Journal of Economics and Sustainable Development
Volume: 06 / N°: 02 (2023), P:813 -830
ISSN : 2661-7986 EISSN: 2773-2606

Measuring the relationship between Devaluation and Domestic Inflation in the short term- The case of Algeria an econometric study for the period (1990-2021)

Mohamed Toumi [1] [*], Bilal Toumi [2]
[1] Blida University 1, ISTA (Algeria), toumi9@gmail.com
[2] University of Blida 2 Lounici Ali (Algeria), bilaltoumitoumi@email.com

Received: 26/03/2023 ***Accepted: 01/08/2023*** ***Published: 01/09/2023***

Abstract:
The aim of this study is to shed light on the measurement of the relationship and determine the direction of causality between the reduction of currency value and short-term local inflation rates. The study draws its importance from evaluating the actual impact on inflation rates as a direct result of currency devaluation. The study used a Vector Autoregression (VAR) model based on annual data for the period from 1990 to 2021. The results of the study showed, through a causality test, that there is a dynamic relationship between the reduction of currency value (exchange rate) and local inflation. By analyzing response functions, a response to local inflation rates was observed due to shocks in the rate of change of the nominal exchange rate and imported inflation rates, and this response decreases over time.
Keywords: Local inflation; Currency devaluation; VAR model.
JEL Classification: E31; E52 ; F31; F41

[*] ***Corresponding author.***

Introduction

(In today's globalized world, inflation and currency devaluation (exchange rate) are critical components of all economies, whether advanced, emerging, or developing. The stability of an economy depends on maintaining stability in both exchange rates and inflation, making exchange rate stability a top priority for governments and international institutions.

Algeria's economy has undergone several stages of development, with the country initially following a planned economic system. In the 1990s, Algeria shifted towards a market economy and adopted structural adjustment policies in line with the International Monetary Fund to revive the national economy. One of these policies included a devaluation of the national currency. However, this measure was accompanied by inflationary waves, particularly in the early years following the devaluation process.

It is worth noting that the relationship between inflation and exchange rates is complex, and numerous factors can impact these two crucial components of the economy. Therefore, understanding the underlying causes and consequences of these phenomena is critical for policymakers and researchers alike. Recent literature highlights the importance of carefully balancing inflation and exchange rate stability to ensure a healthy and sustainable economy. In this study, we aim to provide an updated and robust overview of the topic, presenting both theoretical and empirical perspectives on inflation and exchange rates, with a particular focus on the Algerian economy.

Research Question: Due to the importance of the relationship between currency devaluation and local inflation, this study aims to address the following research question: what is the nature of the relationship and the direction of causality between local inflation and currency devaluation in Algeria?

Assumptions:

- The currency devaluation process leads to an increase in local price levels in the short term, and thus currency devaluation creates inflation.
- There is a cause-and-effect relationship between the rate of change in the nominal exchange rate and local inflation in Algeria in the short term.

Objective: This study aims to measure the actual impact on local inflation rates due to the continuous devaluation of the currency value, considering the characteristics of the rent-based Algerian economy, the dependence of the local market on imported goods to meet local demand, and to understand the nature of the cause-and-effect relationship between currency devaluation and local inflation in the short term.

Study method: The study adopted a descriptive method in identifying the

concepts of currency devaluation policy and local inflation, as well as the experimental method in order to know the relationship between local inflation rates and currency devaluation for the period (1990-2021), by applying possible economic measurement means.

Previous studies: To understand the study subject, we decided to divide the study into two main axes and a conclusion, the first axis being devoted to previous studies and the theoretical framework, while the second axis is devoted to the applied framework, and the study ends with a conclusion including the results. Previous studies: To analyze the study problem and discuss it, we used some previous studies, including the following:

-The study by (MADIOU & NEMIRI, 2022) Entitled "The long and short-term determinants of the Algerian Dinar exchange rate (1970-2017) (Distributed Lag Autoregressive Model)" Uses the ARDL model to determine the most suitable variables for the Algerian economy that influence the exchange rate. The results suggest that gross domestic product, inflation, foreign exchange reserves, degree of openness, money supply, public spending, and oil prices are the most appropriate for determining the exchange rate over the period from 1970 to 2017. Long-term and short-term relationships are analyzed to study these results.

- The study by (SEHAILIA & SAKHI, 2021), investigates the correlation between inflation and exchange rate fluctuations in Algeria from 1990 to 2018, using a four-variable vector autoregressive model. The research indicates that there is a two-way causal relationship between exchange rates and inflation, with inflation rates directly proportional to the exchange rate. Any change in the exchange rate has an impact on inflation of approximately 15% in the medium to long term. The study concludes that exchange rate fluctuations have a significant impact on inflation in Algeria.

- The study by (MAHLOUL & BENDAHMANE, 2022), examines the exchange rate pass-through to inflation in Algeria and aims to provide a clear understanding of the relationship between exchange rates, import prices, and consumer prices. The study uses VAR and ARDL approaches to estimate the two effects and analyzes three variables in monthly frequency. However, the results do not support the assumption that the exchange rate affects import prices and consumer prices significantly. The study contributes to the literature by analyzing exchange rate pass-through to inflation with two stages and providing VAR and ARDL approaches to estimate the two effects. Overall, the study concludes that the exchange rate does not have a significant impact on both import prices and consumer prices in Algeria.

-The study by (CHERIEF, 2020), Titled "The Effect of Inflation and Exchange Rate on FDI Flows in Services in Algeria" examines the impact of inflation rates and exchange rates on investment flows in Algeria. The study finds that investment flows in Algeria are volatile and have been impacted by the decline in oil prices, leading to a decline in economic performance. The industrial sector receives the most investment, followed by the energy sector, while investment in the services sector is relatively low. The study also finds that higher inflation rates lead to larger investments in services, as investors turn to the least productive sectors in the long term due to economic instability.

-The study by (KENNICHE, 2001), Titled "Overvalued currency, price system and devaluation in Algeria" examines the overvalued currency, price system, and devaluation in Algeria. The Algerian dinar has gone through two phases since its creation, the first being characterized by stability and inconvertibility, and the second marked by limited convertibility and the liberation of exchange rates, prices, and interest rates. The study concludes that while nominal devaluation of the dinar is necessary for the recovery of the Algerian economy, it is not sufficient without real macroeconomic reform. Administered exchange rate variations cannot ensure macroeconomic balance over a long period.

- The study by (Chekouri, 2022), titled "Identifying Algeria’s de facto exchange rate regime: a wavelet-based approach" aims to determine Algeria's de facto exchange rate regime. The study uses the Frankel and Wei (2008) approach to estimate the basket of currencies to which the Algerian dinar is pegged, as well as the degree of exchange rate flexibility. The study suggests that Algeria has adopted a basket peg arrangement with the US dollar and Euro as nominal anchors and may have a crawling peg and band around those currencies. The study also employs Wavelet methods to assess the time-frequency co-movement patterns of the Algerian dinar, US dollar, and Euro, revealing a high level of co-movement within Algeria's currency, US dollar, and Euro across all time scales. The results contribute to the literature by providing a de facto classification of Algeria's exchange rate regime, which can be used for policy analysis and decision-making.

1- Theoretical framework of the phenomenon of inflation and monetary devaluation policies:

Inflation and currency devaluation (exchange rates) are among the most important economic variables and are the goal of any economic policy. On the one hand, they reflect the reality of economic performance, and on the other hand, they highlight the economic situation, which can clarify economic perspectives and indicate in which direction the economy is

heading. Therefore, inflation and exchange rates have social and economic meanings, and the concepts and relationships are intertwined in such a way that inflation and exchange rate degradation are phenomena that are related to each other.

1-1- Inflation (concept, types, sources)

Inflation is an important and crucial subject in the economic and social field, and although it does not occur permanently, its occurrence can affect individuals, businesses, and countries in general. Inflation leads to a general increase in the prices of goods and services, resulting in increased costs and causing disruptions in society. It has many different effects on the economy and often causes stress among individuals. There are many factors that lead to its occurrence, and many researchers, experts, and institutions seek to address inflation and try to reduce its effects on the economy.

1-1-1- Definition of Inflation

According to (Britannica T. , 2023), inflation is generally defined as a significant rise in the overall level of prices in the economy. It can be viewed through four basic schemata, with the oldest being the quantity theory that proposes the level of prices is determined by the quantity of money. The general rise in prices constitutes a situation of overall imbalance called inflation. This phenomenon involves the intervention of all economic actors and mechanisms such as production, income, and prices. Therefore, the inflationary process is based on macroeconomic mechanisms and constitutes a self-sustaining phenomenon (Jalladeau, 1998). Inflation is defined as a continuous increase in the general level of prices, or as a continuous decrease in the real value of the monetary unit, this value being measured by the general average of all goods and services that can be purchased with this monetary unit (Saqr, 1977, page 42). Inflation is characterized by a continuous and increasing rise in the prices of goods and services, which leads to an increase in wages. This inflation is caused by a more rapid increase in the money supply compared to the value of these goods and services (N. Crespelle, 2009). Finally, inflation is defined as the fact that the total supply does not meet the factors of production of real total demand.

1-1-2- Types of inflation:

There are two broad types of inflation: cost-push inflation and demand-pull inflation . However, inflation can also be categorized into different sub-types, such as creeping inflation, galloping inflation, hyperinflation, stagflation, and deflation.

Here is a summary table of the different types of inflation and their explanations (Murphy, 2021):

Table number (1): table of the different types of inflation

Type of Inflation	Explanation
Cost-Push Inflation	Results from an increase in per-unit production costs
Demand-Pull Inflation	Results from excess demand that cannot be matched by production
Creeping Inflation	Refers to a low rate of inflation (usually less than 3% per year)
Galloping Inflation	Refers to a high rate of inflation (usually between 10% and 20% per year)
Hyperinflation	Refers to an extreme form of inflation with rates exceeding 50% per month
Stagflation	Refers to a situation where inflation and unemployment both rise
Deflation	Refers to a decrease in the general price level of goods and services

source :Collected and summarized by the researchers from the source (Murphy, 2021)

It is important to note that these categories are not mutually exclusive, and different types of inflation can occur simultaneously in an economy.

1-1-3-The sources of inflation:

Inflation refers to the sustained increase in the general level of prices over time. There are four commonly used theories to explain inflation. The quantity theory of money, which is the oldest theory, assumes that prices increase as the money supply increases. Demand-pull inflation occurs when aggregate demand grows faster than aggregate supply, leading to an excess demand for goods and services, and thus increasing prices. Cost-push inflation occurs when the cost of production increases, and firms raise prices to maintain their profit margins. Finally, built-in inflation results from the expectations of individuals and firms that prices will continue to increase, leading them to demand higher wages and prices. (Britannica T. , 2003)

1-2-Currency Devaluation Policy

Currency devaluation policy refers to the deliberate reduction in the value of a country's currency relative to other currencies or standards. Such a policy is usually adopted by countries with a fixed exchange rate system to control supply and demand. It is considered a monetary policy tool used by a country's central bank to achieve economic stability. Devaluation can have both advantages and disadvantages for a country, depending on its economic situation**.**

1-2-1-The Concept of Currency Devaluation

Currency devaluation refers to the intentional reduction of the value of a country's currency relative to other currencies, a group of currencies, or a currency standard (Times, 2021). It can be used as a policy tool by governments to stimulate exports and domestic production by making them

more competitive in international markets. However, devaluation can also lead to higher inflation and increased import costs for consumers.

According to (Team, 2022), currency devaluation refers to the deliberate downward adjustment of a country's value of money relative to a foreign currency or standard. The purpose of devaluation is to boost exports by reducing the cost of goods perceived by countries that import them, to reduce trade deficits, and to lower the cost of interest payments on government debt.

In summary, currency devaluation is a tool used by countries to manipulate the value of their currency and boost their economy.

The distinction between currency depreciation and devaluation both terms refer to the present value of a country's money, with devaluation specifically referring to a change in value of a money that has its value set by the government, while depreciation refers to a decrease in the value of a currency in a free-floating exchange rate system (ENOTES, 2015).

1-2-2- Motivations and objectives:

Treatment of the trade deficit: reducing the value of the local currency makes imported goods more expensive for residents, thereby reducing the purchase of foreign goods and increasing interest in local goods and services, given the stability of nominal wages. This leads to a decrease in the country's imports, which saves foreign currency for the state's expenses related to these imports (Swain, 2016, pp. 83-84).

1-2-3-The results and conditions for the success of currency devaluation policy can be summarized as follows:

Currency devaluation policy is a monetary tool used by countries to improve their economic competitiveness, increase exports, and reduce trade deficits. The success of this policy depends on several factors, including:

- The level of domestic production: Devaluation may not be effective if a country does not have a competitive domestic production base to take advantage of the weaker currency. If the country relies heavily on imported goods and services, devaluation may lead to inflation and a decrease in living standards (W. Robinson, 1979, p. 31).
- The degree of international competition: If other countries are also devaluing their currencies, the benefits of devaluation may be offset by higher prices for imported goods and services (Weldzius, 2021).
- The level of debt: If a country has significant foreign debt denominated in foreign currencies, devaluation may make it more difficult to service that debt, leading to a debt crisis (Dalio, 2022, p. 75).

- The level of inflation: If inflation is already high, devaluation may lead to even higher inflation, reducing the effectiveness of the policy (Matthew Kwabena Valogo, 2023, p. 1).
- The level of confidence in the economy: Devaluation may lead to a loss of confidence in the economy, making it more difficult to attract foreign investment and finance (SEHAILIA & SAKHI, 2021).

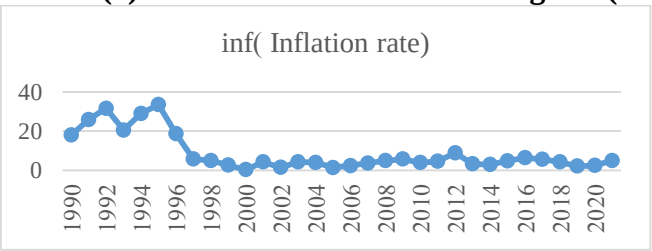
In order for currency devaluation policy to be successful, a country must carefully consider these factors and have a clear plan for how to take advantage of the weaker currency. This may involve investing in domestic production, promoting exports, and attracting foreign investment. Additionally, policymakers must communicate the benefits of devaluation to the public and ensure that the policy is implemented in a transparent and accountable manner.

2- Analysis of the evolution of the local inflation rate in Algeria for the period (1990-2021)

To analyze the phenomenon of inflation, it is necessary to use certain indicators that measure the degree of inflation. Official figures are among the most widely used indicators to measure inflation. Through Figure 2, it can be seen that inflation rates in Algeria have experienced a sharp increase since 1990, particularly in 1992, where it reached 7.31%, and 8.29% in 1995. This was due to the devaluation of the Algerian dinar and the removal of all forms of subsidy on products. Then, a decrease in inflation rates has been observed since 1998, and in 2000, it recorded a very low rate, the lowest during this period, estimated at 0.3%, which is the lowest level reached by the inflation rate in this period (Merzouki, 2021, p.401). However, the inflation rate quickly returned to an increase in 2001, reaching 4.2%. This was due to the increase in the money supply and the launch of economic stimulus programs, which led to an increase in budget spending, resulting in an increase in inflation rates (El Aqoun and Maqache, 2020, p.67). From 2006 until 2021, inflation rates have oscillated between slight increases and decreases, with the highest rate being recorded in 2012 with 8.89% (Kadri and Tahroury, 2022, p.509), then decreased in 2013 and 2014 due to the decline in oil prices and some basic products on the global market. The inflation rate in Algeria has experienced successive increases since 2015, reaching a rate of 6.4% in 2016, at the same time as the depreciation of the Algerian dinar against the dollar, which led to an increase in prices of locally imported products. However, in 2018, the general price level significantly decreased to reach 4.27% due to the improvement in the efficiency of food supply, local distribution channels, and the continuation of the policy of subsidizing high-demand consumer

products. After 2018, it decreased to reach 2.09% in 2019 and 2.46% in 2020, then increased to about 4.97% in 2021.

Figure number (1): Inflation Rate Trends in Algeria (1990-2021)



Source: Prepared by researchers using data from the World Bank.

2-1- Standard study of the relationship between local inflation and currency depreciation:

- **Study variables:** In order to understand the relationship between currency depreciation and local inflation, annual data of three variables for the period from 1990 to 2021 were used. These data were obtained from the World Bank database and the National Statistics Office, and these variables are as follows**:**

• **Dependent variable:** The rate of change of the consumer price index (inflation), denoted (INF), and its unit of measurement (%).

• **Independent variables:** The rate of change of the nominal exchange rate as an indicator of currency depreciation, denoted (TCHN), which represents the number of Algerian dinars needed to buy one unit of US dollar, and its unit of measurement (%). The imported inflation rate, denoted (INFIM), and its unit of measurement (%). Étude de la stabilité des séries chronologiques (test de racine unitaire): Before proceeding with the estimation, it is necessary to test the stability of the time series of the study variables to determine their degree of integration. Skipping this important step can lead to erroneous results that cannot be used in this study. Despite the multitude of unit root tests available, we will only use the augmented Dickey-Fuller (ADF) test, as shown in Table (2):

Table number (2) : Results of the unit root test using the (ADF) test

integration	Unit Root Test (ADF)						Variables
	1er différences			Level			
	None	Constant & Trend	Constant	None	Constant & Trend	Constant	
I(1)	-5.6599 (0.0000)	-5.6631 (0.0004)	-5.6452 (0.0001)	-1.3612 (0.1573)	-1.9140 (0.6232)	-1.6343 (0.4534)	**INF**
I(0)	-	-	-	-3.6267	-3.6795	-3.6778	**TCHN**

				(0.0007)	(0.0391)	(0.0096)	
I(1)	-5.5319 (0.0000)	-5.5910 (0.0004)	-5.5276 (0.0001)	-1.4933 (0.1244)	-1.7372 (0.7101)	-1.6625 (0.4397)	**INFIM**

Source: Written by the researchers based on the results from Eviews12 software.
*Values in parentheses represent probability values (p-values)

The results of the unit root test (ADF) presented in Table (2) indicate the instability of the original series of variables (INF and INFIM) at a significance level of 5%, whether with an intercept and trend, or only with an intercept, or even without intercept or trend. The calculated value of the t-statistic was higher than the critical value at a significance level of 5%, but the series was stabilized after taking the first differences, meaning that these time series are integrated of order one (I(1)). On the other hand, the time series (TCHN) is stable at the level of origin, with the calculated t-statistic being lower than the critical value at a significance level of 5%, indicating that it is integrated of order zero (I(0)). Therefore, the time series in the study are stable at different levels, a mix of I(0) and I(1), and we cannot use the error correction model. Although the autoregressive distributed lag model can be used, we will rely on the technique of the vector autoregressive regression (VAR) model in this study, as our study focuses on the short-term relationship between currency depreciation and local inflation in Algeria, and we are not seeking to study a long-term equilibrium relationship (Ben Omrane & Aznag, 2000, p. 95).

Estimation of VAR model: The process of estimating the model involves first determining the number of lags or equivalent delays of the variables in the model, and the results were as follows:

Table number (3): Results of determining the number of lags for the vector autoregressive regression model.

VAR Lag Order Selection Criteria
Endogenous variables: INF TTCHN INFIM
Exogenous variables: C
Date: 01/24/23 Time: 19:33
Sample: 1990 2021
Included observations: 29

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-135.5887	NA	2.841383	9.557840	9.699284	9.602139
1	-113.6989	37.74095*	1.174179	8.668892	9.234669*	8.846086*
2	-106.3528	11.14579	1.347804	8.782954	9.773065	9.093045
3	-94.20661	15.91575	1.151130*	8.565973*	9.980417	9.008959

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

Source : Rédigé par les chercheurs sur la base des résultats du logiciel Eviews12

- The results of the determination of the optimal number of lags of the vector autoregressive regression model are presented in Table (3). It appears that the optimal lag length is one period, based on the smallest values of the SC and HQ criteria, and the largest value of the LR criterion. Thus, the estimated VAR(1) model is as follows:

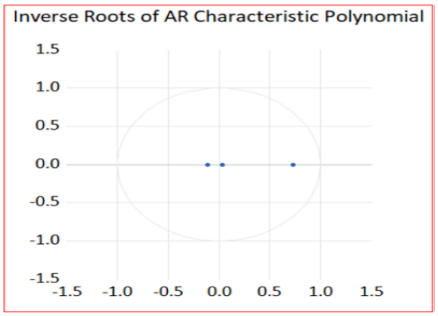
$$INF = - 0.81614373543INF(-1) + 0.130326790603TTCHN(-1) + 1.42329980708*INFIM(-1) + 1.26186632012$$

- The model is deemed acceptable and statistically significant, as evidenced by the adjusted coefficient of determination of approximately 0.80, indicating a high interpretative capacity of the model. In addition, the Fisher statistic value of 43.01 indicates the overall significance of the model. Economically, the estimation results show that the decrease in the value of the currency in the previous year is reflected in the increase in the inflation rate, explaining the increase in import costs due to the decrease in the value of the currency.

- **Quality test of the autoregressive regression model (VAR):**

• Test of the stability of the residuals of the autoregressive regression model (VAR): Instability of the model can lead to erroneous and incorrect results. Therefore, it is necessary to test for stability using the inverse roots test. The model is considered stable if all roots are less than 1, that is, they lie inside the unit circle. The following table and figure show the results of this test.

Figure number (2): Results of the stability test of the autoregressive regression model residuals



Source: Written by the researchers based on the results from Eviews12 software

In the table above, we present the results of the stability test for the VAR regression model. The test is performed using the inverse roots

method, and the results show that all roots have values less than one and are located inside the unit circle, indicating that the model is stable.

Table number (4): Results of the stability test for the residual of the Vector Autoregression (VAR) regression model.

Roots of Characteristic Polynomial
Endogenous variables: INF TTCHN INFIM
Exogenous variables: C
Lag specification: 1 1
Date: 01/24/23 Time: 19:39

Root	Modulus
0.727574	0.727574
-0.107420	0.107420
0.036598	0.036598

No root lies outside the unit circle.
VAR satisfies the stability condition.

Source: Written by researchers based on the results from Eviews12 software.

- **Autocorrelation test of the residuals of the vector autoregressive regression (VAR) model:**

Table number (5): Results of the autocorrelation test of the model residuals

VAR Residual Serial Correlation LM Tests
Date: 01/24/23 Time: 19:40
Sample: 1990 2021
Included observations: 31

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	4.802473	9	0.8512	0.522587	(9, 53.7)	0.8517
2	6.590267	9	0.6797	0.728613	(9, 53.7)	0.6808
3	2.239215	9	0.9871	0.238209	(9, 53.7)	0.9872

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	4.802473	9	0.8512	0.522587	(9, 53.7)	0.8517
2	11.53148	18	0.8705	0.613352	(18, 54.2)	0.8734
3	13.81602	27	0.9830	0.455394	(27, 47.4)	0.9845

*Edgeworth expansion corrected likelihood ratio statistic.

Source: Written by researchers based on the results from Eviews12 software.

From Table 5, we notice that for different degrees of correlation between the model residuals, all probability values are above the 5% significance threshold, indicating acceptance of the null hypothesis that there is no correlation between the model residuals.

- **Heteroskedasticity test of residuals for the VAR regression model:**

Table number (6): Heteroskedasticity of residuals for the VAR regression model.

VAR Residual Heteroskedasticity Tests (Levels and Squares)
Date: 01/24/23 Time: 19:41
Sample: 1990 2021
Included observations: 31

Joint test:

Chi-sq	df	Prob.
31.92485	36	0.6628

Source: Written by researchers based on the results from Eviews12 software.

In the table above, it is evident that the probability value of the Heteroskedasticity statistical test is 0.8950, which is greater than 0.05 at the 5% significance level. Therefore, **we accept the null hypothesis indicating homoscedasticity of the residuals**.

- **Normal distribution test of the residuals of the VAR regression model:**

To determine if the VAR regression model follows a normal distribution, the Jarque-Bera test presented in Table 6 was used, and its results confirmed that the estimated model follows a normal distribution. The probability value exceeded the threshold of 0.05, and thus we cannot reject the null hypothesis that confirms that the residuals do not suffer from a normal distribution problem, i.e., they follow a normal distribution.

Table number (7): Results of the normal distribution test of the residuals of the model.

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 01/24/23 Time: 19:51
Sample: 1990 2021
Included observations: 31

Component	Jarque-Bera	df	Prob.
1	1.144520	2	0.5642
2	4.360136	2	0.1130
3	3.245276	2	0.1974
Joint	8.749931	6	0.1881

*Approximate p-values do not account for coefficient estimation

Source: Written by researchers based on the results from Eviews12 software.

- **Analysis of the dynamics of the estimated model**: After confirming the validity and adequacy of the model in expressing the variations of the studied variables, it can be used to study and analyze the different potential relationships between these variables using special analysis **tools exclusive to VAR models.**
- **Causality test:** Causality means that one variable influences another, that is, the ability of a variable to affect another variable, and here the causality is in a one-way direction. Sometimes, each of them affects the other and causality is in both directions. To determine the direction of the causal relationship between the study variables, the Granger causality test was used, which is based on the results of the vector autoregression regression model, and the table below shows the results of the direction of the causal relationship between the variables.

Table number (8): Results of the normal distribution test of the model residuals.

Pairwise Granger Causality Tests
Date: 01/24/23 Time: 19:42
Sample: 1990 2021
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
TTCHN does not Granger Cause INF	31	16.9984	0.0003
INF does not Granger Cause TTCHN		0.00364	0.9523
INFIM does not Granger Cause INF	31	8.53329	0.0068
INF does not Granger Cause INFIM		4.87959	0.0355
INFIM does not Granger Cause TTCHN	31	0.16911	0.6840
TTCHN does not Granger Cause INFIM		13.6935	0.0009

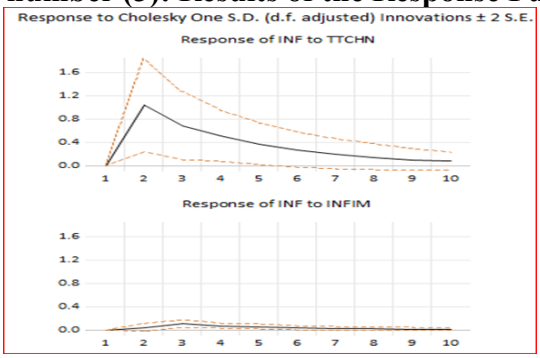
Source: Written by researchers based on the results from Eviews12 software.

We accept the existence of a causal relationship only if the corresponding probability value is less than a significance level of 5%. Therefore, we observe from the table above:

- The nominal exchange rate has an effect on local inflation, while local inflation has no effect on the nominal exchange rate. Therefore, we can say that there is a unidirectional causality from the nominal exchange rate to local inflation.
- There is a bidirectional causal relationship between the imported inflation rate and the local inflation rate on one hand, and between the local inflation rate and the imported inflation rate on the other hand.
- The imported inflation rate does not affect the nominal exchange rate, while the nominal exchange rate has an effect on the imported inflation rate.
- **Analysis of response functions for the vector autoregressive regression (VAR) model:**

The analysis of response functions allows us to track the temporal trajectory of sudden changes to various variables in the model and understand how the variables respond to any sudden changes in the model's variables. Since our study focuses on the relationship between currency devaluation and local inflation, we will try to analyze the results of a shock in the variations of the nominal exchange rate and the imported inflation rate on local inflation rate in Algeria and how it responds over a period of ten years. The results are as follows:

Figure number (3): Results of the Response Function



Source: Written by researchers based on the results from Eviews12 software.

During the first year, the shock in the nominal exchange rate is zero, measured by one standard deviation. In the second period, it has a positive impact on local inflation, but after the second year, it has an inverse reaction where the local inflation rate experienced a continuous decline throughout the response period, but still in a positive manner. The response peaked in the second year before continuing to decline until the end of the response period. As for local inflation, it has a positive and direct response during the third year to a shock of one standard deviation in the imported inflation rate, but after the third year, it has an inverse and still positive response. The response peaked in the third year before continuing to decline until the end of the response period, as illustrated in Figure 2.

- **Analysis of the results of the variance decomposition:**

The objective of the variance decomposition is to determine the proportion of variance caused by a variable itself and by other variables. From table 9, we observe that the variations in the local inflation rate for the next ten years are due to endogenous shocks of the variable itself, with a variance of 100%. However, this proportion has slightly decreased over the

years to reach about 64% ten years later. We also find that the contribution of other variables in the fluctuations of local inflation rates was moderate but increasing, where the contribution of the average exchange rate in explaining the variations in the inflation rate was estimated at an average of 21.93%, while the contribution of the imported inflation rate was estimated at an average of 6.15%. Therefore, we conclude that short-term fluctuations in local inflation are more explained by the nominal exchange rate than the imported inflation rate.

Table number (9): Analyse des résultats de la décomposition de la variance pour le modèle de régression linéaire multiple

Period	S.E.	INF	TCHN	INFIM
1	4.434909	100.0000	0.000000	0.000000
2	6.233916	82.06181	15.59074	2.347446
3	7.428243	73.56395	21.57666	4.859390
4	8.168002	69.50477	24.10816	6.387073
5	8.619220	67.40003	25.34668	7.253284
6	8.894737	66.23910	26.01228	7.748622
7	9.063794	65.57101	26.39099	8.038005
8	9.168029	65.17546	26.61412	8.210427
9	9.232537	64.93685	26.74843	8.314716
10	9.272566	64.79116	26.83037	8.378465
Cholesky Ordering: INF TCHN INFIM				

Source: Written by researchers based on the results from Eviews12 software.

Conclusion

Although currency devaluation (exchange rate) has positive effects on the national economy, these effects may be long-term, while the negative effects of local currency devaluation are short-term. One of the most significant negative effects of currency devaluation is the occurrence of waves of inflation, as Algerian exports are not flexible as they depend on a single product, fuels, and imports are not flexible as most are essential goods that cannot be avoided. Therefore, currency devaluation may benefit industrial countries seeking to have their products demanded in foreign markets, but it may not benefit non-industrial countries that rely on imported goods or companies that import raw materials for production. Based on the assumptions and objectives of this study, the most important results can be drawn from the following key points:

- Nominal exchange rates influence local inflation rates.
- Imported inflation rates do not affect local inflation rates.
- The analysis results showed a causal trend of nominal exchange rates towards local and imported inflation rates.
- The analysis results showed a bidirectional causality between local and imported inflation rates.

- There is a response to local inflation rates due to shocks in exchange rates and imported inflation rates, and this response disappears over time.
- Short-term inflation fluctuations are explained more significantly by nominal exchange rates than by imported inflation rates.

Bibliography

Bournonville carole. (1998). Introduction aux théories des organisations. paris: foucher.

Britannica, T. (2003, 3 5). inflation summary. *Editors of Encyclopaedia*. (E. Britannica, Ed.) Retrieved from https://www.britannica.com/summary/inflation-economics

Britannica, T. (2023, 02 17). inflation. Encyclopedia Britannica. Editors of Encyclopaedia. Retrieved from https://www.britannica.com/topic/inflation-economics

Chekouri, S. C. (2022). Identifying Algeria's de facto exchange rate regime: a wavelet-based approach. *Economic Structures, 15*(11), 2-17. doi:https://doi.org/10.1186/s40008-022-00277-5

Dalio, R. (2022). *Principles for navigating big debt crises.* New York, États-Unis: Simon and Schuster.

D'almeida nicole, Libaert thierry. (2007). *la communication interne de l'entreprise* (Vol. 5). paris: dunod.

Demont liliane, Kempf alain,Rapidel martine,Scibetta charles. (2000). *Communication des entreprises stratégies et pratiques.* nathan.

Détrie philippe, Boyer catherine. (2001). *la communication interne au service du management.* paris: éditions liaisons.

ENOTES. (2015, 1 4). *What is the difference between devaluation and depreciation of a currency?* Retrieved from eNotes Editorial: https://www.enotes.com/homework-help/what-difference-between-devaluation-depreciation-450818

jean claude scheid. (1980). *les grands auteurs en organisation.* paris: dunod.

jean michel plane. (2003). *management des organisations-théories concepts cas-.* paris: dunod.

Kennedy carol. (2003). *toutes les théories du management-les idées essentielles des auteurs les plus souvent cités-* (Vol. 3). paris: maxima.

les memos. (2007). *théories des organisations.* alger: el dar othmania.

MAHLOUL, M., & BENDAHMANE, M. (2022, 12 31). Exchange rate pass-through toinflation in Algeria. *RooaaIIkkttiissssaaddiiaaRReevviieew, 12*(02), 197-211.

Matthew Kwabena Valogo, E. D. (2023). Effect of exchange rate on inflation in the inflation targeting framework: Is the threshold level relevant? *Research in Globalization, 6*, 1-10. doi:https://doi.org/10.1016/j.resglo.2023.100119

Murphy, R. P. (2021). *Understanding Money Mechanics.* Auburn, alabama: Mises institute. doi:10.1787/d98b8cf5-en

Omar actouf. (1994). *le management entre tradition et renouvellement* (Vol. 3). montréal, canada: gaétan morin.

philippe, B. (2007). *Gestion de la communication d'entreprise aspects théoriques et pratiques.* paris: lavoisier.

SEHAILIA, Z., & SAKHI, B. (2021). Inflation and Exchange Rate Pass-Through in Algeria. *Revue Organisation & Travail, 10*(3).

Team, C. (2022, 12 12). *Devaluation*. Retrieved 02 3, 2023, from CFI: https://corporatefinanceinstitute.com/resources/economics/devaluation/

Times, T. N. (2021, 12 14). Retrieved 03 07, 2023, from With Americans Stuck at Home, Trade With China Roars Back: https://www.nytimes.com/2020/12/14/business/economy/us-china-trade-covid.html

W. Robinson, T. R. (1979). The Influence of Exchange Rate Changes on Prices: A Study of 18 Industrial Countries. *Economica*, *46*(181), 27–50. doi:https://doi.org/10.2307/2553094

Weldzius, R. M. (2021). The end of currency manipulation? Global production networks and exchange rate outcomes. *Economics & Politics, 33*(3), 514-532. doi: https://doi.org/10.1111/ecpo.12184

Annex (Appendices)

Appendix N 1: Estimation of the vector autoregressive (VAR) regression model

Vector Autoregression Estimates
Date: 01/24/23 Time: 19:46
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	INF	TTCHN	INFIM
INF(-1)	-0.816144	-22.74974	-0.815123
	(1.25324)	(3.19280)	(1.25495)
	[-0.65122]	[-7.12533]	[-0.64952]
TTCHN(-1)	0.130327	0.050855	0.130493
	(0.04674)	(0.11908)	(0.04681)
	[2.78821]	[0.42706]	[2.78797]
INFIM(-1)	1.423300	23.37857	1.422040
	(1.28210)	(3.26630)	(1.28385)
	[1.11014]	[7.15750]	[1.10764]
C	1.261866	1.587858	1.259195
	(0.99860)	(2.54406)	(0.99996)
	[1.26364]	[0.62414]	[1.25924]
R-squared	0.826966	0.789104	0.826615
Adj. R-squared	0.807740	0.765671	0.807350
Sum sq. resids	440.0538	2856.130	441.2560
S.E. equation	4.037114	10.28507	4.042625
F-statistic	43.01285	33.67500	42.90754
Log likelihood	-85.10720	-114.0972	-85.14948
Akaike AIC	5.748851	7.619177	5.751580
Schwarz SC	5.933882	7.804208	5.936610
Mean dependent	8.300437	10.48619	8.297742
S.D. dependent	9.207173	21.24682	9.210403
Determinant resid covariance (dof adj.)		0.770419	
Determinant resid covariance		0.509018	
Log likelihood		-121.4946	
Akaike information criterion		8.612552	
Schwarz criterion		9.167644	
Number of coefficients		12	

Source: Written by researchers based on the results from Eviews12 software.

Appendix N 2: Response function shock results.

Period	TTCHN	INFIM
1	0.000000	0.000000
	(0.00000)	(0.00000)
2	1.050683	0.038251
	(0.40281)	(0.03480)
3	0.685652	0.105060
	(0.29495)	(0.03004)
4	0.508574	0.071120
	(0.21923)	(0.02250)
5	0.369027	0.052425
	(0.18054)	(0.01955)
6	0.268604	0.038074
	(0.15365)	(0.01782)
7	0.195417	0.027709
	(0.13147)	(0.01605)
8	0.142182	0.020160
	(0.11150)	(0.01410)
9	0.103448	0.014668
	(0.09336)	(0.01209)
10	0.075266	0.010672
	(0.07716)	(0.01017)

Cholesky Ordering: INF TTCHN INFIM
Standard Errors: Analytic

Source: Written by researchers based on the results from Eviews12 software.