Impact of Inflation Targeting Policy on Achieving Economic Growth Stability in Algeria.

Safa Mohamed [1] ♦, Cheriet abed [2]

[1] University Of Tiaret (Algeria), Safamed2018@gmail.com
ORCID: https://orcid.org/0009-0009-8361-3278
[2] University Of Tiaret (Algeria), Cheriet14@gmail.com
ORCID: https://orcid.org/0009-00022927-8730-

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Abstract:

This study focused on analyzing and mesuring the effects of inflation targeting policies on economic growth stabilization in Algeria from 2002 to 2022. As a novel approach to managing monetary policy to combat and minimize inflation, the research utilized the ARDL methodology. Findings suggest that Algeria implicitly embraced this policy between 2002 and 2010, transitioning to a semi-explicit adoption from 2010 to 2022. The analysis showed a significant long-term positive correlation between economic growth and inflation rates when they are below the target, with a slope of 2.38. Conversely, inflation rates exceeding the target negatively affected growth, with a slope of -1.70, while the broader monetary mass exhibited only a slight impact (slope of -0.07). The study underscores the effectiveness of inflation targeting in promoting sustained economic growth and recommends that the Bank of Algeria formally implement an inflation forecasting and targeting strategy to ensure long-term economic stability.

Keywords: Economic growth, Inflation targeting policy, Actual inflation, Monetary policy, Long-term relationship

♦ **Corresponding author.**

I- Introduction:

In today's world, countries, regardless of their systems and levels of development, are experiencing varying inflation rates that impact various macroeconomic variables on both local and international scales. This has prompted nations to seek effective macroeconomic policies to mitigate the effects of inflation. Typically, these policies are implemented in response to inflation after it occurs. However, recent research suggests that countries, particularly those facing high inflation, should adopt proactive and targeted economic strategies known as inflation targeting policies. These policies involve early interventions by relevant authorities to restrict monetary expansion and adjust interest rates, aiming to stabilize the monetary environment. This approach facilitates economic growth while maintaining low inflation rates, aligns with exchange rate monitoring, and addresses various economic shocks.

Like many nations, Algeria has embraced inflation targeting as part of its economic policy. Under the Monetary and Credit Law 90-10, the Bank of Algeria is entrusted with ensuring the country's monetary stability, both domestically and internationally. In 2010, the Central Bank officially set an inflation target range of 4% to 5%. Looking ahead, Algeria aims to maintain inflation at roughly 4% to support a sustained economic growth rate of 4.2%.

The main issue :

From this perspective, several key questions arise, such as: How does the inflation targeting policy (Inf.T.P) influence the stabilization of economic growth rates in Algeria?

Hypotheses:

To address this question, a fundamental hypothesis was proposed, suggesting that Algeria's economic growth rate has a long-term relationship with inflation: a positive impact when inflation (Inf.R) remains below the target and a negative impact when it exceeds the target.

A descriptive and analytical approach was employed to explore the theoretical framework, covering various concepts and definitions related to inflation and inflation targeting policy (Inf.T.P). Additionally, quantitative analysis was conducted to demonstrate the effect of Inf.T.P on economic growth (E.G).

A benchmark study was also carried out, estimating a model to assess the impact of inflation targeting on E.G in Algeria using annual time series data from 1980 to 2022.

Study Importance:

The significance of this study stems from the fact that inflation negatively affects economic growth, particularly given Algeria's experience with high inflation rates during the 1990s, which necessitated the implementation of monetary and fiscal policies to mitigate this issue. However, recent research suggests that targeting the inflation rate can help reduce its adverse effects.

Previous stady:

Numerous studies have explored the concept of inflation targeting, including:

"The Impact of Inflation Targeting on Inflation and Growth: How Robust Is the Evidence?" by authors P.N. (Raja) Junankar and Chun Yee Jenny Wong, examines the effectiveness of inflation targeting in influencing inflation and promoting economic growth. This study utilized a sample of both developing and developed countries and employed a

panel data methodology. The findings indicated that the effects of inflation targeting on both inflation and economic growth were weak for the selected sample.

This study focused on assessing the effectiveness of inflation targeting policy (Inf.T.P) in influencing inflation and stimulating economic growth (E.G) by analyzing a sample of both developing and developed countries through a panel data approach. The results revealed that the impact of inflation targeting was relatively weak on both inflation and economic growth for the selected sample. Specifically, countries employing Inf.T.P experienced a growth rate increase of 0.5% and a reduction in inflation of 21%. In contrast, countries that did not implement an inflation targeting policy saw an 18% growth rate increase and a 10% decrease in inflation rates (P.N. (Raja) & Chun Yee (Jenny) , 2020, p. 02).Additionally, a study titled "Inflation Targeting Monetary Policy, Inflation Volatility, and Economic Growth in South Africa" was conducted by author Wolassa L. Kumo.

This paper seeks to examine the effects of inflation targeting monetary policy and inflation variability on economic growth (E.G) in South Africa. The study is divided into two periods: before the implementation of inflation targeting (1960Q1-1998Q4), during which South Africa employed various monetary policy frameworks, including exchange rate targeting and monetary aggregate targeting. This era was marked by elevated inflation levels, which adversely affected economic growth.

During this period, high inflation negatively affected economic growth (E.G), whereas inflation had a less significant impact on E.G during the inflation targeting period from 2000Q1 to 2013Q3. Empirical results indicate that the inflation targeting policy (Inf.T.P) adopted by South Africa post-2000 effectively reduced the inflation rate, creating a favorable environment for promoting economic growth (Wolassa L, 2015, p. 04).

1. Theoretical context of the inflation targeting policy.

Inflation is a global economic phenomenon faced by countries worldwide, irrespective of their economic systems or development levels. To address it, many nations have implemented various economic policies, with inflation targeting emerging as one of the most significant approaches. Introduced in the 1990s, inflation targeting is a modern and direct method for combating inflation, serving as a framework for managing monetary policy.

1.1. Definition of inflation targeting policy.

The concept of inflation targeting has captured the interest of numerous scientists and economists, leading to extensive research and studies in this area. Some of the most significant definitions of inflation targeting policy (Inf.T.P) include:

- Inflation targeting is defined as a monetary policy (M.P) system that involves publicly setting an official target for the inflation rate (Inf.R). This target may be presented as a range or a specific quantitative value, for a single period or across multiple periods. The primary long-term objective of this approach is to maintain low inflation, which is explicitly recognized as the main goal of M.P (Tutar, 2002, p. 01).

Inflation targeting (Inf.T) is defined as a system that directly targets an inflation rate (Inf.R) without relying on intermediate targets or stabilizers. To implement an inflation targeting policy, three key steps must be followed. First, the necessary monetary policy (M.P) must be determined to achieve the desired Inf.R. Second, the central bank (C.B) must

forecast the future inflation rate. Third, the differences between the targeted and expected Inf.R need to be assessed. If there is a positive deviation, an expansionary M.P is applied, whereas a contractionary M.P is implemented in the case of a negative deviation (Oulmi & Djabari, 2014, p. 95).

- Inflation targeting is a contemporary monetary policy (M.P) strategy first implemented in New Zealand in 1990, where it successfully achieved the goal of price stability (P.S). By 2007, over 20 countries had adopted this approach. The strategy is notable for its reliance on setting a specific numerical inflation rate as a target, and it emphasizes managing inflation expectations, where M.P plays a crucial role in forecasting. This approach also allows for transparency and accountability in policy implementation (Svensson, 2017, p. 01)

- According to the economist (Mishkin F. S., 2004, p. 01) Inf.T.P is a system which consists of five elements:

Public announcement of an Inf.R to be targeted in the short term.

- ✓ Institutional commitment to P.S as the main objective of M.P and considering other objectives subordinate to it
- ✓ Relying on an information strategy that includes many variables, including monetary aggregates and the E.R.
- ✓ Achieving transparency through communication with the public and markets regarding the plans, objectives, and decisions of the monetary authority (M.A).
- ✓ Increase the C.B's accountability for achieving the inflation target rate.

- Inflation targeting is defined as a monetary policy (M.P) strategy in which the central bank (C.B) forecasts and publicly announces a target inflation rate to steer actual inflation, utilizing the primary tools of monetary policy (Central Bank Of Nigeria, 2021, p. 04)

Based on the previous definitions, inflation targeting policy (Inf.T.P) can be defined as a monetary policy (M.P) strategy aimed at achieving long-term monetary stability. This strategy involves publicly announcing an inflation rate—either as a range or a specific target—as a future goal. The difference between the targeted and anticipated inflation rates (Inf.R) is then assessed. If the target rate is lower than the expected rate, a contractionary M.P is implemented to reduce expected inflation to the target level. Conversely, if the target rate is higher, an expansionary M.P is employed.

1.2 Conditions and requirements for applying inflation targeting Policy.

Three conditions must be met to implement inflation targeting policy effectively:

- **General (necessary) conditions:**

These conditions are outlined by: (Youssef, Hadjazy, & Mohamed Nasr, 2018, pp. 241-243)

a. Explicity announcing a Numerical target for the inflatin Rate in the medium term:

The monetary authority (M.A) must establish a target inflation rate, presented either as a specific figure or a range over a defined time period. This target should be

communicated through various channels, such as official reports, speeches, and press releases.

b. Prices Stability as a Key Objective of Monetary Policy in the Long Term:

There should be a clear institutional commitment to prioritize price stability (P.S) as the main goal of monetary policy (M.P) over the long term.

c. Accountability and Transparency:

The central bank (C.B) must enhance its accountability for achieving the inflation target and demonstrate progress in this regard. Additionally, effective communication and information sharing with the public and financial markets should be prioritized.

d. Providing Comprehensive Information on Inflation Targeting:

Mechanisms and tools must be in place to ensure a wealth of information is available for the inflation targeting period. This includes programs and quantitative models designed for predicting inflation.

- **Pre-conditions for inflation targeting:**

These conditions must be met for a country to effectively implement an inflation targeting policy (Inf.T.P) (Djallit & Lahham, 2020, pp. 41-42)

a. Central Bank Independence:

This entails that the central bank (C.B) can utilize its monetary tools and adjust them freely to achieve the inflation target. To ensure this independence, the C.B should operate in a monetary policy environment free from public finance constraints. This means avoiding financing government budget deficits through monetary expansion and not committing to providing low-interest financing to the public sector. The government must secure the necessary revenues to cover its expenditures without frequently resorting to the C.B. Additionally, the nominal exchange rate (E.R) should be liberalized to support the independence of the central bank (Paul, Miguel, & Sunil, 1998, p. 35),

According to some studies, countries that have experienced inflation rates (Inf.R) between 15% and 25% for five to six years are often unable to adopt a monetary policy aimed at achieving low and sustainable inflation rates.

b. Existence of a Single Objective for Monetary Policy:

Implementing an inflation targeting policy (Inf.T.P) necessitates that there are no competing targets for other variables, such as the exchange rate (E.R) or wage levels in the long term. Monetary policy cannot effectively pursue the goal of maintaining a low inflation rate (Inf.R) while simultaneously aiming for a stable exchange rate over an extended period.

c. Existence of a Stable Relationship Between Monetary Policy Tools and the Inflation Rate:

The monetary authority (M.A) should develop a dynamic model of inflation that allows it to manage the Inf.R based on available data and future projections. If the Inf.R deviates from its intended path or target, the M.A must intervene using its available tools to adjust and correct this deviation. The effectiveness of monetary policy in achieving the inflation target is further enhanced by the presence of developed and active financial markets.

1.3 Types of inflation targeting:

Inflation targeting (Inf.T) can be classified based on the criteria of the inflation target and the nature of that target.

- **Criterion of Inflation Targeting:**

Inflation targeting can generally be categorized into three main approaches. First, point targeting focuses on achieving a specific numerical inflation rate, aiming for an exact figure. Second, inflation targeting involves setting a range within which the inflation rate can fluctuate, allowing for more flexibility in managing inflation while maintaining overall stability. Finally, sectoral targeting sets different inflation targets for various sectors of the economy, enabling tailored strategies to address specific economic conditions. Thus, we can distinguish three different forms of inflation targeting: (Central Bank Of Nigeria, 2021, p. 04)

a. Full inflation targeting (FFIT):

This type of inflation targeting (Inf.T) is characterized as the most prevalent approach, typically adopted by countries that possess a medium to high degree of clarity and credibility in their monetary policy (M.P) and demonstrate a strong commitment to its implementation. Additionally, these countries have institutional frameworks that require accountability for the actions taken by the central bank (C.B) in relation to achieving the specified inflation targets.

b. Selective inflation targeting (EIT):

This type of inflation targeting is characterized by countries that possess a high degree of credibility, enabling them to achieve low and stable inflation rates (Inf.R). However, it may lack the necessary transparency and full accountability. In addition to these attributes, these countries are marked by a significant level of flexibility, allowing them to respond effectively to various changes in the economic environment. This adaptability contributes to the stability of both output and prices.

c. Partial Inflation Targeting (ITL):

This type of inflation targeting applies to countries that have adopted broad-based inflation targeting but possess relatively low credibility. These nations often contend with weak institutional frameworks that limit their capacity to reduce fluctuations in the inflation target. Consequently, they are more vulnerable to economic shocks and face challenges related to financial instability.

- **Criterion of the trade-off between inflation and the output gap**

This criterion can be divided into the following categories:

a. Strict inflation targeting

In this type of inflation targeting, the central bank (C.B) prioritizes achieving stability in inflation at its target level without considering the impact on the real economy. This approach may lead to inflation when the C.B raises interest rates and controls monetary variables in a general sense to attain acceptable and stable price levels. However, this can occur without significant changes in the level of productive activity. In this context, monetary policy aims to align the actual inflation rate (Inf.R) with the targeted inflation

rate, thereby reducing the inflation gap despite a substantial production gap. For this reason, this type of inflation targeting is generally not pursued.

b. Flexible inflation targeting:

In this type of inflation targeting, the central bank (C.B) focuses on guiding monetary variables toward a stable inflation rate (Inf.R) while also considering the real economy. This means that the C.B aims to stabilize inflation at its target level while recognizing the importance of maintaining economic activity in terms of production and employment, relative to the available potential. As a result, this approach may lead to an increase in the standard deviation of inflation while decreasing the standard deviation of output.

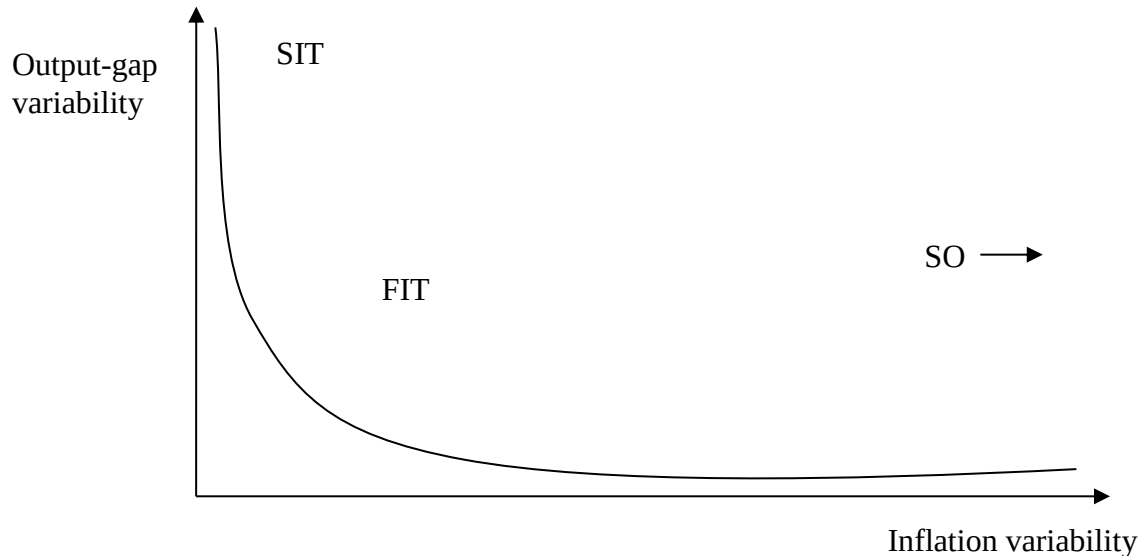
This type is notable for being the most commonly applied in practice. Whenever an economic shock occurs, monetary authorities assess the speed and extent of the return of inflation to its target level. This involves evaluating the potential extension of the period required to achieve the target, which is influenced by the degree of credibility of the C.B.

c . Output Tight Targeting:

In contrast to tight inflation targeting, the central bank (C.B) focuses on stimulating productive activity by implementing an expansionary monetary policy (M.P), often at the expense of achieving stable prices. This approach results in an increased inflation gap while decreasing the output gap, leading to a higher standard deviation of inflation compared to a lower standard deviation of output. As a result, this type of inflation targeting is generally not pursued.

The previous types can be illustrated in the following chart:

Figure (01) : Trade-off between the inflation rate changes and output gap fluctuations



Source : L. E. O. Svensson " Monetary Policy And Real Stabilization" Working Paper 9486, National Bureau Of Economic Research Cambridge, MA 02138,2003,pp8-9

1.4. Advantages and disadvantages of implementing the inflation targeting policy

The inflation targeting policy (Inf.T.P) is regarded as an effective approach that has played a significant role in reducing inflation rates (Inf.R) to economically acceptable levels. However, it is not without its criticisms.

- **Advantages of applying the inflation targeting policy**

Among the most significant advantages of inflation targeting policy (Inf.T.P), as highlighted by Mishkin: (Mishkin & Apostolos, 2011, pp. 469-470)

a. Addressing the Challenge of Time Inconsistency

Inflation targeting policy (Inf.T.P) primarily emphasizes the long-term objectives of the central bank (C.B) in managing inflation rates (Inf.R), with less focus on stimulating economic growth (E.G) and employment through expansionary monetary policy. This long-term orientation alleviates political pressures on the central bank to maintain inflationary practices, thereby minimizing the risk of falling into the time inconsistency trap that often arises when short-term proposals prioritize immediate production and employment gains.

b. Increasing of transparency

The inflation targeting policy (Inf.T.P) is marked by a high level of transparency, making it accessible and understandable for the public due to effective communication strategies. The central bank (C.B) maintains regular interactions with the government, which are often driven by mandatory legal and legislative requirements, as well as responses to informal inquiries. Government officials actively engage in delivering speeches and statements about the monetary policy (M.P) strategy and its developments. Additionally, a variety of informative documents and reports are published, featuring appealing graphics and designs aimed at educating citizens about the policy's objectives, conditions, the specific inflation rate and its determination, as well as insights into deviations and their underlying causes.

c.Increased accountability

Inflation targeting (Inf.T) is distinguished by the significant accountability of the central bank (C.B) to both the public and the government regarding the effectiveness of the policy. The government holds the authority to remove the bank's governor if there are breaches of the established conditions for meeting inflation targets.

d. Improving the performance of monetary policy

International experiences, particularly in developed industrialized nations, have demonstrated the efficacy of inflation targeting policy (Inf.T.P) in bringing inflation rates (Inf.R) down to manageable levels. Furthermore, this policy enables the central bank (C.B) to concentrate on domestic factors and respond effectively to economic shocks. Additionally, Inf.T.P aids in curbing inflation without necessitating a stable correlation between the money supply and inflation.

- **Disadvantages of inflation targeting policy**

The challenges and limitations of inflation targeting policy (Inf.T.P) vary between developed and developing countries. Developed nations typically have a conducive

environment for implementing Inf.T, while developing countries often face significant obstacles in this regard. Some of the primary disadvantages and challenges include:

a. Delayed signals and response on the monetary policy

Inf.T.P is marked by a sluggishness in conveying signals and a lag in responding to monetary policy actions. This necessitates a waiting period for establishing credibility and trust in monetary policy measures, a phase often referred to as the credibility-building stage. (Zied, 2010, p. 56).

b. Excessive tightening:

Economists Friedman and Kuttner argue that Inf.T.P mandates decision-makers to adhere to strict rules, which restricts monetary authorities from exercising discretion in response to atypical situations. Consequently, setting a predetermined inflation rate can negatively impact production.

c. Potentially increasing output volatility:

Critics of Inf.T.P point out that its implementation often reflects a concern for fluctuations in production levels. Many countries that adopt this policy establish an inflation target above zero; for example, New Zealand sets its inflation target at 2%. This approach is based on the understanding that aggressively reducing inflation rates could adversely affect real economic activity.

D. Reducing economic growth:

Economists argue that although inflation targeting policy (Inf.T.P) has benefits in curbing long-term price rises, it raises concerns regarding its potential impact on decision-makers' ability to boost economic growth. In particular, lowering the inflation rate may often be incompatible with maintaining production and employment levels, especially in the initial phases of implementation. This poses a significant challenge for developing countries, whose economies are generally too fragile to endure such pressures. (Mishkin & Apostolos, 2011, pp. 471-472)

2. The reality of applying the inflation targeting policy in Algeria

In the early 1990s, as part of its shift towards a market-based economy, Algeria implemented significant monetary and structural reforms, including the introduction of the Monetary and Credit Law 90-10. This law outlined the primary objectives of monetary policy, which included fostering economic growth and achieving price stability, measured by the gradual increase in the consumer price index. With the reforms introduced in 2010, particularly under order 10-04 dated August 26, 2010, the Bank of Algeria officially designated inflation targeting as the primary goal of monetary policy. In response, the Bank developed a model for short-term inflation forecasting, and the Monetary and Credit Council set an inflation target range of 4% ± 1 percentage point.

Algeria's approach to inflation targeting has generally unfolded in two distinct phases. The first phase, from 2002 to 2009, was marked by implicit inflation targeting, with an unofficial rate set at 3% in 2004. The second phase began in 2010, shifting to explicit inflation targeting, where the rate was formally established at 4% for that year and beyond.

2.1 Possibilities of implementing inflation targeting in Algeria:

For Algeria to effectively implement an inflation targeting policy, several foundational and general conditions need to be met:

- **Explicit announcement of inflation targeting**

This condition is considered to be met, as the Governor of the Bank of Algeria has repeatedly indicated in reports that the target inflation rate is set at 4%.

(Bank of Algeria,, 2016, p. 140)

- **Selecting the consumer price index (CPI) as a measure of inflation**

The inflation rate (Inf.R) reflects the gradual change in the consumer price index (CPI), which is established by the Algerian National Bureau of Statistics. It is calculated using the following formula:

$$INF = \frac{CPI_n - CPI_{n-1}}{CPI_{n-1}} * 100$$

Where: INF is the inflation rate, CPI_n is the consumer price index for the current year and CPI_{n-1} is the consumer price index for the previous year.

This formula measures the percentage change in the consumer price index from one year to the next, indicating the rate of inflation.

- **Estimating future inflation expectations**

The Bank of Algeria utilizes the ARIMA model to forecast expected inflation in the short term. This model is estimated and validated through a range of relevant statistical tests to ensure its accuracy and reliability.

- **Existence of a key monetary policy target**

According to Order No. 10-04, issued on August 26, 2010, the inflation target (P.S) is established as the primary long-term goal of monetary policy, alongside the ongoing maintenance of monetary quantity targets.

(People's Democratic Republic of Algeria, 2010, p. 11)

- **Increasing of transparency**

In this regard, Algeria has focused on enhancing communication channels between the government and the public. This includes the publication of reports and statements, as well as presentations made by the Governor of the Bank of Algeria before Parliament, which are also accessible on the Bank of Algeria's website. Additionally, the Bank prepares reports detailing the country's financial and monetary situation.

- **Increased accountability**

In light of the recent fiscal and monetary reforms, the governor of the Bank of Algeria is held accountable to members of Parliament regarding the implementation of the inflation targeting policy (Inf.T.P) and its effectiveness in achieving its goals.

▪ **The existence of a stable relationship between monetary policy instruments and the inflation rate**

Algeria employs a forward-looking strategy to analyze the relationship between monetary policy instruments and the inflation rate. In this framework, various quantitative models have been developed by Bank officials to manage and mitigate excessive inflation increases.

▪ **Independence of the Central Bank**

The independence of the central bank (C.B) is a crucial condition for effectively implementing inflation targeting policy (Inf.T.P). The Monetary and Loan Law 90-10 grants the Bank of Algeria several powers, including the ability to submit applications to the treasury, with a limit of 10% of the previous year's confirmed regular state revenues. Various orders have been enacted to enhance the C.B's authority, notably Order 10-04, which expanded the bank's role in banking supervision and control, thereby bolstering its ability to achieve financial stability and strengthen the banking system in support of the Inf.T.P (Bshishi, 2017, pp. 112-114).

Furthermore, the Bank of Algeria is equipped to monitor market indicators, including fluctuations in stock prices and options.

2.2 Analyzing the path of Algeria's inflation targeting policy during the period: 2002-2023

The table below illustrates the progression of the implicitly targeted inflation rate (Inf.R) from 2002 to 2010, the explicitly targeted inflation rate from 2011 to 2023, and the actual inflation rate recorded during the period from 2002 to 2023

Table(01) : Evolution of the Inflation Targeting Policy in Algeria during the period 2002-2023

Actual inflation rate	Target Inflation Rate	year	Actual inflation rate	Target inflation rate	Year
3.25	1±4	2013	1.41	4	2002
2.91	1±4	2014	4.26	4	2003
4.78	1±4	2015	3.96	4	2004
6.39	1±4	2016	1.32	4-3	2005
5.59	1±4	2017	2.31	4-3	2006
4.26	1±4	2018	3.67	3	2007
1.95	1±4	2019	4.85	3	2008
2.42	1±4	2020	5.73	3	2009
6.5	1±4	2021	3.91	3	2010
	1±4	2022	4.52	1±4	2011
	1±4	2023	8.89	1±4	2012

Source: Prepared by the researcher, based on information extracted from bank reports and the National Bureau of Statistics

The table reveals that during the implicit inflation targeting period from 2002 to 2010, the actual inflation rate (Inf.R) generally fell below or was nearly aligned with the targeted inflation rate, except for 2008 and 2009. In those years, the actual Inf.R deviated from the target by 1.85% and 2.73%, respectively, a shift primarily attributed to the surge in global prices for imported goods following the 2008 financial crisis.

Regarding the explicit inflation targeting policy implemented from 2011 to 2023, it is evident that this strategy effectively reduced the actual Inf.R, with deviations remaining within 1% for most years during this period. Notable exceptions occurred in 2012 and in the years 2016-2017 and 2021-2023. In 2012, the Inf.R reached its peak for this timeframe,

deviating by approximately 4.4%. This spike can be linked to rising costs, particularly in current budget expenditures, driven by increases in worker wages and retroactive payments, along with higher expenses for imported goods essential for local production, such as car spare parts. The years 2016 and 2017 also saw the Inf.R exceed the target, with deviations of 2.39% and 1.59%, respectively, primarily due to declining oil prices.

The underlying reasons for these trends stem from a decline in oil prices, which significantly impacted Algeria's economy, given that oil is the primary source of state revenue. In response, Algeria implemented an austerity policy aimed at reducing expenditures across various sectors, including curtailing imports. However, this reduction in imports, coupled with a weak local production capacity, resulted in decreased supply, leading to increased prices and, consequently, heightened inflation. Between 2021 and 2023, the inflation rate (Inf.R) experienced substantial growth compared to the established inflation target. This surge can be attributed to the global increase in prices triggered by the repercussions of the COVID-19 pandemic and the ongoing conflict in Ukraine, alongside Algeria's commitment to an inflation targeting policy.

Overall, Algeria's approach to inflation targeting (Inf.T.P) has lacked clarity and official declaration, demonstrating limited success in curbing inflation rates, particularly during crisis periods such as the 2008 financial crisis, the 2014 oil price decline, and the COVID-19 pandemic, as well as the ongoing conflict in Ukraine. This underlines the need for developing a more resilient inflation targeting framework that can effectively respond to economic shocks and crises.

2.3 The impact of inflation targeting policy on economic growth rates in Algeria

The following table shows the evolution of economic growth rates and target growth rates :

Table(2) : The Evolution of Inflation Rates and Economic Growth in Algeria during the Period: 2002-2022

Economic growth rate	deviation	Inflation rate	Years	Economic growth rate	deviation	Inflation rate	Years
2.80	0.75-	3.25	2013	5.60	-2.59	1.42	2002
3.80	-1.09	2.92	2014	7.20	0.26	4.27	2003
3.70	0.78	4.78	2015	4.30	-0.04	3.96	2004
3.20	2.39	6.40	2016	5.90	-2.68	1.38	2005
1.30	1.59	5.59	2017	1.70	-1.69	2.31	2006
1.20	0.26	4.27	2018	3.40	-0.32	3.68	2007
1.00	-2.05	1.95	2019	2.40	1.86	4.86	2008
-5.10	1.58	2.42	2020	1.60	1.74	5.74	2009
3.40	2.5	7.23	2021	3.60	-0.91	3.91	2010
3.20	5.27	9.27	2022	2.90	0.52	4.52	2011
			2023	3.40	4.89	8.89	2012

Source: Prepared by the researcher based on data extracted from World Bank reports and the National Bureau of Statistics

The data suggests that smaller deviations from inflation targets can play a role in fostering higher economic growth rates in Algeria. This trend is particularly evident during the implicit inflation targeting period of 2002 to 2010, during which economic growth rates were generally positive. Specifically, from 2002 to 2005, the country experienced relatively strong economic growth, with an average rate of 5.75%, which was likely supported by the

economic recovery program implemented at that time. For the entire period of 2002 to 2010, the average economic growth rate was approximately 3.97%.

However, despite low inflation target deviations, there were instances of reduced growth. For example, in 2006, the growth rate dropped to 1.7%. This decline could be attributed to shifts in the composition of overall real output, particularly a decrease in the contribution of rights and duties on imports, which fell from 5.9% in 2005 to 2.7% in 2006.

Regarding the explicit inflation target period 2011-2022, growth rates have reached an average of 2.05%, which is low compared to the previous period, and it can be noted that 2012 recorded the largest deviation in the inflation target rate (4.89%), but the economic growth rate increased to 3.40%, and this can be attributed to the improvement of the sectors contributing to the formation of the economic growth rate, the most important of which are rights and duties on imports, whose contribution rate was 0% in 2011 to 17.3% in 2012, in addition to the above. In addition to the above, we find that 2014 was able to maintain the economic growth rate within 3.8% in parallel with a decrease in the deviation in the inflation target rate to (-1.09%) despite the decrease in oil prices at that stage, while 2019 witnessed a decrease in the economic growth rate and 2020 an economic contraction (-5.10%). 10%), despite the low inflation target deviation rate, as the world witnessed at the end of 2019 a health crisis (Corona), which led to the closure of borders, which caused a decrease in oil prices and reduced the volume of imports, as Algeria relied on its cash reserves and commodity stocks to ensure an acceptable standard of living for citizens, and with 2021 and the signs of detente from the Corona crisis, growth rates in Algeria increased, reaching 3.40% and 3. This is due to the fact that Algeria has reduced its imports and replaced them with the local product, as the high inflation for these two years is due to the lack of the volume of local product that compensates for imports, i.e. local demand exceeds supply, on the one hand, and on the other hand, the emergence of some forms of speculation by traders, which caused an increase in prices, which contributed to increasing the Inf.R.

2.4 Difficulties and constraints in implementing the inflation targeting policy in Algeria

Although Algeria has undertaken financial and monetary reforms to facilitate the implementation of an inflation targeting policy, the approach has not been fully realized as intended. This shortfall can be attributed to various factors, as certain prerequisites for effective implementation remain unmet and require further adjustment. Key challenges to implementing inflation targeting in Algeria include:

- The inflation target rate has not been officially announced by the monetary authority or the Bank of Algeria through a formal directive; it has only been referenced in Bank of Algeria reports, with a target of 4%, according to Order 10-04.

- The Central Bank lacks full independence from the public treasury. For example, while Law 90-10 limits Central Bank financing for the treasury to 10%, in practice, this proportion has reached 51%.

- Despite the Bank of Algeria's focus on long-term price stability as a primary goal of monetary policy, some objectives remain heavily reliant on monetary policy measures.

- Although Bank officials have developed an inflation forecasting model, it is limited to a two-year horizon, making it inadequate for long-term forecasting needs.

- Inflation calculation in Algeria is based on the consumer price index, which does not distinguish between government-subsidized and unsubsidized goods, impacting the inflation targeting policy.

3. Trying to build a model to measure the impact of the inflation targeting policy on economic growth in Algeria during the period: 2002-2022

In this context, we aim to apply econometric techniques to assess whether a short-term and long-term equilibrium relationship exists between the inflation targeting policy and the economic growth rate. This analysis will utilize the autoregressive distributed lag (ARDL) model, which is well-suited for examining both short-term dynamics and long-term relationships within time series data. The ARDL approach allows for an understanding of how inflation targeting might influence economic growth over different time horizons, providing valuable insights into the policy's effectiveness in achieving stable economic growth.

3.1 Formulating the model and defining its variables

We will rely on the Khan and Senhadji model to estimate the impact of Inf.T.P on the stabilization of E.G in Algeria, as this model takes into account the impact of inflation on E.G below and above the threshold level. The model of E.G with Inf.T.P is written according to Khan and Senhadji's model and after disposing of it with the following mathematical formulation (Khan & Abdelhak, 2000)

$$Y_t = \mu_t + \gamma_0 INF_t + \gamma_1\left(1 - {d_t}^{\pi^*}\right)(INF_t - {INF^*}_t) + \gamma_2 {d_t}^{\pi^*}(INF_t - INF^*) + \theta {M_2}_t + e_t$$

Y_t : The annual growth rate of GDP per capita is a dependent variable that reflects economic growth

μ_t: represents the constant term

INF_t : represents inflation that is the evolution of the consumer price index in period t

${INF^*}_t$: represents the target Inf.R.

${M_2}_t$: Represents the quantity of money in a broad sense

${d_t}^{\pi^*}$: A dummy variable that takes the value of one (1) if inflation rates are above the inflation target and takes the value of zero (0) if Inf.R are below the inflation target.

γ_0: This parameter measures the impact of inflation on economic growth before Inf.R reach the target range.

γ_1: Expresses the impact of inflation on economic growth if inflation is less than or equal to the inflation target

γ_0: Reflects the impact of inflation on economic growth if inflation is greater than the inflation target

Interest rate on deposits: A parameter that measures the effect of the interest rate on deposits on the rate of economic growth

e_t: Random error.

Model variables were obtained from the World Bank.

3.2 Definition of the deceleration period

From the Eviews program we obtain:

Table (03) : Slowdown period by AIC, SC, and HQ.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-177.2562	NA*	56.63620*	18.22562*	18.47455*	18.27421*
1	-159.0609	25.47333	122.9655	18.90609	20.39969	19.19766

Source: Exported from the Eviews program Thus,

the lag period is set to zero.

3.3 Stability test for time series

The Augmented Dickey Fuller (ADF) test was used to test the stationarity of the time series, where the results of the test are summarized in the following table:

Table (04) : Stationarity test of time series

القرار	Level	10%	5%	1%	t-stat	Probability value	
Stable	First difference	-1.60	-1.96	-2.69	-7.55	0.00	PIBR
Stable	Level	-3.27	-3.67	-4.53	-3.92	0.031	INF
Stable	Level	-2.65	-3.02	-3.83	-2.71	0.090	D1
Stable	Level	-2.65	-3.02	-3.83	-4.10	0.005	D2
Stable	Level	-3.27	-3.67	-4.53	-4.086	0.023	M2

Source: Prepared by the researcher based on the EVIEWS program

3.4 Boundary test

In order to determine whether there is co-integration of the model variables in the long run, we perform a bounds test using the Eviews program and obtain the following table: D(PIBR) M2 KK1 KK1 INF

Table (05) : Model Boundary Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	12.34933	10%	1.9	3.01
K	4	5%	2.26	3.48
		2.5%	2.62	3.9
		1%	3.07	4.44

Source: From the output of the Eviews program

The results indicate that Fisher's statistic (12.34) exceeds the upper critical bound at the 1% significance level. Consequently, we reject the null hypothesis of no long-run cointegration relationship among the variables. This suggests that a stable long-term equilibrium exists between the inflation targeting policy and economic growth in Algeria.

3.5 Estimation of the error correction model

Using the Eviews program, we obtain the following table:

Table (06) : Error correction model

ARDL Error Correction Regression
Dependent Variable: D(PIBR, 2)
Selected Model: ARDL(3, 2, 2, 1, 1)
Case 1: No Constant and No Trend
Date: 04/07/24 Time: 10:57
Sample: 2002 2022
Included observations: 17

ECM Regression
Case 1: No Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PIBR(-1), 2)	0.186857	0.145728	1.282226	0.2690
D(PIBR(-2), 2)	-0.406603	0.098550	-4.125852	0.0145
D(INF)	2.674942	0.582657	4.590941	0.0101
D(INF(-1))	3.656701	0.251338	14.54896	0.0001
D(D1)	-2.132029	0.591991	-3.601455	0.0227
D(D1(-1))	-5.497443	0.389805	-14.10306	0.0001
D(D2)	-2.579981	0.603575	-4.274497	0.0129
D(M2)	-0.248891	0.034212	-7.274901	0.0019
CointEq(-1)*	-2.074588	0.186685	-11.11275	0.0004

R-squared	0.991628	Mean dependent var	-0.105882
Adjusted R-squared	0.983257	S.D. dependent var	5.160968
S.E. of regression	0.667803	Akaike info criterion	2.335406
Sum squared resid	3.567690	Schwarz criterion	2.776519
Log likelihood	-10.85095	Hannan-Quinn criter.	2.379253
Durbin-Watson stat	2.054751		

* p-value incompatible with t-Bounds distribution.

Source: From Eviews program outputs

3.6 Tests of the error correction model

Several tests need to be conducted on the error correction model before proceeding with its analysis:

- **Breusch- Godfrey test**

The results of this test revealed that the LM statistic is insignificant, indicating that there are no autocorrelation issues present in the residuals.

- **Error variance homogeneity test**

We present the following table:

Table (07) : Error variance homogeneity test results:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.728765	Prob. F(13,3)	0.7050
Obs*R-squared	12.91148	Prob. Chi-Square(13)	0.4547
Scaled explained SS	0.564975	Prob. Chi-Square(13)	1.0000

Source: Imported from the Eviews program

This test indicates that the Fisher's F-statistic exceeds 0.05, leading us to accept the null hypothesis, which suggests that the random errors exhibit homogeneity

- **Jarque-Bera random error normal distribution test**

According to the Eviews program results, the Jarque-Bera statistical probability is 0.89,

which exceeds 0.05. Therefore, we accept the alternative hypothesis, indicating that the random errors are normally distributed.

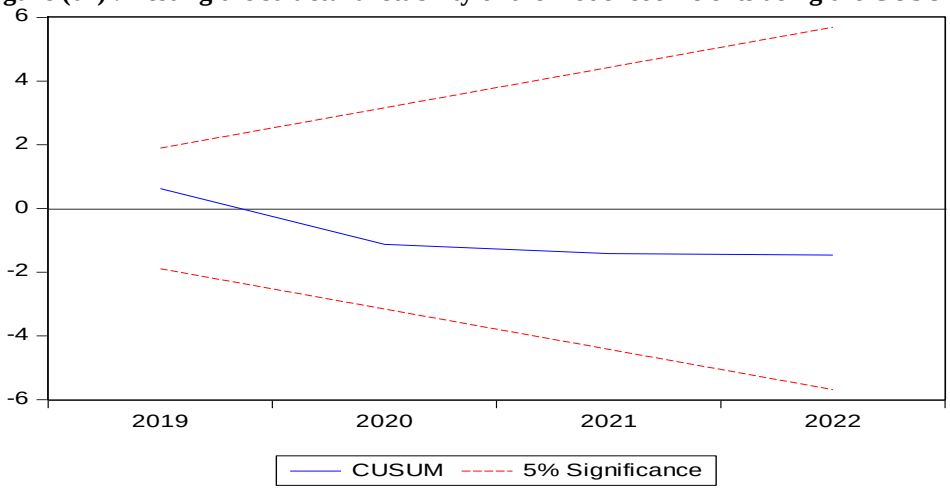
- **Testing the Ramsey Reset Hypothesis**

The Eviews program yields a statistical likelihood of 0.35 for this test, which is greater than 0.05. This indicates that the estimated model is valid.

- **Testing the structural stability of the model coefficients**

We have the following figure:

Figure (02) : Testing the structural stability of the model coefficients using the CUSUM statistic



Source: From Eviews Program Outputs

This figure illustrates that the CUSUM statistic remains within the critical boundaries at the 5% significance level, suggesting that the model is free from autocorrelation problems.

3.7 Model analysis

Using the Eviews program, we obtain the estimate of the error correction model shown in the following table:

Table (08) : Estimation results of the correction model (short-term)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PIBR(-1), 2)	0.186857	0.145728	1.282226	0.2690
D(PIBR(-2), 2)	-0.406603	0.098550	-4.125852	0.0145
D(INF)	2.674942	0.582657	4.590941	0.0101
D(INF(-1))	3.656701	0.251338	14.54896	0.0001
D(D1)	-2.132029	0.591991	-3.601455	0.0227
D(D1(-1))	-5.497443	0.389805	-14.10306	0.0001
D(D2)	-2.579981	0.603575	-4.274497	0.0129
D(M2)	-0.248891	0.034212	-7.274901	0.0019

CointEq(-1)*	-2.074588	0.186685	-11.11275	0.0004
R-squared	0.991628	Mean dependent var		-0.105882
Adjusted R-squared	0.983257	S.D. dependent var		5.160968
S.E. of regression	0.667803	Akaike info criterion		2.335406
Sum squared resid	3.567690	Schwarz criterion		2.776519
Log likelihood	-10.85095	Hannan-Quinn criter.		2.379253
Durbin-Watson stat	2.054751			

Source: From the output of the Eviews program

The table indicates that all model variables are significant except for the variable D(PIBR(-1),2). However, when this variable is lagged by one period (D(PIBR(-2),2), it becomes significant. Inflation exhibits a positive effect at the first lag, while the deviation of actual inflation from the target, whether lower or higher, has a negative effect at the first lag. Additionally, the estimation results reveal that the broad money supply (M2) has a negative impact.

The error correction threshold coefficient is highly significant, with a probability value of 0.0004 and a negative slope of -2.07, indicating a long-run equilibrium relationship. This suggests the presence of an error correction mechanism. The coefficient reflects the speed at which the model adjusts when transitioning from a short-run disequilibrium state to a long-run equilibrium state. The rate of adjustment from the short term to the long term reached a rate of 2.07,Specifically, a deviation in economic growth in period t+1 from its equilibrium value is corrected at a rate of 2.07 in the current period (t) i.e. an adjustment period of

(1/2.07 =0.483 year).

3.8 Analyzing the long-term relationship:

We have the following table:

Table (09) : Estimation results of the error correction model:

Levels Equation Case 1: No Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.718479	0.217638	-3.301262	0.0299
D1	2.381652	0.672842	3.539690	0.0240
D2	-1.708646	0.674333	-2.533829	0.0644
M2	-0.073947	0.026383	-2.802812	0.0487
EC = D(PIBR) - (-0.7185*INF + 2.3817*D1 -1.7086*D2 -0.0739*M2)				

Source: Eviews program outputs

The table reveals an inverse correlation between the economic growth rate and the inflation rate (Inf.R), with a significant negative slope of -0.71. which is a significant value, meaning that the decrease in the inflation rate contributes positively to stimulating economic growth in Algeria, and vice versa, which is consistent with economic theory, In contrast, the Inf.R below target rates demonstrates a positive correlation with economic growth, evidenced by a significant positive slope of 2.38, the largest among the variables. This suggests that when inflation is below target levels, it positively influences growth, consistent with economic principles. In this context, the targeted inflation can be seen as the

optimal inflation or the optimal target threshold. Working in the region where the achieved inflation is less than the target is considered a stimulating area to enhance economic growth , and vice versa, as it is clear from the previous table that economic growth is inversely related (with a slope of -1.70, which is significant at 10%) to inflation rates that deviate positively from the target rates, meaning that the country operating within the region where the actual inflation rate is higher than the target inflation (excess inflation), its growth rate will be negatively affected by this excess, which is consistent with economic theory, and economic growth is inversely related with the money supply at a slope of (-0.07) which is a significant value at 5%, since every increase in the money supply if not met by an increase in production will lead to higher prices, i.e. an increase in inflation which has a negative impact on economic growth in Algeria, as confirmed by economist Milton Friedman, as every increase in the amount of money supplied contributes to an increase in liquidity in banks, which causes a decrease in interest rates, which in turn contributes to an increase in the volume of investment which has a positive impact on increasing national production, and if the production growth rate is less than the liquidity growth rate, this will cause an increase in the inflation rate which in turn has a negative impact on the economic growth of the country, and vice versa.

Conclusion:

The Inf.T.P is one of the new tools used in the management of M.P to achieve P.S in the long term, and has been adopted by many countries with the aim of improving macroeconomic performance by reducing and controlling Inf.R to contribute to increasing economic growth rates, and Algeria is one of the developing countries that witnessed high waves of inflation, especially in the 1990s, where its rates reached nearly 31% in 1992, Algeria worked in this context to adopt an Inf.T.P at the beginning of 2011 at a threshold estimated at: 04±1%, in order to stabilize economic growth in the long term. This study came up with a set of findings and suggestions, which are summarized below:

Results:

Among the key findings of this study we mention the following:

1.The Algerian economy witnessed two phases of inflation targeting, the implicit inflation targeting phase during the period 2002-2009, such as the implicit rate in 2004 is (3 %), and the explicit inflation targeting phase, which was set at 4 %.

2. Conditions for Implementing Inf.T.P: For the effective implementation of the Inf.T.P in Algeria, several essential and general conditions must be met. These include:

- The explicit announcement of the inflation target.
- The measurement of inflation based on the consumer price index (CPI).
- The existence of a mathematical model to estimate future inflation, specifically using the ARIMA model for short-term inflation forecasting.
- The acknowledgment of price stability (P.S) as the primary objective of monetary policy (M.P), as outlined in Order No. 10-04.
- The establishment of accountability, where the Governor of the Bank of Algeria is responsible for addressing various questions posed by Parliament regarding the implementation of the inflation targeting policy.

-Despite the efforts made to implement the inflation targeting policy in Algeria, it was characterised by the fact that it was unclear and was not officially announced, and this policy was not successful in controlling inflation rates, especially in periods of economic crises such as the 2008 financial crisis, the 2014 oil price collapse crisis, and the 2019 COVID-19 health crisis.

This situation necessitates that monetary authorities implement a more effective Inf.T.P to address these economic challenges.

- Algeria's inflation targeting policy, in which the deviations from the target are small, has confirmed that it has a fundamental role in stimulating growth rates and their development.

- From the benchmark study, we identified a long-term relationship between the growth rate and inflation rates (Inf.R), both below and above target levels, in addition to the broad money variable. The results from the error correction model revealed that the economic growth rate is positively related to Inf.R below target rates, with a significant slope of 2.38 at the 5% significance level. This indicates the effectiveness of lower inflation targeting in improving growth rates in the Algerian economy. Conversely, the growth rate is negatively associated with Inf.R above target rates, reflected by a significant slope of -1.70. Additionally, there is a negative relationship between the growth rate and overall inflation, with a slope of -0.71 at the 5% significance level. Moreover, the analysis revealed a negative impact of the money supply on growth rates, with a slope of -0.07, also significant at the 5% level, indicating the least adverse effect on economic growth.

Perspectives:

The study offered several key recommendations, including:

-The Bank of Algeria should officially and explicitly announce an inflation targeting (Inf.T) policy to stabilize economic growth in the long term.

-A set of laws and regulations should be enacted to enhance the independence of the Bank of Algeria, increase its accountability, and establish various communication channels between the government and the public to promote transparency.

The study also identified several strategic perspectives, including:

- Establishing a reliable database through the digitization of various sectors in Algeria to gather accurate statistical information essential for implementing inflation targeting (Inf.T.P). This initiative should involve experts in finance and economic measurement to create standard models with statistical significance that effectively predict future inflation and economic growth rates.

-Developing standard Inf.T models that account for external variables, such as oil price shocks, particularly since Algeria relies heavily on petroleum revenues to fund its economic activities.

-Diversifying the economy by strengthening non-oil sectors like agriculture, manufacturing, and tourism. This diversification aims to promote and support local products, thereby contributing to higher economic growth rates and reducing the impact of imported inflation.

- Learning from the successful experiences of other countries that have effectively implemented inflation targeting policies.

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