بنك الجزائر
BANK OF ALGERIA

WORKING PAPER 1-2022

INFLATION DYNAMICS AND DETERMINANTS IN ALGERIA: AN EMPIRICAL INVESTIGATION

November 2022

Abstract

This paper investigates the determinants of inflation in Algeria over the 2011-2021 period using an Autoregressive Distributed Lag Model (ARDL). This approach allows to examine the existence of a long term relationship between inflation on the one hand, and money supply, nominal effective exchange rate, import price index, and public expenditure, on the other hand. Using monthly data, estimation results show that money supply, import price index, and nominal effective exchange rate determine inflation variations in the long run. Moreover, the decomposition of annual contributions of each variable to inflation shows that its main determinants are money supply and import price index, with an average contribution to inflation of 91 percent.

Keywords: Algeria, inflation, determinants, ARDL.

JEL codes: E31, C22, O55.

1. INTRODUCTION

The 2020 pandemic marked the beginning of an "inflation hurricane", amid extreme economic volatility and geopolitical instability never seen in decades. Indeed, global inflation is quite persisting, and it has sharply increased in 2022 due to rising energy and food prices, lasting supply chain disruptions and labor markets pressures. In most developing countries, inflation rates which are usually higher and more volatile than in developed countries, have also sharply widened and reached double-digits. Indeed, from May to September 2022, inflation is above 5% in 88.9% of low-income countries, 91.1% of lower-middle-income countries, and 96% of upper-middle-income countries (World Bank, 2022).

Nevertheless, high and persistent inflation is not a recent phenomenon nor merely due to the pandemic shock. Indeed, price stability has always been the ultimate objective of policymakers since it supports economic growth and employment. There is a vast theoretical and empirical literature which has identified many determinants that explain inflation fluctuations and trends.

Indeed, inflation can be caused by many supply or demand driven factors in the short, medium, or long term. In the long run, it is widely recognized that inflation is essentially a monetary phenomenon caused by excessive money supply/creation (Friedman, 1956). In the short term, it is established that changes in price levels are influenced by determinants such as changes in global supply and demand, changes in commodity prices, technological change, exchange rate swings, and climate shocks (Kinda, 2011).

Moreover, the literature has identified some social, political, and institutional factors that can also affect price levels in the short and long term, especially in developing countries. Some of these factors may be due to government barriers to stimulating solid and sustained economic growth with strong institutions. Inflation is therefore caused by factors beyond the control of central banks, such as inadequate private savings, underdeveloped industrial development, political instability, and weak governance and institutional quality.

The sources of inflation differ across countries. While there are many studies that have investigated the determinants of inflation in several developed countries, less attention has been paid to oil-exporting developing countries. Yet, monitoring inflation is more challenging in these countries for at least two reasons. First, inflation becomes inevitable if oil revenues are not carefully invested in the real sector. Second, despite exporting a commodity which is not only inelastic in demand, but can also increase the value of the domestic currency relative to

other currencies, i.e., lead to an exchange rate appreciation, inflation level remained high over time in many oil-exporting developing countries.

Algeria is among the top three oil producers in Africa and the top ten net oil exporters in the world. The oil sector is the backbone of its economy. In 2021, this sector represented the primary source of income accounting for about 30% of the GDP, more than 82% of export earnings, and about 60% % of the total budget revenues. Like many other oil-exporting developing countries, Algeria will benefit from a short-term surge in oil and gas prices resulting from the current pressures on the world energy markets. However, even though Algeria's economy is off to a good start to 2022 after proving to be very resilient to the COVID-19 waves and their aftermath, rising inflationary tensions is unescapable.

Thus, examining and identifying the country's inflation dynamics and sources is a pivotal question. This paper aims to shed some light on this issue by investigating both short and long run determinants of inflation in Algeria over the 2011-2021 period using monthly data. The remainder of this paper is organized as follows. Section 2 overviews some studies that are most related to our work. Section 3 briefly describes our data, and discusses the econometric methodology used to analyze them. Section 4 reports our results and Section 5 summarizes our findings and gives some concluding remarks. An appendix contains some complementary material.

2. RELATED WORK

This section briefly surveys and discusses a piece of recent empirical studies that are most related to our work. This review is by no means exhaustive but rather serves the purpose of guiding us in identifying relevant variables and choosing appropriate proxies to include in our model.

Inflation changes are often interpreted as partial adjustments to the long run (or equilibrium) of actual price levels.[1] Understanding the determinants of inflation is crucial as it helps central banks to conduct effective monetary policy in order to ensure price stability. The relative importance of each determinant varies across countries and changes over time depending on: i) the use of economic resources, which determines the size of the output gap, and thus demand-side inflation; ii) supply-side shocks for key commodities such as food and energy; ii) exchange

[1] The theoretical literature on the determinants of inflation considers both demand and supply side factors, which are extensively discussed. See, Asfuroğlu (2021), among others.

rate fluctuations which can affect general price levels due to pass-through effects; and iv) the monetary policy ability to meet inflation expectations (Mehibel and Belarbi, 2018).

In Algeria, a study by ZAID (2013) estimated a VECM model using monthly data over the 2003 – 2011 period in order to identify the determinants of price movements. The explanatory variables considered in the model were oil prices, money supply, import price index, and the exchange rate of the Algerian dinar. The main finding confirmed the existence of a causal long run relationship between import price and money supply. Therefore, the author concluded that the main determinant of the country's inflation has been imported inflation.

Similarity, Si Mohammed (2016) analyzed the determinants of inflation in Algeria using data from 1980 to 2012, and an ARDL specification. The explanatory variables considered in the model were import prices, oil prices, money supply, government spending, and the nominal effective exchange rate of the Algerian dinar. Empirical results showed a stable long-term relationship between inflation and its determinants. However, only external factors such as import prices, oil prices and nominal exchange rate seemed to impact Algeria's inflation in the long run.

In the same vein, Souissi (2017) investigated the determinants of inflation in Algeria during the 2003 – 2016 period. He estimated an inflation model that considers both foreign and domestic policy factors using a vector error correction model (VECM) approach. The results suggest that domestic macroeconomic policies and external factors are key drivers of long-term inflation in Algeria. In the short term, inflation is very persistent and the money supply appeared to be the most important determinant of inflation compared to macroeconomic policy factors such as exchange rates and fiscal variables.

In a recent study, Mahyaoui (2019) used a VECM model for the period 1990-2015 to examine the factors that could explain inflation in Algeria. Empirical results showed that inflation is driven by the level of import prices, public spending and GDP in the long run, while in the short run, no significant relationship was found between inflation and the independent variables.

In a nutshell, this empirical literature clearly suggests that money supply and imported inflation are the main drivers of inflation in Algeria. We build on these findings to choose an appropriate set of data to include in our model, which we present in the next section.

3. DATA AND EMPIRICAL METHODOOGY

We collected monthly data from January 2011 to December 2021 on the following variables: consumer price index (*CPI*), money supply (*M2*), nominal effective exchange rate (*NEER*), import price index (IPI), and public expenditure (*PE*). The data were obtained from the Bank of Algeria databases and the Algerian National Office of Statistics (ONS). Table A1 in the appendix gives more details on data and discusses the effects that theory allows us to expect.

All the variables were log-transformed prior to performing our econometric analysis in order to minimize the effect of the significant differences in their scale and interpret the estimated coefficients as "elasticities" of the dependent variable with respect to the corresponding independent variables.[2]

The validity of time series data analysis dwells on a first important step which consists of checking the stationarity of the time series under consideration. A standard recommendation is to use unit root tests and additional stationarity tests to assess the stochastic properties of variables used to estimate the model. A clear result can be obtained when both test types are in agreement. Therefore, three tests were performed in this paper: The Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test, and the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) test.

Prior to the implementation of the unit roots tests we performed two standard preliminary tests: correlation matrix and Toda-Yamamoto causality test. Then, we choose to estimate and analyze the long-run relationships and dynamic interactions among our variables of interest by using the bounds testing or ARDL cointegration procedure developed by Pesaran *et al.* (2001).[3] This procedure considers temporal dynamics when accounting for time series variables, which allows to formulate efficient economic policy in contrast to static models, where the explanation is not distributed over time and only partially recovers the variation of the explained variable (kuma, 2018). In addition, the ARDL cointegration method is suitable when dealing with time series characterized by mixed order of integration, i.e., I(0) and I(1).[4]

The long-run relationship between inflation and its determinants is estimated via the ARDL approach as follows:

[2] Log-transformation has been shown to alleviate the problem of heteroscedasticity (Maddala and Kim, 1998).
[3] See Pesaran *et al.* (2001) for a detailed explanation of this procedure.
[4] However, this procedure cannot be applied to variables with an integration order greater than or equal to two I(2).

$$CPI_t = c_{0+} \sum_{i=1}^{p} \delta_{1i} CPI_{t-i} + \sum_{i=0}^{q} \delta_{2i} M2_{t-i} + \sum_{i=0}^{r} \delta_{3i} L\_NEER_{t-i} + \sum_{i=0}^{s} \delta_{4i} L\_IPI_{t-i} + \sum_{i=0}^{l} \delta_{5i} L\_PE_{t-i} + \varepsilon_t, t = 1,2,\dots,T$$

where the terms $\delta_1, \delta_2, \delta_3, \delta_4, \delta_5$ represent the long-term coefficients, C_0 the constant, et Ɛ the error term.[5]

The short-run relationship between inflation and its determinants is estimated via the ARDL approach as follows:

$$\Delta CPI_t = \lambda + \sum_{i=1}^{p} \phi_i \Delta CPI_{t-i} + \sum_{i=0}^{q} \varphi_i \Delta M2_{t-i} + \sum_{i=0}^{r} \omega_i \Delta NEER_{t-i} + \sum_{i=0}^{s} \vartheta_i \Delta IPI_{t-i} + \sum_{i=0}^{l} \mu_i \Delta PE_{t-i} + \gamma ect_{t-1} + \varepsilon_t, t = 1,2,\dots,T$$

where the terms ϕ, φ, ω, ϑ, μ, are the short-term dynamic coefficients of the model once it has converged to equilibrium. ect_{t-1} is the error (or equilibrium) correction term derived from the long-run equilibrium relation, and γ is the coefficient associated with this term that represents the speed of adjustment.

4. ESTIMATION RESULTS AND DISCUSSION

4.1. Correlation

A preliminary examination of the correlation coefficients between the dependent variable (CPI) and the various independent variables (M2, NEER, IPI, PE) are shown in Table 1. The results are consistent with initial theoretical expectations. Indeed, the correlation between CPI and M2 is highly significant (97%), as is the correlation between CPI and IPI (86%). This means that an increase in the money supply or import prices will lead to an increase in inflation. Moreover, the correlation between CPI and NEER is highly significant and negative (-94%). This statement is consistent with economic intuition as NEER of the Algerian Dinar is quoted at a constant rate and a decline in NEER would result in increased inflation reflecting the nominal depreciation of the Algerian Dinar. However, the correlation between inflation and PE is positive but not significant (38%).

[5] Before implementing our model, we need to determine the optimal number of lags to include in the regression. The importance of this step is that the number of lags affects the robustness of estimation results. It is then necessary to choose the number of lags that optimizes these results. We used the Akaike Information Criterion (AIC), the optimal number of lags being the one that minimizes the AIC.

Table 1. correlation coefficients

	CPI	M2	NEER	IPI	PE
CPI	1.000000	**0.966644**	**-0.942013**	**0.862910**	0.384579
M2	0.966644	1.000000	-0.898182	0.790346	0.378664
NEER	-0.942013	-0.898182	1.000000	-0.825911	-0.404989
IPI	0.862910	0.790346	-0.825911	1.000000	0.332436
PE	0.384579	0.378664	-0.404989	0.332436	1.000000

4.2. Causality

The Toda-Yamamoto causality test can detect the existence of a causal relationship between two variables, and the direction of that relationship, if one exists. This test can be performed with mixed time series (different integration orders).[6] However, this test cannot be applied to variables with an integration order greater than or equal to two.

Table 2. Toda-Yammamoto causality test results (Wald test)

Null Hypothesis	Chi-sq	Prob.
M2 does not Cause CPI	7.662632*	0.0535
CPI does not Cause M2	0.108585	0.9908
NEER does not Cause CPI	8.658112*	0.0314
CPI does not Cause NEER	2.782455	0.1689
IPI does not Cause CPI	14.78256*	0.0020
CPI does not Cause IPI	5.705964	0.1268
PE does not Cause CPI	10.31748	0.1713
CPI does not Cause PE	12.75544	0.0783

Table 2 above shows that a one-way causal relationship exists between CPI, NEER, M2 and IPI. These results are consistent with initial theoretical expectations, as they imply that the nominal effective exchange rate, money supply, and import price index cause inflation, but not *vice versa*. However, test results show that there is no causal relationship between inflation and public expenditure.

[6] This test is based on the null hypothesis: H_0: X does not cause Y. At a 5% level of confidence, the null hypothesis is rejected when the estimated p-value is lower than (0.05).

4.3. Stationarity

The unit root testing procedure is well established in the literature and will therefore not be discussed here with great details. The ADF and PP tests are designed to test the null hypothesis of a unit root against the alternative of no unit root. Unlike the ADF and PP tests, the KPSS test is a test of stationarity with the null being that the series is stationary. A rejection of the null hypothesis of stationarity in the KPSS test would then tend to corroborate a failure to reject the null hypothesis of a unit root in the ADF and PP tests. Three different specifications of these tests are available. The first excludes both the trend and the intercept. A second specification includes the intercept but excludes the trend term. The third specification includes both the trend term and the constant term. Following Harris *et al*. (2002), we include both the trend term and the constant term in our analysis.

Table 3. ADF, PP, and KPSS tests results[+]

Series in levels			
Variable	ADF-statistic	PP-statistic	KPSS-statistic
CPI	-3.902*	-3.900*	0.343**
M2	0.225	-0.003	0.399**
NEER	-3.560*	-3.202	0.222**
IPI	-0.320	-2.519	0.294**
PE	-1.506	-6.741*	0.128
Series in first differences			
CPI	-10.584*	-17.789*	0.0895
M2	-8.829*	-18.115*	0.1793
NEER	-12.669*	-12.612*	0.0257
IPI	-14.221*	-17.429*	0.0740
PE	-3.023*	-19.629*	0.1153

[+]A "*" attached to a value of the ADF- or the PP-statistic indicates a rejection by the test of the null hypothesis H_0 that the series is a unit root process, in which case it is not stationary, at the 5% statistical significance level.
[+]A "*" attached to a value of the KPSS-statistic indicates a no rejection, at the 5% significance level, of the null hypothesis H_0 that the series is stationary against the alternative hypothesis H_1 that it is a unit root process.

The ADF, PP and KPSS tests are applied to our time series in both their levels and their first differences, and Table 3 above below gives the results of these tests. The results indicate that the variables have mixed orders of integration. Indeed, CPI and NEER are stationary in level. In other words, they are integrated of order 0. Whereas M2, IVI and PE are not stationary in level but stationary in first differences, i.e., they are integrated of order 1. These mixed results further confirm the appropriateness of using an ARDL model to investigate the existence of a long term relationship among the variables.

4.4. ARDL estimation results

The result of the bound test is presented in Table 4 below, and shows that the Fisher test value (F = 6.31) far exceeds the upper limits of the critical values. In this case, we can reject the null hypothesis of no long-term relationship and we can conclude that a long-term relationship exists between the variables in the model.

Table 4. Bound test results[7]

	I(0) bound	I(1) bound	Significance level
F – statistics = **6.31**	2.2	3.09	10%
	2.56	3.49	5%
	2.88	3.87	2.5%
	3.29	4.37	1%

Table 5. ARDL estimation results (short-run equation)

Selected Model : ARDL (1, 1, 0, 2, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.323811	0.225927	1.433257	0.1549
CPI (-1)*	**-0.104998**	0.039251	-2.675041	**0.0087**
M2 (-1)	0.021612	0.015645	1.381375	0.1702
NEER*	**-0.052873**	0.024693	-2.141238	**0.0347**
IVI (-1)**	**0.029703**	0.017252	1.721696	**0.0882**
PE	-0.002122	0.001296	-1.638206	0.1045
D(M2)	-0.053758	0.082255	-0.653556	0.5149
D(M2(-1))	-0.188155	0.079385	-2.370153	**0.0197**
D(IVI)	-0.013219	0.019250	-0.686710	0.4939
D(IVI (-1))	**-0.056097**	0.020853	-2.690057	**0.0084**
D(IVI (-2))	-0.030612	0.018160	-1.685738	0.0950

R-squared	0.957831	Mean dependent var	0.004005
Adjusted R-squared	0.917440	S.D. dependent var	0.008614
S.E. of regression	0.004518	Akaike info criterion	-7.756435
Sum squared resid	0.001102	Schwarz criterion	-7.214666
Log likelihood	292.3534	Hannan-Quinn criter.	-7.540990
F-statistic	12.53216	Durbin-Watson stat	2.106595
Prob(F-statistic)	0.000000		

The estimation results of the ARDL model is presented in Table 5 above, where CPI(-1) represents the misalignment of the CPI from its long-run equilibrium. According to econometric theory, the value of the associated coefficient must be statistically significant and negative and

[7] See Pesaran *et al. (2001)* for a detailed explanation of the bound test.

can be interpreted as the speed of adjustment to equilibrium after a short-term deviation. In our model, this coefficient is negative and statistically significant (-0.104). This indicates that a misalignment of the CPI from its long-run equilibrium is corrected by 10.4 percent each period (each month in our model). In other words, a misalignment from its long-run equilibrium is fully corrected after 9.5 months.

The long-run equation takes the following form:

$$\widehat{CPI}_t = \underset{\mathbf{[0.027]}}{0.2058}*M2_t - \underset{\mathbf{[0.029]}}{0.5036}*NEER_t + \underset{\mathbf{[0.030]}}{0.2829}*IVI_t - \underset{[0.159]}{0.0202}*PE_t + 3.0840$$

The coefficients associated with M2 and IPI are positive and statistically significant (0.20 and 0.28 respectively) and are in line with theoretical expectations. In other words, a 1% increase in money supply leads to a 0.20% increase in inflation. Similarly, a 1 percent increase in import price index leads to a 0.28 percent increase in inflation. Moreover, we note that the values of these coefficients are quite close. In other words, an increase in money supply and an increase in import unit value index have almost the same impact on inflation in terms of magnitude. This magnitude seems, however, quite small. This could indicate that inflation in Algeria is not strictly a monetary phenomenon.

The coefficient associated with the NEER is negative and statistically significant. It therefore meets theoretical expectations, and represents the highest coefficient in terms of magnitude in our model. Thus, the effect of a depreciation of the Algerian dinar has a greater impact on inflation than the impact of an increase in import prices or in money supply. Indeed, a 1 percent depreciation of the Algerian dinar leads to a 0.5 percent increase in inflation. The coefficient associated with PE variable is not statistically significant. Hence, government expenditure does not appear to drive inflation upward in our model.

In order to ensure the reliability of the results and to avoid any biased estimation, it is necessary to test the econometric robustness of the estimated model by performing validation tests on the residuals of the model. We will check the robustness of our estimates by performing the standard triad of tests, namely, an autocorrelation test (Breusch-Godfrey), a normality test (Jarque and Bera), and a heteroskedasticity test (Breusch-Pagan-Godfrey).

The results of these tests are presented in Table 6, Graph 1, and Table 7, respectively. The results of the autocorrelation test indicate that the p-value associated with the test (0.913) is

above the significance level (0.05). Therefore, we can accept the null hypothesis that the residuals are not autocorrelated and reject the alternative hypothesis. On the other hand, the results of the normality test indicate that the value of the probability associated with the test (0.530) is above the significance level (0.05). We can therefore accept the null hypothesis that the residuals have a normal distribution and reject the alternative hypothesis. Finally, the results of the heteroskedasticity test indicate that the p-value associated with the test (0.441) is greater than the significance level (0.05). We can therefore accept the null hypothesis that the residuals are homoscedastic and reject the alternative hypothesis.

Table 6. Breusch-Godfrey Serial Correlation test results

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 10 lags

F-statistic	0.456154	Prob. F(10,90)	**0.9136**
Obs*R-squared	5.354516	Prob. Chi-Square(10)	0.8663

Graph 1. Normality test results

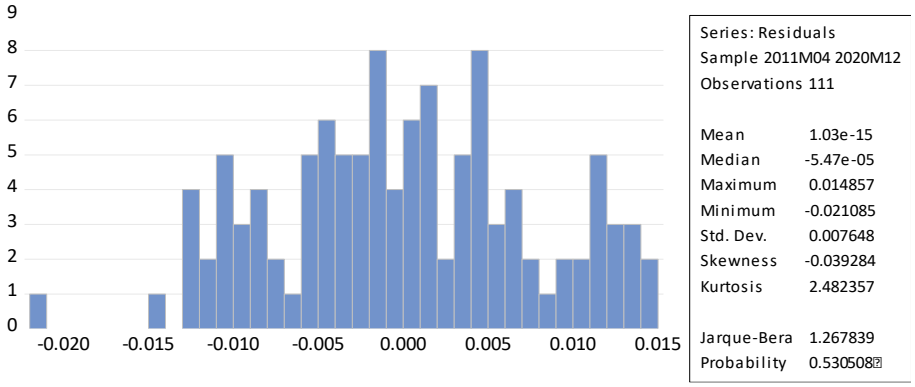


Table 7. Heteroskedasticity test results

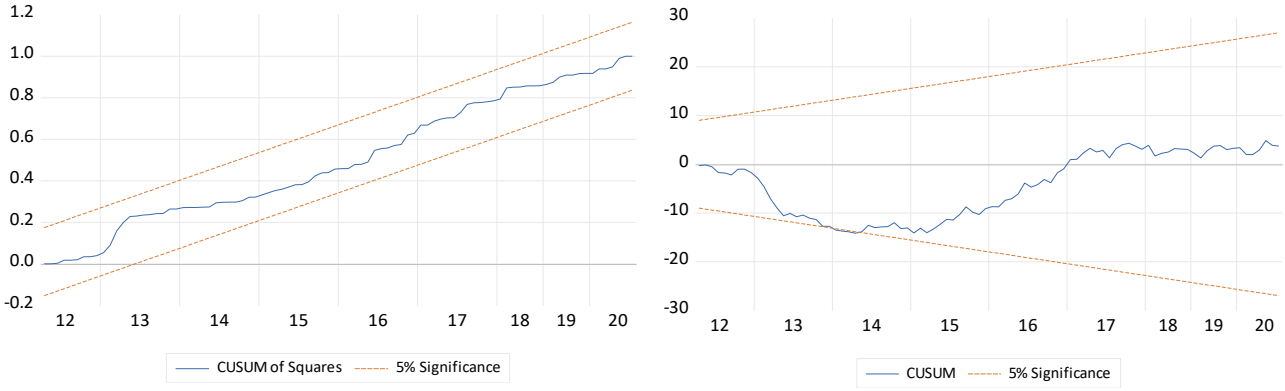
Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.008799	Prob. F(10,100)	**0.4415**
Obs*R-squared	10.17156	Prob. Chi-Square(10)	0.4256
Scaled explained SS	6.118776	Prob. Chi-Square(10)	0.8052

In light of these results, we can conclude that the three conditions of normality, serial independence of the residuals, and homoscedasticity are confirmed. We also implement the CUSUM and CUSUMQ stability tests to examine the stability of the estimated model. The results presented in Graph 2, below, show that the parameters of the model are stable since the

graph is inside the interval of critical values at the 5% significance level. Thus, we can confirm the robustness of our econometric model and the reliability of its results.

Graph 2. CUSUM and CUSUMQ test results



4.5. Inflation contributions

In the following, we aim to decompose the contribution of each determinant in global inflation. The decomposition method used is based on the calculation of a proxy for each variable (determinant of inflation) which depends mainly on two components: the size of its coefficient in the long-run equation, and the variation of this variable between two periods. Table 8 below depicts the contribution of each determinant to inflation over the 2012-2021 period. Our findings indicate that the main determinants of overall inflation are money supply and the import price index. Indeed, their average contribution to inflation over this period is 91 percent.

Table 8. Contributions to inflation over the 2012 – 2021 period

	M2	NEER	IPI	PE	TOTAL
2012	91 %	5 %	-12 %	16 %	100 %
2013	100 %	5 %	5 %	-10 %	100 %
2014	65 %	34 %	-4 %	5 %	100 %
2015	71 %	-13 %	43 %	-1 %	100 %
2016	13 %	67 %	16 %	4 %	100 %
2017	8 %	51 %	40,8 %	0,2 %	100 %
2018	25 %	9 %	59 %	7 %	100 %
2019	34 %	60 %	4 %	2 %	100 %
2020	93 %	-191 %	178 %	20 %	100 %
2021	17 %	22 %	59 %	2 %	100 %
AVERAGE	52 %	5 %	39 %	4 %	100 %

With an average contribution of 52 percent, money supply M2 ranks first. Its contribution to inflation was 85% between 2012 and 2014, then declined from 2015 (except in 2020 where its contribution reached 93%). On the other hand, the average contribution of import price index ranks second with a rate of 39%. Its contribution to inflation has been significantly increasing since 2015, except in 2019 where it contributed only by 4 percent to inflation. The nominal effective exchange rate contributes only by 5 percent to inflation on average over this period. However, its contribution varies significantly from year to year, from a minimum of 5 percent to a maximum of (-191) percent. Public expenditure contributes only marginally to inflation over the period under consideration, since it only determines inflation by an average of 4 percent.[8]

It should be noted that the main determinant of inflation in Algeria in 2021 is imported inflation, since the share of the import price index in the latter was 59%. This is explained by the weakness of the Algerian economy's production and its heavy dependence on imports, which makes it vulnerable to world prices swings and exposes it to external shocks. Thus, and following the pandemic shock, global inflation was the central catalyst of the inflationary process in Algeria via the import channel. The nominal effective exchange rate contributed 22 percent to overall inflation in 2021, while the M2 money supply contributed only by 17 percent.

5. CONCLUSION

This paper has sought to identify the main determinants of inflation in Algeria by analyzing monthly data from 2011 to 2021. To this end, we searched for empirical evidence of a robust long-run relationship between inflation and some determinants that have been highlighted in the literature. Using an ARDL approach and controlling for a set of relevant variables, we found an empirical evidence of the existence of a cointegration relationship between inflation, money supply, nominal effective exchange rate, and import price index. This led us to go further by decomposing the contribution of each determinant in global inflation over the period under consideration.

Our major finding is that import price index seem to be one of the main determinant of inflation, which confirms the fact that the weakness of Algeria’s production and the lack of domestic product substitution make it vulnerable to world prices swings and exposes it to persistent and

[8] Nevertheless, one should bear in mind that a large proportion of public expenditure is transformed into money supply, which explains its significant contribution to inflation during the period under consideration.

high levels of inflation through imports. All things being equal, Algerian policymakers should accelerate the process of domestic economic diversification, improve the business environment, attract foreign direct investment, and strengthen the means to promote integration into the world economy. This would undoubtedly reduce long-run inflationary pressure that stem from the import dependence.

REFERENCES

ASFUROĞLU, D. [2021]. "The Determinants of Inflation in Emerging Markets and Developing Countries: A Literature Review". *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, 21(2): 483-504.

FRIEDMAN, M. [1956]. *The Quantity Theory of Money-A Restatement*, University of Chicago.

HARRIS D., MCCABE B., and LEYBOURN S. [2002], "Stochastic cointegration: estimation and inference", Journal of Econometrics, 111(2): 363–384.

KINDA, T. [2011]. *Modeling Inflation in Tchad*, IMF Working Paper N° 11/57, International Monetary Fund.

KUMA, K. [2018]. *Modélisation ARDL, Test de cointégration aux bornes et Approche de Tado-Yamamoto : éléments de théorie et pratique sur logiciels*, Université de kinshasa, 6-7.

MADDALA G.S. and KIM I.M. [1998], *Unit Roots, Cointegration, and Structural Change. Themes in Modern Econometrics*, Cambridge University Press.

MEHIBEL, S. and BELARBI, Y. [2018]. "Inflation Dynamics in Algeria," *Journal of Economics and Behavioral Studies, AMH International*, vol. 9(6), pages 174-187.

PESARAN M.H., SHIN Y., and SMITH R.J. [2001], "Bounds testing approaches to the analysis of level relationships," *Journal of Applied Econometrics*, 16: 289–326.

SI MOHAMMED, K. [2016]. The Main Determinants of Inflation in Algeria: An ARDL Model. Les Cahiers Du Mecas, 12(1), 6-15.

SOUISSI, M. [2017]. *Determinants of inflation, Algeria : Selected Issues* (IMF Country No 17/142; (All MCD), and (FAD)). International Monetary Fund. https://www.imf.org/en/Publications/CR/Issues/2017/06/01/Algeria-Selected-Issues-44961

WORLD BANK [2022]. Food security update. Available at: https://www.worldbank.org/en/topic/agriculture/brief/food-security-update

ZAID, H. [2013]. "Comprendre l'inflation en Algérie", International Conference on Business, Economics, Marketing & Management Research (BEMM'13) Volume Book: Economics & Strategic Management of Business Process (ESMB), École Nationale Supérieure des Statistiques et d'Économie Appliquée, Alger.

APPENDIX

Table A1. Variables, designation, and theoretical predictions

Variable	Designation	Expected signs
CPI	Consumer price index	The Algerian consumer price index (CPI) is released monthly by the National Office of Statistics and is composed of a sample of 260 goods and services, and the reference year is 2001. The CPI is calculated according to the Laspeyres formula. The volatility of this index is a standard indicator for measuring inflation.
M2	Money supply (billions dinars, excludes domestic oil company deposits and foreign currency deposits)	Reflects the amount of money that circulates in the economy at any given time. According to the literature, fluctuations in this variable affect inflation. Indeed, an increase in money supply, especially through credit to the economy, leads to an increase in aggregate demand, which, other things being equal, leads to additional inflation. This variable excludes domestic oil company deposits and foreign currency deposits, as the latter do not contribute to domestic demand for goods and/or services.
NEER	Nominal effective exchange rate of the Algerian dinar	We include this index to consider the transmission channel of changes in the Algerian dinar nominal exchange rate to inflation. In fact, the weight of imported products is about 23% in the Algerian consumer basket. Therefore, inflation is expected to rise when the domestic currency depreciates. However, it should be noted that inflation and exchange rate movements ultimately depend on the stance of monetary policy. Monetary policy aims to control inflation by limiting exchange rate volatility to avoid inflation spikes.
IPI	Import price index	This variable is used as a proxy for imported inflation. In other words, if the Algerian dinar exchange rate against the dollar and/or euro (or other currency) depreciates, the cost of imported products will increase. Import inflation increases the cost of production, increases the selling price of goods and services in the domestic market, and increases the rate of inflation.
PE	Public expenditure (billion dinars)	Represents the government spending, which includes current spending and capital expenditures. This variable is used as a proxy for government demand. In fact, given a constant/constant supply, an increase in public spending leads to an increase in demand, which in turn leads to higher prices (higher inflation).