual time series data for both the inflation rate and wage growth.

The study found evidence of a long-term equilibrium relationship between wage growth and the inflation rate, indicating that inflation in Algeria is influenced in both the short and long term by changes in wages. Since this relationship is both significant and negative, inflation in Algeria tends to rise during periods of increasing wages for employees.

key words: Wage mass, inflation rate, NARDL model.

Introduction :

Wages have been and remain one of the most important topics for discussion at the national level. The majority of conflicts within the working class stem primarily from seeking higher wages and an improved standard of living. The wages and

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salaries individuals receive in return for their intellectual or physical efforts play a significant and vital role in achieving a level of satisfaction for the individual, thus reflecting on their general behavior and performance, which manifests in job stability. Additionally, the wage system affects the quality and satisfaction of workers with their jobs.

Wages and various associated compensations are considered fundamental rights of the worker and are among the employer's most important obligations towards the worker. The legislator has recognized this right, especially in Article 32 of Law 03-06, which includes the General Basic Law for Public Service, guaranteeing the employee's right to salary after service. Wages are an effective and influential tool on individual performance. This has led some to call contemporary economics "the economics of wages," given its importance as a developmental element contributing to the creation and formation of a productive and effective working class. It also serves as a factor in social stability, stimulating human potential to develop, improve, and upgrade products, thereby becoming an economic welfare upon which countries rely to boost their economic activity.

The Algerian economy has undergone a transitional phase from a socialist economy towards a classical liberal economy based on market economy principles. Like other countries, Algeria has not been immune to inflation, especially in the 1990s, after embarking on economic reforms and transitioning to a market economy. This transition necessitated price liberalization, leading to a significant increase in inflation rates. As a result, Algeria has adopted many reform policies, either independently or with the assistance of international bodies. Inflation is an economic phenomenon influenced by various macroeconomic variables, either negatively or positively.

Based on the above, our research problem is embodied in the following main question:

What is the impact of changes in wage levels on inflation in Algeria during the period 1989-2023?

1.Research Hypotheses: The research hypotheses are as follows:

- An increase in wages affects the inflation rate in Algeria during the study period.
- There is an equilibrium relationship in the short and long term between wage levels and inflation rate in Algeria.

2.Significance of the Research: Wages are of great importance as they determine the purchasing power in Algeria. They play a significant role in achieving a level of satisfaction for the individual, thus reflecting on their general behavior.

3.Research Objectives: This research aims to:

- Understand the reality and evolution of inflation rates in Algeria.
- Understand the reality and evolution of wage levels in Algeria.
- Determine the impact of wage increases on inflation rate in Algeria through empirical study.

4.Research Methodology: To answer the research problem and test its hypotheses, we will adopt a descriptive and analytical methodology. This aims to understand the evolution of wages and inflation rates in Algeria during the period 1989-2023. Additionally, we will build a standard model to measure the impact of wage increases on the inflation rate in Algeria.

SECTION I : Reality and Evolution of Inflation in Algeria During the Period 1989-2023

Inflation is considered one of the most important problems facing global economies, both in advanced and developing countries. Therefore, it receives careful attention in formulating overall and partial policies, as it is an important indicator of economic and social stability, given the negative effects it can have on both levels. However, this phenomenon is

multidimensional and multifaceted, linked to several economic variables.

First Requirement: The Nature of Inflation

Concepts of inflation vary greatly depending on the perspectives from which the phenomenon is viewed, and the different principles and bases on which it is based. Definitions of inflation vary according to the causes that create it; its characteristics and manifestations. These definitions correspond and intersect with the intellectual analysis of theories, which vary according to the perspectives that explain the phenomenon and its times.

Paragraph1: **The Monetary Definition of Inflation (according to the quantity):** theory of money) suggests a set of hypotheses and basic assumptions to support the idea that money governs prices, based on several points **(Saleh, 2004, p. 141)** which we will address in the intellectual analysis of the inflationary phenomenon. This theory is one of the first theories that attempted to explain inflation as a monetary phenomenon, defining it as any increase in the quantity of money in circulation leading to an increase in the general price level. This definition implies that the increase in the quantity of money is the cause of inflationary pressures **(HOUSSINE, 2000, p. 14)**.

Paragraph 2: Definition of inflation based on its economic impact. This concept is the most common for the phenomenon of inflation, focusing on its direct impact on the national economy as a result thereof, namely "the rise in the general level of prices." Many economists have gone in this direction, such as Alfred Marshall (1842-1924), Joan Robinson (1903-1983), and others, some of whom have stipulated continuity in the rise.
(DHAYAE, 1993, p. 214) .

However, despite its popularity and acceptance by the majority of economists, this definition is not accurate, especially regarding the price level considered inflationary. It focuses on the predominant aspect of the phenomenon and neglects other aspects, especially its sources, thus limiting its contribution to the

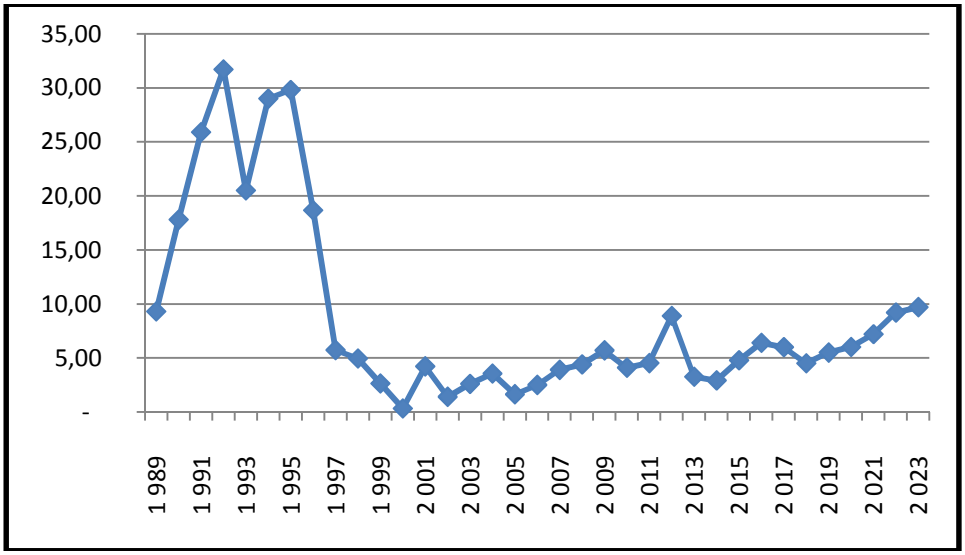
formulation of effective policies to address it. The economist Emil Jaim tried to remedy this observation by describing inflation as "a continuous and escalating movement of prices resulting from excess demand over supply capacity"**(AHMED, 2017, p. 180).**

The differences in the previous definitions of inflation do not imply a conflict between economists, but rather differences in their perspectives on the phenomenon. Therefore, the previous concepts describe the phenomenon partially, either through its causes as a monetary phenomenon, an increase in demand over supply, or an increase in spending, or through the result of these causes and their impact on the economy, as the general rise in prices. Therefore, inflation is defined as: the continuous increase in the general price level resulting from the increase in the quantity of money in circulation, leading to an increase in effective total demand over total supply of goods. Therefore, this proposed definition combines the characteristic of the phenomenon and its effects resulting from the imbalances causing it in the relationships between the variables of the national economy.

Second Requirement: Analyzing the Evolution of Inflation in Algeria 1989-2023.

The following figure shows the evolution of the general price level represented by the inflation rate during the period 1989-2023. The general trend towards increasing prices of consumer products from year to year is evident throughout the period, with varying rates of intensity that can be divided into three periods, after representing these numbers in the following figure:

Figure (01): Evolution of Inflation Rate in Algeria 1989-2023.



Source : Prepared by the researcher using Excel, relying on data from the World Bank and the National Statistics Office.

The development of consumer prices can be observed in the period specified through the previous figure, which illustrates the curve of the national consumer price index (CPI) along with a chart showing the annual change in its value from year to year, expressing the annual inflation rate. Consumer prices in Algeria showed continuous growth from year to year throughout the period (except for the year 2000), with varying degrees of increase ranging from 1.8% to 31.7%. We will now describe the price developments according to their intensity:

- Period (1990-1996): Consumer prices in Algeria witnessed an annual increase from year to year, reaching their peak in the study period, with an annual change rate exceeding 20% and reaching up to 32%. This indicates a period of sustained inflation, averaging between excessive and gradual, largely attributed to the political unrest in Algeria since the early 1990s, which led to economic deterioration and deterioration of overall indicators, as we will explain later. The inflation rate peaked in 1995 at 31.7% compared to the previous year. The national price index reached a level of 406.2 compared to the base year 1989, meaning it quadrupled in the first half of

the last decade of the twentieth century, the highest rate in the study period. Relatively lower, the CPI reached 197 in 1992 compared to the base year 1989, and 34.2 compared to the base year 2001, representing a 30% inflation rate for the previous year. In the early 1990s, inflation rates fluctuated between relatively high rates close to hyperinflation, the most damaging form of inflation to the economy and individuals, resulting in many negative effects, including increased money circulation speed and loss of purchasing power, particularly for those with fixed incomes.

- Period (1997-1998): Prices witnessed a decline in inflation compared to the early 1990s, with an inflation rate around 6%, characterized by inflationary pressures.
- Period (1999-2000): During these two years, Algeria experienced a clear price stability after a series of increases in the previous decade. The inflation rate fell below zero for the first time in three decades, with the national consumer price index for 2000 showing a decrease of -0.6% compared to 1999, and 2000 was chosen to renew the base for measuring the quantities consumed of the products included in the index basket, considering it as the reference year for 2001.
- Period (2002-2023): After adopting the new base for measuring the national consumer price index, the IPC stabilized in terms of price growth rates compared to previous years, with prices periodically increasing in a sine wave function, recurring approximately every four or five years. These cycles can be estimated in four inflation cycles that are similar in shape (2002-2006), (2007-2010), (2011-2014), (2015-2019), where each period is characterized by a decrease in the inflation rate at its extremes and an increase in the middle year (peak). These

peaks increase from one cycle to another, with inflation rates of 4.2% in 2004, 6.5% in 2009, and 9.7% in 2012, the highest rate of increase in the general price level in Algeria since the beginning of the twenty-first century, with the national index reaching 163.5, an increase of 63.5 compared to the base year 2001. In the recent years 2020, 2021, 2023, there has been a continuous increase in the inflation rate, rising from 2.42% to 9.2% in 2023, due to the increase in food prices in the global markets.

SECTION II :The Reality and Evolution of Wages in Algeria during the Period 1989-2023

Wages are a matter of great interest and concern for institutions as they often represent more than half of their total costs. This is because wages are a financial and economic variable; in general, the wage mass represents the expenditure incurred by institutions. The study of wages is of great economic importance as workers and their families rely entirely on wages to meet their basic needs. Given the importance of wages and their role in driving the economic and social development process, we will try to present some concepts related to wages.

First Requirement: the nature of wage mass.

The wage mass is an important factor in the economy, representing a major source of income for many households. It directly affects consumption patterns and savings rates, which in turn impacts inflation and the economy as a whole. Understanding the impact of wage changes on inflation rates is essential for developing effective economic policies that contribute to economic stability.

Paragraph 1:defines wages, as the price of labor, the amount of money paid by the employer to the worker for services rendered. For the worker, it represents the amount received for the effort exerted over a certain period for the employer. Additionally, wages are defined as the compensation calculated based on the weight of the hours worked and are due daily or weekly, varying according to the number of hours worked.**(HAMOUD, 2006, p. 33)**

Paragraph2: the concept of wages in capitalist systems, where wages are viewed as a cost borne by the project that affects the profits obtained by the project owner **(Al-Azzawi & Jawad, 2010, p. 193).**

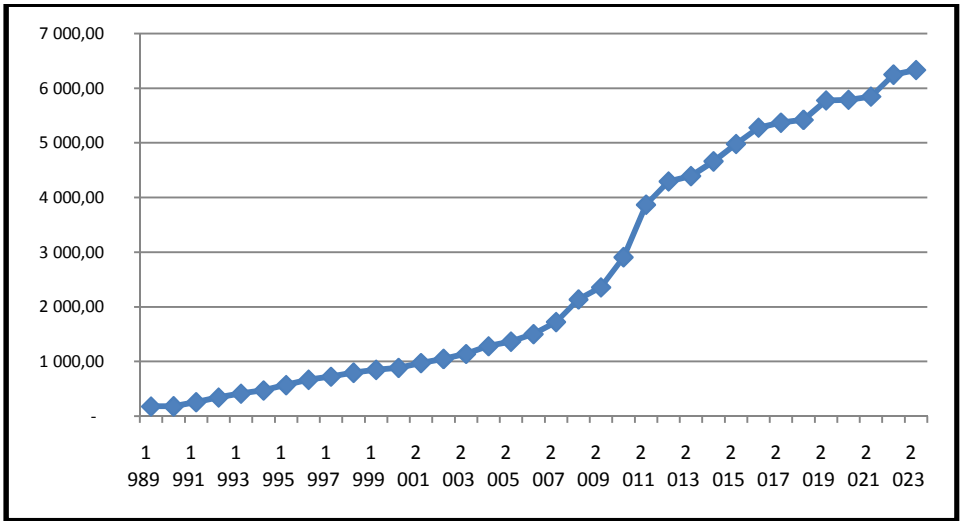
Paragraph 3:the concept of wages in socialist systems, where wages are based on the philosophy of these systems that focus on collective ownership of the means of production and the humanitarian view of workers. Workers should receive wages that ensure their decent living and are commensurate with their efforts **(Al-Azzawi N. A., 2010, p. 199).**

Second Requiremen: the analysis of the evolution of wage mass in Algeria for the period 1989-2023

The increase in wage costs is one of the most important contributors to the increase in production costs in the economy as a whole. Since wages are among the most important determinants of aggregate demand, an increase in wages reflects an increase in consumption spending. This can create inflationary pressures in the form of excess demand if this increase is not matched by an increase in labor productivity. In Algeria, the wage mass is one of the most important components of production costs in general, representing a high percentage of the total business volume for most public economic institutions. It is also an important part of the national income and a large component of total demand and general spending on public expenditure.

Wage developments in Algeria have witnessed significant changes during the period from 1989 to 2023, and the impact of these changes has significant economic and social implications. At the beginning of this period, Algeria was suffering from a severe economic crisis due to the decline in oil prices, which is the main source of national income. This is illustrated in the following figure:

Figure 02: Evolution of Wage Mass in Algeria during the Period 1989-2023



Source : Prepared by the researcher using Excel, relying on data from the World Bank and the National Statistics Office.

The graph above illustrates the evolution of wage mass in Algeria from 1990 to 2017. It shows a significant development in wage expenditure during this period, increasing from 180 billion DZD to 5367.8 billion DZD, which is approximately 30 times higher. This can be attributed mainly to the revisions in the wage scale and the increasing number of permanent positions.

The significant contribution of the wage mass to the production costs of Algerian institutions can be estimated by the percentage allocated to this mass, ranging from 41% to 90% of the total costs borne by the institutions **(SALEH, 2002, p. 35).**

This percentage varies according to each sector and the nature of the activity. The National Statistics Office in Algeria prepares bulletins on the wage situation and its distribution by sectors. In May 2017, the average net wage for the public and private sectors (excluding agriculture and industry sectors) was 40,325 DZD per month, an increase of about 50% from the wage recorded in 2010.

Wage levels in Algeria are differentiated based on several criteria, including employee qualifications, the legal sector, the size of the institution, and sectoral compensation characteristics. For instance, the extractive industries have the highest wages

compared to other sectors, with an average wage of 104,838 DZD, significantly higher than the next highest sector, the financial sector, with an average wage of 60,000 DZD **(HICHAM, 2020, p. 245).**

The clear evolution of wage mass in Algeria from 1990 to 2017 is evident, with the positive slope of the curve indicating that this development has experienced different growth rates. The wage mass increased at higher rates, especially in the second half of the first decade of this century, due to wage revisions that witnessed significant increases. The wage mass grew at an average rate of 15%. However, this increase varied from one period to another, with the annual increase rate of the wage mass ranging from 1.9% in the latter period to 30% recorded in 2011.

The early 1990s witnessed significant growth, with the highest growth rates in the wage mass of 42%, 33.6%, and 20.9% in 1991, 1992, and 1993, respectively. These increases coincided with disruptions and labor protests due to the decline in citizens' purchasing power, resulting from rising prices, a depreciation of the dinar, security conditions, social stability, and a decline in citizens' purchasing power.

Through the above figure, there is a parallel between the growth of wages and the growth of prices in Algeria in many periods of the national economy. This demonstrates the importance of wages as a determinant of aggregate demand, as well as the impact of prices on wage increases, especially in the early 1990s and the beginning of the second decade of the twenty-first century. The increase in wages shown in the figure is largely due to non-economic reasons, as these increases are not linked to productivity increases, but are usually due to primarily political motives, often coinciding with periods preceding elections as a form of buying social peace.

SECTION III: The standard study on the impact of wage mass on inflation

the study focuses on the asymmetric impact of wage mass on the inflation rate in Algeria, using the Nonlinear Autoregressive Distributed Lag (NARDL) model during the period 1989-2023, both in the long and short terms. The NARDL model is considered more efficient, and its results are more accurate and realistic than linear models.

First Requirement: the study focuses on identifying the variables

It highlights the asymmetric impact of wage mass on the inflation rate in Algeria, using the following variables:

- **INF**: The dependent variable, representing the inflation rate as a percentage.
- **MS**: Wage mass as an independent variable, estimated in billion DZD.
- **PP**: Global oil prices as a structural independent variable, estimated in US dollars per barrel.

$$\Delta INF=\alpha+\rho INFt-1+(\beta+Mt-1+\beta-Mt-1)+\delta PPt-1+\sum j=0\rho-1\alpha j\Delta PPt-j+\mu t\Delta INF=\alpha+\rho INFt-1+(\beta+Mt-1+\beta-Mt-1)+\delta PPt-1+\sum j=0\rho-1\alpha j\Delta PPt-j+\mu t$$

Where:

- **a** : represents the intercept or estimation constant.
- $\beta+Mt-1+\beta-Mt-1\beta+Mt-1+\beta-Mt-1$ represents the positive and negative values in the long term for wage mass.
- **μt** : represents the random error term.

Second Requirement: the results of the model and various tests.

First, the stationarity test: is conducted to ensure the stability of the model before statistical estimation. The stationarity of the time series is confirmed using the Augmented Dickey-Fuller (ADF) test. **(Obben, 1998, pp. 109-121)**.

If the absolute value of the calculated ADF test statistic is greater than the critical values at the 0.05 significance level, and if the probability value is less than 0.05, the null hypothesis of the presence of a unit root in the series is rejected, **(Gujarati, 2003, p. 19)**indicating that the time series is stationary. The ADF test is

performed in the presence of a trend and intercept. If the absolute value of the calculated ADF test statistic is greater than the critical values at the 0.05 significance level, and if the probability value is less than 0.05, the null hypothesis is rejected, indicating that the time series does not contain a unit root. **(khaled lafi anif, 2018, p. 26)**

Table 01 :The results of the ADF test

Variable	Level		The first difference	
	Calculated value	Statistical significance	Calculated value	Statistical significance
INF	(-2.05)	0.557	(-4.155)	0.0095
MS	(-2.515)	0.32	(-5.698)	0.0001
PP	(-2.17)	0.49	(-9.44)	0.000
Decision	Series are unstable at level		Series are stable	

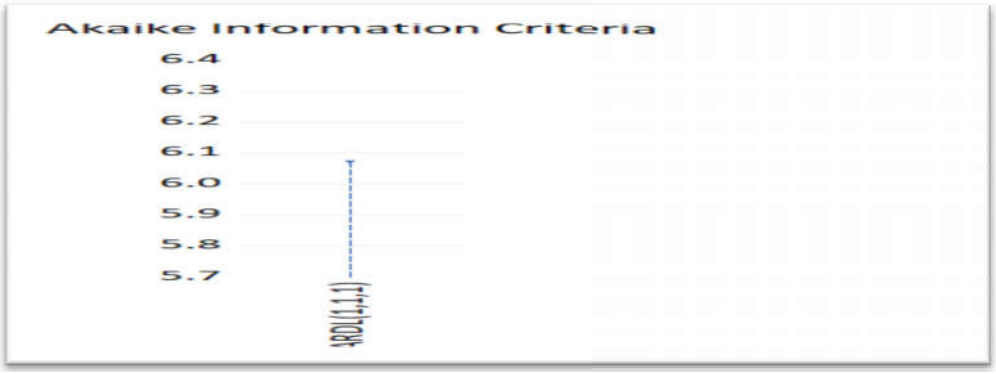
Source: Prepared by the researcher using EViews 13

Interpreting the results of the augmented Dickey-Fuller test reveals that for all variables in the table, the calculated value is less than the tabulated value, or one can rely on the probability value. It is noted that all variables are greater than 5% at the level, so the null hypothesis cannot be rejected. Therefore, all variables are unstable at the level. Conversely, when applying first differences to the variables, all variables stabilized, as the probability values for the variables are less than 5%. Thus, all variable data stabilized at the first difference, indicating that all variables are integrated of order one, I(1). This allows the possibility, according to Granger, of having a common integration among the variables, and thus the NARDL model can be applied, if it is proven by the Wald Test (symmetry or symmetry test) that there is no symmetry.

Secondly, the common integration test: Since the units of the variables differ between dollars and dinars, we relied on the standard method in estimating the NARDL model in order to unify the currencies between the variables.

1.Determining the lag lengths in the NARDL model

Figure 3: Results of the optimal lag length test



Source: Prepared by the researcher using EViews 13

Based on the graphical representation, the optimal lag for the variables is (1, 1, 1). This corresponds to the lowest value of the Akaike Information Criterion (AIC).

2.Model Quality Assessment: Before proceeding with the statistical and economic analysis of the model, it is essential to ensure that there are no measurement problems that could lead to biased and spurious estimates and, consequently, misleading results. Additionally, the structural stability of the estimated NARDL models should be verified using the Cusum and Cusum Square tests. The results of these tests are summarized in the following table:

Table (02): Summary of Measurement Problem Tests

Probability value	Statistical value	The test	type Test
0.89	0.27	**Jarque-Bera**	The Normalité distribution of résiduels
0.07	2.198	**LM-Correlation**	Autocorrelation between residuals
0.25	9.819	**Breush pagan godfrey**	Heteroskedasticity
0.27	1.06	**Ramsey**	Model spécification problem test

Source: Prepared by the researcher using EViews 13.

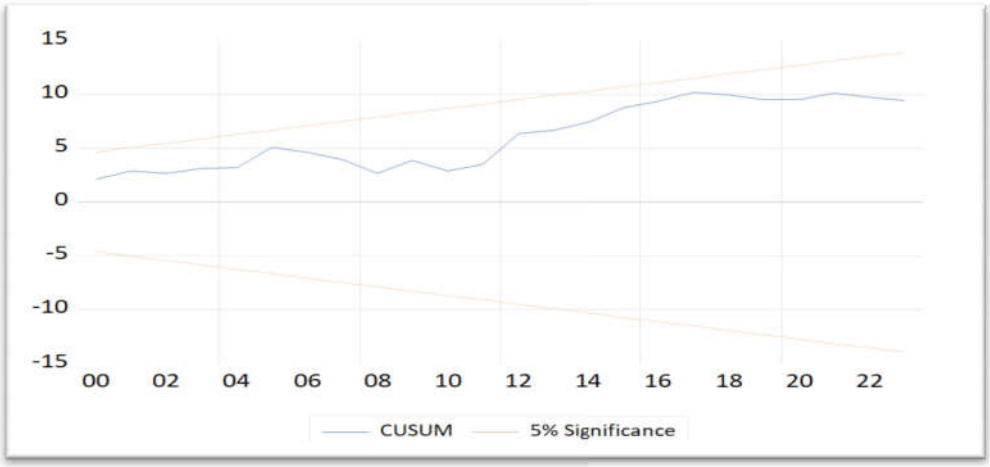
The tests shown in the table are based on similar assumptions in principle. The null hypothesis for these tests states the absence of a problem, while the alternative theory suggests the opposite.

From the table above, we notice that the probability values for the tests: Jarque-Bera, Breusch-Godfrey, serial correlation are all significantly greater than the critical values (0.05), meaning that we accept the null hypothesis for all tests. Therefore, the model residuals do not suffer from the problems of autocorrelation, heteroscedasticity, and they are normally distributed. Additionally, the Ramsey test indicates that the probability corresponding to the F-statistic is greater than 0.05, hence, the null hypothesis that the model is well specified is accepted.

hirdly, the stability test of the model coefficients: The stability of the model is assessed through the structural stability test of the short-term and long-term coefficients. This means that the data used in the model do not exhibit structural changes over time. Two tests were employed for this purpose.

1. **Cusum Test:** The cumulative sum of squares test for the successive estimates of the model coefficients was relied upon. Stability tests are based on the graphical representation of the evolution of the estimated model coefficients over time and examining the extent of their stability within a specified confidence interval. If the coefficients remain stable and there are no structural changes, the estimated values of the coefficients will remain within the confidence limits. Each test consists of upper and lower bounds, with the path of the model coefficients' evolution lying between them. If the test path falls between the upper and lower bounds and does not exceed either of them, this indicates that the model coefficients are stable.

Figure (04): Structural Stability Test using Cusum Test

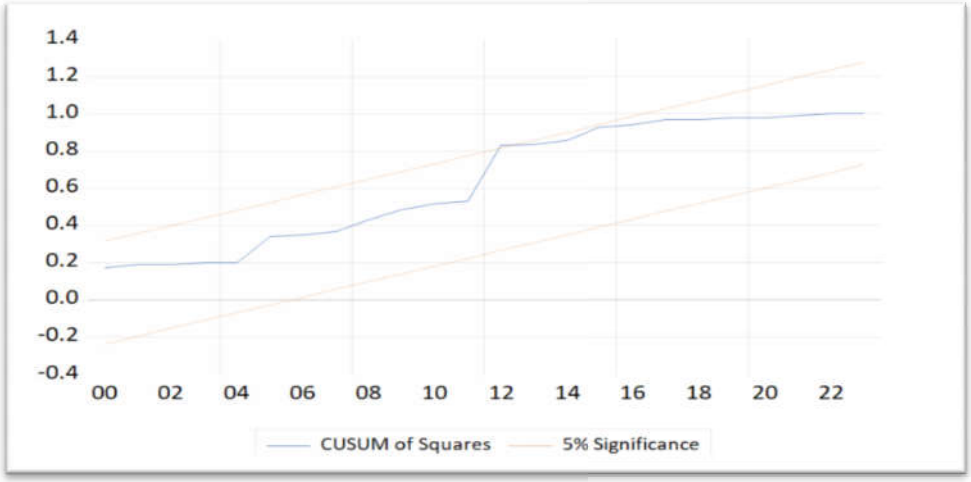


Source: Prepared by the researcher using EViews 13.

The Cusum Test, which represents the cumulative sum of squares of successive estimates of the model coefficients, indicates that the test path has been represented within the upper and lower bounds and has not exceeded either of them. Therefore, the proposed model coefficients are stable, and there are no structural changes within the data series used. This indicates stability in the model regarding the results of both short-term and long-term periods.

2. Cusum Test of Square :

Figure (05): Structural Stability Test using Cusum of Squares



Source: Prepared by the researcher using EViews 13.

Through graphical representation, the Cumulative Sum of Squares test for the successive estimates of the model coefficients shows that the test path appeared within the two lines, with an excursion during the 2014 period, indicating structural shocks during this period. However, these shocks dissipated in 2016, as the test path returned within the upper and lower bounds, indicating a return to stability in the coefficients during the study period and thus confirming the validity of the estimated model.

Fourthly, Boundary Test:

Table (03): Results of Boundary Test

Bounds Test

Null hypothesis: No levels relationship
Number of cointegrating variables: 4
Trend type: Unrest. constant (Case 3)
Sample size: 54

Test Statistic	Value
F-statistic	19.111134
t-statistic	-4.250884

Bounds Critical Values

	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F-Statistic						
50	2.614	3.746	3.136	4.416	4.306	5.874
55	2.578	3.710	3.068	4.334	4.244	5.726
Asymptotic	2.450	3.520	2.860	4.010	3.740	5.060
t-Statistic						
Asymptotic	-2.570	-3.660	-2.860	-3.990	-3.430	-4.600

* I(0) and I(1) are respectively the stationary and non-stationary bounds.

Source: Prepared by the researcher using EViews 13.

We observe from the table that the statistical value of (F-st=19.11) is greater than the upper and lower critical values for the Narayan test at the 5% level (3.06, 4.33). Therefore, we can infer the possibility of a common integration between the variables. To further confirm this, we turn to the Student's t-test, where the statistical value is compared to the critical value (4.25), which is greater than the upper and lower critical values for Narayan at the 5% level (2.86, 3.99). Thus, there is a long-term common integration relationship between the variables.

Fifthly : Symmetry or Symmetry Test

Table (04): Wald Test

Coefficient symmetry tests
Null hypothesis: Coefficient is symmetric
Degrees of freedom (simple tests): F(1,45), Chi-square(1)
Degrees of freedom (joint tests): F(2,45), Chi-square(2)
Equation:

Variable	Statistic	Value	Probability
	Long-run		
PP	F-statistic	12.33188	0.0010
	Chi-square	12.33188	0.0004
	Short-run		
PP	F-statistic	12.40213	0.0010
	Chi-square	12.40213	0.0004
	Joint (Long-Run and Short-Run)		
PP	F-statistic	10.20277	0.0002
	Chi-square	20.40554	0.0000

Source: Prepared by the researcher using EViews 13.

From the table results, it is evident that the statistical probability of the test is estimated at (0.0002), which is smaller than 0.05. This leads to rejecting the null hypothesis and accepting the alternative hypothesis, which indicates a lack of symmetry in the effect of positive values compared to negative values in both the short and long terms. It is clear from this test that the choice of the NARDL model is the optimal model for interpreting the relationship under study.

1. Estimation of Short-Term Relationship

Table (05): Results of Error Correction Model (ECM) Estimation

Error Correction

Dependent Variable: D(TI)
Method: ARDL
Date: 03/18/24 Time: 01:06
Sample: 1992 2023
Included observations: 32
Max. dependent lags: 1 (Fixed)
Fixed-lag linear regressors: M
Fixed-lag dual non-linear regressors: PP
Deterministics: Unrestricted constant and no trend (Case 3)
Selected model: ARDL(1,1,1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	-0.191701	0.080444	-2.383049	0.0245
D(M)	0.002535	0.004520	0.560774	0.5796
@DCUMDP(PP)	-0.089308	0.109048	-0.818980	0.4200
@DCUMDN(PP)	-0.049160	0.078699	-0.624655	0.5374
C	2.095287	1.937733	1.081308	0.2891

R-squared	0.217403	Mean dependent var	-0.506250
Adjusted R-squared	0.101462	S.D. dependent var	4.505438
S.E. of regression	4.270760	Akaike info criterion	5.884062
Sum squared resid	492.4536	Schwarz criterion	6.113083
Log likelihood	-89.14499	Hannan-Quinn criter.	5.959976
F-statistic	1.875126	Durbin-Watson stat	2.080101
Prob(F-statistic)	0.143782		

* p-values are incompatible with t-Bounds distribution.

Source: Prepared by the researcher using EViews 13.

Through the table, it is evident that the error correction term is negative and significant (-0.19), indicating that 19% of the short-term errors will be corrected to achieve long-term integration. Correcting these deviations requires more than 5 years (1/0.16=5.26), representing a somewhat long correction period, indicating that the economy is somewhat inflexible. As for the impact of positive shocks, it is not significant, as the statistical probability value for positive effects is estimated at 0.5796, which is greater than 0.05, indicating no effect in the short term. Even if there is an effect of positive shocks, it is weak and fades away in the short term.

2. Estimation of Long-Term Relationship

Table (06): Estimation of Long-Term Relationship

Cointegrating Specification

Deterministics: Unrest. constant (Case 3)

CE = TI(-1) - (-0.020737*M(-1) + 0.312170*@CUMDP(PP(-1),"1991") - 0.456265*@CUMDN(PP(-1),"1991"))

Cointegrating Coefficients

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
M(-1)	-0.020737	0.021365	-0.970603	0.3398
@CUMDP(PP(-1))	0.312170	0.473219	0.659673	0.5147
@CUMDN(PP(-1))	-0.456265	0.409532	-1.114113	0.2744

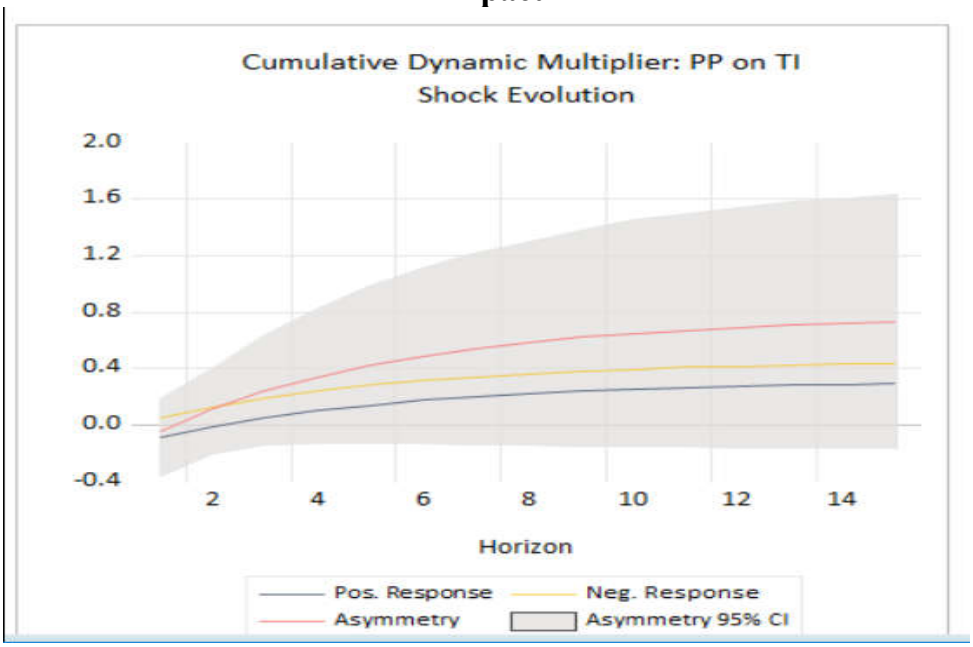
Note: * Coefficients derived from the CEC regression.

Source: Prepared by the researcher using EViews 13.

We notice that the effect of positive shocks was negative and insignificant, while the effect of negative shocks was inverse and significant. Therefore, we can say that positive shocks do not affect inflation rates in Algeria, while negative shocks have a significant inverse effect on inflation rates. Thus, in the long

term, inflation rates are only affected by negative shocks and are not affected by positive shocks.

Figure (06): Asymmetric Dynamic Cumulative Multiplicative Impact



Source: Prepared by the researcher using EViews 13.

The results indicate that there are different effects of shocks occurring at the level of oil prices concerning asymmetric relationships. A positive shock through an increase in the positive effects of pp and MS by one unit will lead to a gradual and somewhat weak decline in the inflation rate until the 15th year, after which it begins to stabilize, indicating the fading of the positive shocks' effects. This suggests that positive shocks have a short-term effect. On the other hand, the effect of negative shocks leads to a significant decrease in the inflation rate and does not stabilize in the long term, indicating that the negative effects of MS on inflation rates are long-term effects.

Through the cumulative multiplier for 15 years, we notice that the response of the inflation rate to negative shocks for an increase in wage mass is greater than its response to positive shocks.

Conclusion:

Through this research paper, we attempted to apply the standard analysis using the Nonlinear Autoregressive Distributed Lag (NARDL) model to understand the impact of wage changes on inflation rates in Algeria during the period 1989-2023. In conclusion, the following results were obtained:

- Inflation is of great importance as a key indicator of economic stability, as it is linked to various aggregate indicators. However, the disparity between advanced economies and developing countries has led to variations in determining its true sources.
- The irrational use of capital and its decreasing productivity due to increasing consumption and unexpected temporary conditions such as wars, crises, and pandemics like COVID-19, which hinder production or the importation of raw materials.
- Wages play a significant role in economic developments by increasing aggregate demand.
- The continuous and accelerating increase in prices of final or productive goods imported from abroad reflects on the rise in prices of goods and services in local markets.
- Structural constraints that hinder expansion in production, especially regarding the inflexibility in food supply and demand coverage in case of growth, foreign exchange restrictions, and budget constraints.
- The importance of inflation lies in the magnitude of its negative effects on the economy and society. However, its manifestation depends on the severity and duration of price increases, as well as the anticipation of their occurrence. Wealth redistribution remains one of the most significant negative effects of this phenomenon, depending on measures

that reflect the extent of respect for and application of laws and levels of justice among society's components.

- Monetary policies are crucial in containing inflation by controlling and directing credit use, investment patterns, and production.
- The empirical study results indicate a long-term equilibrium relationship between wage mass and government spending in Algeria, meaning that wages have a long-term impact on the inflation rate in Algeria, directly linking the inflation rate in Algeria in the long run to wage mass changes.
- After conducting unit root tests to determine data stability, the results showed that all study variables stabilize after taking the first difference, meaning all variables are integrated at the first order.
- There is a negative relationship between wage mass and the inflation rate in Algeria, confirming the validity of the first hypothesis.
- There is a common integration relationship between wage mass and the inflation rate, confirming the validity of the second hypothesis.
- The impact of wage increases in the short term on the inflation rate in Algeria is positive and significant, explaining that the inflation rate in Algeria is affected by wage increases in the long term and is directly affected by situational changes in wage mass due to increased demand for consumer goods.
- Finally, the results of this study appear more realistic, especially as they align with the results of most previous studies that addressed the issue in earlier periods or other countries, where the inflation rate in most countries is positively affected by wage mass changes, as wage increases lead to increased demand for consumer goods and consequently to a rise in the general price level.

Recommendations:

- The increase in wages should be accompanied by an increase in the money supply.
- The inflation rate should be calculated based on a basket of food items of economic importance to the community.
- Attention should be given to the real values of wage increases.

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