

Inflation Targeting and Economic Growth in the Middle East, and North Africa (MENA): empirical modeling using ARDL approach

[http://doi.org/10.21272/fmir.6\(1\).5-12.2022](http://doi.org/10.21272/fmir.6(1).5-12.2022)

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Abstract

This paper analyses the relationship between Inflation Targeting and economic growth in 20 countries in the Middle East and North Africa (MENA) countries region (Algeria, Saudi Arabia, Palestinian Authority, Bahrain, Djibouti, United Arab Emirates, Egypt, Iraq, Iran, Jordan, Kuwait, Lebanon, Libya, Morocco, Mauritania, Oman, Qatar, Syria, Tunisia, and Yemen), using an Autoregressive Distributed Lag (ARDL) model over the period 2000-2020. An autoregressive distributed lag (ARDL) model is an ordinary least square (OLS) based model which is applicable for both non-stationary time series as well as for times series with mixed order of integration. The results show that Inflation Targeting can have several functions. It is a monetary policy framework based on an appropriate institutional architecture. The adoption of inflation targeting is often subject to a change in laws or administrative arrangements relating to the Central Bank. Inflation targeting might support economic growth by lowering inflation and volatility. However, monetary policy alone cannot drive growth. Inflation targeting might support economic growth by lowering inflation and volatility. Moreover, the results of econometric tests lead to convergent conclusions and argue for the existence of unidirectional causal relationships between economic growth and economic policy indicators.

Keywords: Inflation Targeting, ARDL, economic growth, the Middle East, and North Africa (MENA).

JEL Classification: A10, B22, C10, C50.

Cite as: Bouyacoub, B. (2022). Inflation Targeting and Economic Growth in the Middle East and North Africa (MENA): empirical modeling using ARDL approach. *Financial Markets, Institutions and Risks*, 6(1), 5-12. [http://doi.org/10.21272/fmir.6\(1\).5-12.2022](http://doi.org/10.21272/fmir.6(1).5-12.2022)

Received: 12.01.2022

Accepted: 02.02.2022

Published: 29.03.2022



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Introduction

Inflation targeting is a framework for a country, the subject of inflation targeting, and economic growth is a major issue, it provokes political debate, and their main role in the economy, which is why, we opted for research in the subject.

Referring to the extensive literature on economic growth, we see that the first challenge of economists is to base a definition appropriate to this concept. Many definitions have been given by economists for economic growth, as defined by J. Huart (2003), that economic growth is “a quantitative process that results in an increase over a long period of time in an indicator that is representative of a country’s wealth production, most often gross domestic product by volume (GDP)” (J. Huart, 2003).

Monetary policy based on an appropriate institutional architecture. The adoption of inflation targeting is often subject to a change in laws or administrative arrangements relating to the Central Bank

M. Bialès et al (2007), defined economic growth as “a sustained increase in size, accompanied by structural changes, and leading to economic progress” (M. Bialès, 2007). For his part, F. Perroux (1961) defined economic growth as “the sustained increase over one or more long periods of time of an indicator of size, for a nation, its total gross or net product, in real terms” (F. Perroux, 1961). To this end, economic growth can be defined as the expansion of the total output of all goods and services of a country over a given period, that is, the increase in national income (BOUYACOUB, 2020).

Moreover, inflation targeting is an economic policy whereby a central bank publishes a medium-term inflation target.

According to the new classical economy, the benefits of an expansionary monetary policy are only transitory, while the consequences for inflation are long-lasting. Therefore, it is appropriate to pursue non-inflationary monetary policies. To the extent that a government commitment in this regard is not credible (as it is not irreversible), it is necessary for the central bank to be independent to counter inflationary expectations (Lucotte, 2015).

Inflation targeting has been used for several decades, following the publication of studies highlighting the role of inflation expectations in economic activity, as well as the beneficial role of monetary stability, which requires the likely inflation to be known in advance by economic agents (BOUYACOUB, 2021).

Since its adoption by New Zealand in 1990, inflation targeting has over the years become a currency policy strategy favoured by a growing number of central banks around the world, particularly within the economies of the Middle East region. East and North Africa (MENA).

The study will examine the impact of inflation on economic growth in the Middle East and North Africa (MENA) region over the period 2000–2020. Through this paper, we sought to answer the following question: what is the effect of inflation on economic growth in the Middle East and North Africa (MENA) region during the period 2000 – 2020?

To do this, the study uses ARDL (Auto Regressive Distributed Lag) modelling between the rate of economic growth, the rate of domestic investment, the rate of inflation, domestic credit provided by the financial sector.

To answer the main question, this study will be divided into two parts.

- The first is devoted to the theoretical aspect of inflation and economic growth.
- The second will focus on the empirical study of the relationship between inflation and economic growth in the Middle East and North Africa (MENA) region over the period 2000–2020 and the results of the estimates.

Literature Review

Theoretical literature on economic growth was widely discussed during the 19th century. Before the Industrial Revolution, most economists found that economic growth is linked by a set of factors: population, division of labour, natural resources, and the external environment. The great economists (Adam Smith, David Ricardo, Karl Marx, Joseph Schumpeter, Harrod and Domar) sought to elucidate the springs of growth, on the one hand, and the conditions of its sustainability, on the other. They favoured the accumulation of physical and human capital as a growth factor but concluded that sustainable growth was impossible (Dwight Perkins, 2008).

In 1956, R. Solow pointed out that economic growth can be interpreted as a phenomenon of adaptation to an exogenous movement of technical improvement. He proposed an improvement in the quality of capital goods, under the influence of technical progress. Their objective is based on the role of technical progress in economic growth (BOUYACOUB, 2018).

In this way, it makes it possible to analyse long-term economic growth. In this context, Solow's model was considered the first formal model of neoclassical growth (Cadoret, 2004).

Since 1980, theories of endogenous growth have appeared with Paul R mer (1986), Robert Lucas (1988) and Robert Barro (1991). They depend on several factors: the accumulation of knowledge that makes an important place for research and development, human capital and technical progress (Michel Bial s, 2007). As a result, these theories have proved that internal or endogenous factors can contribute to economic growth (V die, 2008).

Moreover, the notion of economic growth is one of the most important in contemporary economic theory. This growth is considered a fundamental objective in all countries of the world. It is defined as the increase in a country's production over a long period of time (Cadoret, 2004).

The subject of the relationship between monetary policy and economic growth, or monetary policy indicators (inflation rate, money supply) and economic growth, is considered controversial. Indeed, the basis for empirical studies of such a relationship goes back to the studies of Mundell and Tobin (1965), Andersen-Jordan (1969), Fisher and Modigliani (1978) and Stockman (1981), Litterman Weiss (1985), Geweke (1986), Christiano Ljungqvist (1988) and Barro (1990)., Bruno and Easterly (1995) and Bullard & Keating (1995), McCandless and Weber (1995), Barro (1996) and Temple (1998), and Ghosh and Phillips (1998) (Michel

Bialès, 2007).

Some econometric studies confirm the existence of a positive or negative relationship between these two variables. For example, over the past 20 years in industrialized countries, several empirical studies have drawn a number of conclusions (Simon, 2001):

- In the short and long term, there is a strong relationship between the growth rate of money supply and nominal GDP.
- In Western countries, a change in the rate of money supply growth induces a change in the rate of nominal GDP growth by about six to nine months.

The objectives of central banks are set by their statutes. The maintenance of price stability is a mission entrusted to most central banks, so that this stability is a guarantee for ensuring a higher or lower economic growth.

In other words, the central bank is responsible for taking a decision to implement monetary policy, so that the main objective is price stability. In this sense, Bernard Landais (2008) states that, “monetary policy must therefore set itself this objective of price stability, the objective it can achieve. The central bank is then considered the guarantor of this stability, given the certain effectiveness of its policy” (Landais, Belgique).

But this may open up new horizons for identifying the nature of the relationship between monetary policy and economic growth. This relationship remains at least somewhat unreliable, since the impact of inflation favours the pace of accumulation, knowing that it is sometimes greater than the deployment of technical progress, which complicates the arrangement of the factors of production and increases the complicity of the relationship between monetary policy and growth. We will return to this point in the analysis in chapter three (BOUYACOUB, 2018).

In developed countries, the central banking system is based on a New Keynesian model in which expectations play a decisive role. Thus, the central bank has an inflation-targeting objective, displayed in terms of the rate of inflation, which lies within a range of 2% to 3%. It is calculated in such a way as to avoid an inflationary risk, but also a deflationary risk. This results in normal adjustments in a growing economy.

This adjustment is done through the manipulation of key rates. Thus, the central bank sends messages to steer expectations and guide economic activity towards the objective of price stability. However, today this argument could be called into question, following the fall in interest rates. In this respect, it is the credibility of the central bank that will be undermined (BOUYACOUB, 2021).

Thus, according to most theoretical and empirical studies, monetary policy has an impact on economic activity, for that, we can say that there is another objective of the central bank, which is the stability of the real economy. While monetary policy must participate in stabilizing the real economy when shocks affect it or when the expectations of agents become overly optimistic or pessimistic (BOUYACOUB, 2017).

Methodology and research methods

Through the economic literature, several economists have shown that there is a relationship between inflation and economic growth. In this context, the objective of this section is to perform an empirical analysis of the relationship between inflation and economic growth in the Middle East and North Africa (MENA) region over the period 2000-2020.

The method of estimation

To study and analyse the relationship between inflation and economic growth in the Middle East and North Africa (MENA) region over the period 2000–2020, an empirical approach based on the use of an ARDL model was used. The ARDL approach is a model that considers time dynamics in the explanation of a variable, thus improving the prediction and effectiveness of policies, on the other hand, a simple model restores only part of the variation of the variable to be explained for the instantaneous explanation (Cadoret, 2004). The ARDL model examines the relationship between the rate of economic growth, the rate of domestic investment, the rate of inflation and the rate of domestic credit provided by the financial sector.

Data sources and treatment method

The data in the study are annual data and range from 2000 to 2020, including data from the World Bank and the International Monetary Fund.

Similarly, the Eviews 12.0 software has been used for empirical modeling, it is adapted to perform stationarity tests, cointegration test, modeling (ARDL).

Variables used in empirical model

To highlight the relationship between various economic and monetary variables and economic growth in the MENA region during the period 2000 - 2020, the choice of appropriate variables is necessary. Our empirical study used the following variables: the rate of economic growth, the rate of domestic investment, the rate of inflation and the rate of domestic credit provided by the financial sector.

Specification of the model

Using this empirical modelling, we attempt to analyse the relationship between inflation and economic growth in the Middle East and North Africa (MENA) region over the period 2000–2020. In this context, we formulate the economic equation of our model according to the work objective:

$$GDP=f(DOM_INV, INF, CREDIT) \tag{1}$$

where

GDP: the rate of economic growth;

DOM_INV: the domestic investment rate;

INF: the inflation rate;

CREDIT: the domestic credit rate provided by the financial sector.

To examine the effect of inflation on economic growth in the Middle East and North Africa (MENA) region, the cointegration approach Pesaran et al (2001) “bounds tests” is used. The realization of this technique depends heavily on the study of the stationarity of the set of series.

Results

Before proceeding with the ARDL approach, we tested the stationarity of the different series to ensure that none of them is integrated in order two I(2) or more. Indeed, the "bounds test" procedure is no longer valid if there is an embedded variable of order two or more. We used the Dickey Fuller Augmented (ADF) test (1981) and the Phillips and Perron (PP) test (1988). After applying the Dickey Fuller Augmented test we notice that the four series are stationary, and the table below summarizes the different stationary steps of these series.

Table 1. ADF Stationarity Test Results

Null Hypothesis: the variable has a unit root

	At Level	GDP	DOM_INV	CREDIT	INF
With Constant	t-Statistic	0.0078	0.0059	0.0185	0.6716
	Prob.	0.0301	0.0106	0.6676	0.1491
		**	**	n0	n0
With Constant & Trend	t-Statistic	0.0286	0.0211	0.0861	0.2519
	Prob.	0.0383	0.0312	0.8067	0.2709
		**	**	n0	n0
Without Constant & Trend	t-Statistic	0.0003	0.0007	0.0026	0.5676
	Prob.	0.0012	0.0019	0.1097	0.8171
		***	***	n0	n0
	At First Difference				
			d (CREDIT)	d (INF)	
With Constant	t-Statistic			0.0008	0.0061
	Prob.			0.2511	0.0206
				n0	**
With Constant & Trend	t-Statistic			0.0524	0.0286
	Prob.			0.5926	0.0383
				n0	**
Without Constant & Trend	t-Statistic			0.0000	0.0003
	Prob.			0.0408	0.0012

Notes: a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant; b: Lag Length based on SIC; c: Probability based on MacKinnon (1996) one-sided p-values.

Source: Personal design through Eviews software 12.

Based on the results of this table we find that:

- CREDIT and INF series are stationary at level.
- GDP and DOM_INV series are stationary from the first differentiation according to the Dickey Fuller Augment (ADF) test.

PESARAN Cointegration Test

We reported that the cointegration test at the PESARAN and AI (2001) terminals was suitable for our series. Also, remember that there are two steps to follow to apply the PESARAN cointegration test: determine the optimal offset above all (AIC, SIC); and use the Fisher test to test the cointegration between series.

Optimal Offset and ARDL Model Estimation for Education Variables

We will use the SCHWARZ information criterion (SIC) to select the optimal ARDL model, which offers statistically significant results with the least of the parameters. Below are the estimation results of the selected optimal ARDL model:

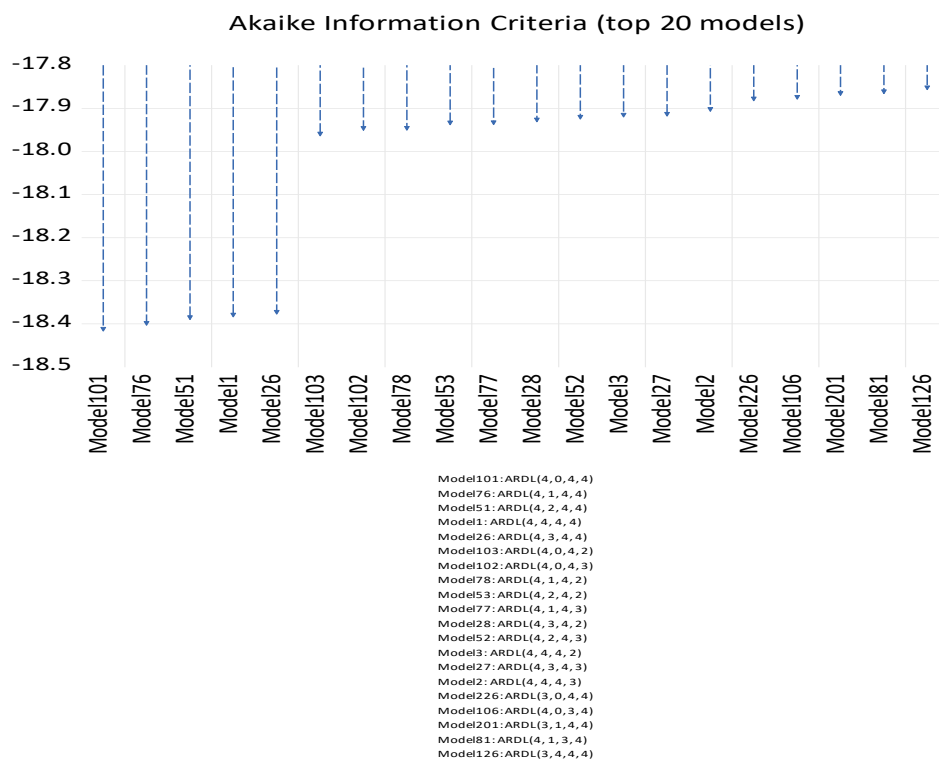


Figure 1. SIC graphic values

Source: Personal design through Eviews software 12.

As we can see, the ARDL model (4,0,4,4) is the most optimal among the other 20 presented, as it offers the smallest value of the SIC. Furthermore, with regard to the tests that help diagnose the estimated ARDL model, there is no autocorrelation of errors, there is no heteroscedasticity, there is normality of errors, and the model has been well specified.

Cointegration test at terminals

Following the automatic procedure on Eviews 12, the cointegration test of Pesaran and Ai. (2001) requires that the ARDL model be estimated beforehand

Table 2. ARDL Bounds test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.225259	10%	2.37	3.2
k	3	5%	2.79	3.67

Table 2 (cont.). ARDL Bounds test

		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	149		Finite Sample: n=80	
		10%	2.474	3.312
		5%	2.92	3.838
		1%	3.908	5.044

Source: Personal design through Eviews software 12.

The results of the “bounds test” procedure above show that the Fisher statistic ($F=4.2252$) is higher than the upper bound for the different significance thresholds (10% and 5%). So we reject the H_0 hypothesis (lack of long-term relationship) and conclude that there is a long-term relationship between the different variables.

Long-term coefficients and short-term dynamics

Short-term results show that inflation can lead when it is high, to a slowdown in economic growth, in the overall product, and to a deterioration in employment. Chronic inflation has many negative effects: It disrupts the macroeconomic distribution of income.

For this reason, too high inflation risks reducing productive investment and thus growth potential. This penalizes households if their wages are not indexed to price increases. In addition, the rate of investment and the rate of economic growth are linked by a virtuous circle: the growth, by the increase in revenues it generates, allows both to finance the investment (by profits) and motivates the investment (by the increase in demand due to higher wages). So, the variables CREDIT, INF and DOM_INV do not seem to have a short-term effect on economic growth.

Table 3. The ARDL Cointegration Test and the Long-Term Form

ARDL Error Correction Regression

Dependent Variable: D(GDP)

Selected Model: ARDL (4, 0, 4, 4)

Case 2: Restricted Constant and No Trend

Date: 01/12/22 Time: 12:50

Sample: 1 135

Included observations: 149

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.217111	0.031633	-6.863356	0.0000
D(GDP(-2))	0.520108	0.030535	17.03303	0.0000
D(GDP(-3))	-0.754527	0.027948	-26.99789	0.0000
D(CREDIT)	0.142411	0.000028	5083.385	0.0000
D(CREDIT(-1))	0.032109	0.004545	7.065224	0.0000
D(CREDIT(-2))	-0.0737	0.004363	-16.89337	0.0000
D(CREDIT(-3))	0.108473	0.004014	27.02188	0.0000
D(INF)	-0.0000135	0.00000175	-7.693421	0.0000
D(INF(-1))	0.0000418	0.00000145	28.80562	0.0000
D(INF(-2))	0.0000791	0.0000019	41.61633	0.0000
D(INF(-3))	0.0000436	0.00000203	21.48928	0.0000
CointEq(-1)*	-0.044632	0.001282	-34.80659	0.0000
R-squared	0.999998	Mean dependent var		0.000464
Adjusted R-squared	0.999998	S.D. dependent var		0.017881
S.E. of regression	2.28E.05	Akaike info criterion		-18.46545
Sum squared resid	7.10E.08	Schwarz criterion		-18.22352
Log likelihood	1387.676	Hannan-Quinn criter.		-18.36716
Durbin-Watson stat	3.631479			

Source: Personal design through Eviews software 12.

Moreover, according to the results marked on EViews we note that:

- The coefficients are significant.
- The coefficient of CointEq(-1) (-0.044632, t-stat=-34.8065), it has the correct sign (negative) and as a result there is a mechanism with error correction.

In conclusion, we can say that the estimated results allow us to declare that our model is a globally significant model. In addition, we were able to observe a positive and significant influence of CREDIT and DOM_INV on economic growth, knowing that these two variables are considered as a very important and decisive element of economic growth. In addition, the higher the inflation, the higher the GDP in value, which tends to lower the debt-to-GDP ratio. As the rate of growth of GDP in value increases, the gap between the apparent interest rate of the debt and the latter, thus the primary balance, decreases. Inflation can be caused by an increase in demand for goods or services, but supply does not increase

On the other hand, investment increases the capital stock per worker, and hence labour productivity. This unexplained share of growth is attributed to a residue, global factor productivity, which measures the contribution of technical progress.

Tarawalie et al (2012) point out that “a rise in inflation leads to a reduction in the wealth of populations, a corollary of the fall in the rate of return on the real capital available to economic agents. The population saves better when it turns to the acquisition of financial assets to guarantee the availability of wealth, and this implies the increase of the prices of its assets and the decrease of the interest rate. The growth of savings leads to greater accumulation of capital and therefore rapid growth of production”.

Conclusions

Economic growth is seen as a fundamental process of contemporary economies, it refers to the positive change in the production of goods and services over a long period. It is reflected in a significant and sustained increase in the production of goods and services. This positive change is measured by the annual development of the gross domestic product (GDP) indicator, which is valued in constant currency to take inflation into account.

The analysis of our study allowed us to analyze the effect of inflation on economic growth in the Middle East and North Africa (MENA) region during the period 2000 – 2020. These results show that the domestic investment rate and the domestic credit rate provided by the financial sector play an important role in determining the change in economic growth in the Middle East and North Africa (MENA) region. Our contribution is thus summarized in the following points:

The results of the econometric estimation show that there is a cointegration relationship between the variables of the empirical model.

The estimate of our ARDL model shows that the economic growth equation is significant with (R²= 0.99), a 99% indexation that can explain the change in economic growth.

A rise in inflation leads to a reduction in the wealth of the population, a corollary of the fall in the rate of return on the real capital available to economic agents. The population saves better when it turns to the acquisition of financial assets to guarantee the availability of wealth and this implies the increase of the prices of its assets and the decrease of the interest rate. The increase in saving leads to a greater accumulation of capital and consequently a rapid growth of production.

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