“Assessing the short-and long-run relationships between fiscal deficit and economic growth in Morocco”

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ASSESSING THE SHORT- AND LONG-RUN RELATIONSHIPS BETWEEN FISCAL DEFICIT AND ECONOMIC GROWTH IN MOROCCO

Abstract

This paper aims to investigate the short- and long-term relationships between fiscal deficit and economic growth in Morocco over the period 1985–2024. The ARDL bounds test approach is used to determine the existence of a cointegration relationship, while the error correction model (ECM) captures the short-run dynamics. The empirical results indicate that fiscal deficit exerts an immediate and significant negative effect on economic growth, suggesting that deficit financing may generate short-term macroeconomic pressures. However, the lagged effects of the fiscal deficit become positive and significant, reflecting a delayed expansionary impact of fiscal policy. In the long run, fiscal deficit has a negative and significant effect on economic growth, implying that persistent budget imbalances can hinder growth through debt accumulation and crowding-out effects. The bounds test confirms the existence of a stable cointegration relationship between the budget deficit and economic growth in Morocco. Furthermore, the negative and statistically significant error correction term indicates a relatively rapid adjustment toward long-term equilibrium following short-term shocks. These findings highlight the importance of prudent and sustainable fiscal management to support long-term economic growth in Morocco.

Keywords fiscal deficit, economic growth, ARDL model, fiscal sustainability, Morocco, public finance

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INTRODUCTION

Fiscal policies constitute a fundamental instrument of public action that support economic activity and promote economic development. However, the recurrent use of fiscal deficit raises growing concerns about macroeconomic stability and long-term growth prospects. Indeed, deficit financing makes it possible to meet immediate needs, particularly in terms of social spending and public investment. Even so, persistent fiscal deficit can lead to increasing financial constraints and limit the government's capacity for future intervention.

In many developing economies, fiscal deficit is the result of structural constraints, including high public expenditure needs and exposure to internal and external economic shocks in the face of limited fiscal resources. Although these deficits can support economic activity in the short term, their persistence raises questions about their long-term effects on growth, particularly through the accumulation of public debt and increased financing costs.

In Morocco, the fiscal deficit remains a recurring feature of the economy despite several reforms aimed at improving public finance man-

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agement and strengthening budgetary discipline. This situation can be explained by the pressure exerted by public expenditure and economic development requirements, in a context marked by limited budgetary resources.

The above considerations raise the following research question: to what extent does the fiscal deficit influence the dynamics of economic growth in Morocco, particularly in the short and long term?

1. LITERATURE REVIEW

The empirical literature on the relationship between fiscal deficit and economic growth shows widely varying results, depending on the countries, periods studied, and econometric methods used.

An initial series of studies distinguishes the effects of fiscal deficit on economic growth according to the time horizon, using dynamic models. In a study conducted across 20 Asian countries between 1980 and 2015 using the ARDL panel model, Amgain and Dhakal (2017) analyzed the impact of fiscal deficit on economic growth. The results revealed that deficits have a significant negative effect on growth in both the short and long term. In Nigeria, Adama et al. (2019) examined the impact of the fiscal deficit on domestic production growth for the period 1986–2018 using cointegration tests and an error correction model. The study showed that the fiscal deficit has a negative impact on domestic production growth in Nigeria, both in the short and long term. In another context, Onwioduokit and Inam (2018) examined the impact of the fiscal deficit on Liberia's economic growth over the period 1970–2014 through cointegration tests. The results showed that the fiscal deficit has a significant negative effect on growth in both the short and long term.

In the same vein, Tung (2018) attempted to determine whether the fiscal deficit is a driver of recovery or, on the contrary, an obstacle to sustainable development for Vietnam by using cointegration tests and an error correction model over the period 1986–2015. The results indicated that the impact of the deficit is negative in both the short and long term. This study also highlighted that deficits mainly financed current expenditure rather than productive investment, which led to an increase in public debt and a crowding-out effect on private investment. Budgetary discipline and a reorientation of expenditure toward productive sectors are necessary in order to stimulate sustainable growth in Vietnam.

In the Moroccan context, Gyasi (2020) examined the impact of the fiscal deficit on Moroccan economic growth over the period 1990–2017 using the ARDL model. The results showed that, in the short and long term, the deficit has a significant negative effect on growth. From another African perspective, Ekpo et al. (2024) attempted to examine the relationship between fiscal deficit and economic growth in Nigeria over the period 1981–2021 using an ARDL model. The results indicated that in both the short run and the long run, the effect of the fiscal deficit on economic growth is positive but statistically insignificant.

Sabr et al. (2021) analyzed the relationship between fiscal deficit and economic growth in Iraq for the period 1980–2018 using an ARDL model. The results showed that the fiscal deficit has a positive and significant effect in the short term, while in the long term, the effect becomes negative. Similarly, Sore et al. (2024) studied the effect of the fiscal deficit on economic growth in 42 sub-Saharan African countries over the period 2011–2021 using the GMM method. The results showed that the deficit has a positive effect on growth in the short term. However, in the long term, the effect of the fiscal deficit is negative.

A study in Albania over the period 1993–2014 was conducted by Zoto and Berisha (2016) to analyze the impact of the fiscal deficit on economic growth using cointegration and causality tests as well as multiple regression. The results showed that the relationship between the fiscal deficit and economic growth is positive in the short term and weak. However, in the long term, the relationship is negative. In India, Mohanty (2013) analyzed the relationship between fiscal deficit and economic growth over the period 1970–2012 using

Johansen's cointegration tests, Granger's causality, and a VECM model. The results showed the existence of a long-term relationship, with the fiscal deficit having a significant negative effect on growth. However, no short-term relationship was found between the two variables. The study also highlighted that the adverse impact of post-reform deficits is more pronounced than that of pre-reform deficits.

Nkrumah et al. (2016) examined the relationship between the fiscal deficit and economic growth over the period 2000–2015 in Ghana using the ARDL model and Granger causality test. The results showed that in the short term the effect is positive but not significant, while in the long term the effect is negative and significant. Granger's test indicates a unidirectional causality from the fiscal deficit to economic growth.

In the Moroccan context, Hettabi (2021) examined the relationship between fiscal deficit and economic growth over the period 1970–2018, using an ARDL model to identify short- and long-term effects. The results revealed that the deficit has a negative and significant effect in the short term, while in the long term, the effect is negative but not significant. Furthermore, Al-Tamimi (2020) examined the effect of the fiscal deficit on the Jordanian economy during 2010–2019 using an ARDL model. The results revealed that the fiscal deficit has no significant effect on economic growth, either in the short or long term. This lack of relationship suggests a form of deficit neutrality.

Masheed et al. (2024) examined the impact of the fiscal deficit on economic growth in Pakistan over 1973–2022 and of public debt, used as a proxy for the deficit, on economic growth in Afghanistan over 2002–2022, using an ARDL model. The results showed that the fiscal deficit has a significant negative effect on growth in Pakistan. For Afghanistan, the adverse effect of public debt on growth was highlighted.

From another African perspective, using DOLS and ECM models, Awadzie et al. (2025) analyzed the sustainability of the fiscal deficit in the Ghanaian economy over the period 1990–2021. The study revealed that in the short term, the fiscal deficit has a positive effect on growth. In contrast, in the long term, the fiscal deficit has a negative but insignificant effect on growth.

Hassan and Akhter (2014) analyzed the relationship between fiscal deficit and economic growth in Bangladesh over the period 1976–2010 using a VECM model supported by Johansen's cointegration test. The results showed that fiscal deficit have a negative effect in the short term. In the long term, the impact of the deficit becomes weaker and insignificant. In another context, Rana and Wahid (2016) studied the relationship between fiscal deficit and economic growth in Bangladesh over the period 1981–2011 using Johansen's cointegration tests, an OLS estimation, a VECM model, and Granger causality. The results indicated that the fiscal deficit has a negative and significant effect on GDP in the long term. The causality test indicates a unidirectional relationship from the deficit to growth.

Conversely, other empirical contributions focus on the general effects of deficits on growth without distinguishing between time horizons, such as that of Fatima et al. (2012), which examined the relationship between fiscal deficit and economic growth over the period 1978–2009 in Pakistan using a linear regression model. The results revealed that the fiscal deficit has a significant negative effect on GDP, mainly because it finances unproductive current expenditure.

In Bangladesh, Haider et al. (2016) attempted to examine the impact of the fiscal deficit on economic growth over the period 1976–2012 using a VAR model, VECM, and Johansen's cointegration test. The study showed that the fiscal deficit has a negative and significant effect on growth.

In a broader study covering ten countries in the MENA region over the period 2000–2013, including Morocco, Arjomand et al. (2016) showed that the fiscal deficit has a negative effect on economic growth. In another regional context, Lau and Yip (2019) examined the link between fiscal deficit and economic growth in ten ASEAN countries over the period 2001–2015, distinguishing between the pre- and post-global financial crisis phases. The results showed that before the financial crisis, the fiscal deficit had a negative effect on growth, while after the crisis it became a lever for recovery, stimulating economic activity.

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In another regional study conducted in the euro area over the period 2001–2019, Bohach and Paientko (2021) examined the impact of the fiscal deficit on economic growth in 37 European countries, distinguishing between developed and developing economies. The study indicated that the fiscal deficit has a significant negative effect on GDP per capita in developed countries. In contrast, the effect of the fiscal deficit in developing countries is insignificant. In a follow-up study focusing again on India, Ramu and Gayithri (2017) examined the relationship between the fiscal deficit and economic growth over the period 1980–2013 using Johansen cointegration tests and a VECM model. They distinguished between the overall fiscal deficit, the revenue deficit, and the effective deficit linked to public investment. The results showed that the overall fiscal deficit and the revenue deficit have negative and significant effects on economic growth, while the effective deficit geared toward public investment has a positive and significant impact.

In a regional context covering six transition countries in South-Eastern Europe, Gllogjani and Balaj (2021) assessed the impact of the fiscal deficit on economic growth for the period 2005–2019 using a dynamic panel model. The results showed that the fiscal deficit has a positive and significant effect on economic growth. Similarly, in a broader European context, Kryeziu and Hoxha (2021) attempted to examine the impact of the fiscal deficit on economic growth in 19 euro area countries over the period 1995–2015 using a linear panel regression. The results indicated that the fiscal deficit has a positive and significant effect on growth.

Similarly, Wang (2023) analyzed the effect of fiscal deficit on national income and employment in G7 countries over the period 2012–2021, using panel regressions. The study revealed that the fiscal deficit has a positive and significant effect on GDP growth. In another context, Van and Sudhipongpracha (2015) sought to examine the relationship between the fiscal deficit and economic growth in Vietnam over the period 1989–2011, in the context of the Doi Moi reforms, and to verify whether the deficit played a direct role in the Vietnamese economic miracle. The results showed that deficits had no direct impact on economic growth.

Furthermore, several studies highlight the nonlinear nature of the relationship between fiscal deficit and economic growth. Akosah (2013) analyzed the case of Ghana over the period 2000–2012 using OLS, VECM, and semi-parametric regression models. The results showed that a moderate deficit can stimulate growth in the short term, but that above a threshold of 4% of GDP, the effect becomes negative. In a similar study, Onwioduokit and Bassey (2014) sought to identify the sustainable level of fiscal deficit that promotes economic growth in the Gambia using a threshold autoregressive (TAR) model over the period 1980–2009. The results showed that the impact of the fiscal deficit on economic growth in the Gambia is positive when the fiscal deficit is less than or equal to 6% of GDP, while above this threshold, the effect becomes negative.

Tounsi and Abdenour (2015) examined the nonlinear effects of fiscal policy on economic growth using a panel of 36 developing countries covering the period 1999–2012, with a specific application to the case of Morocco over the period 1980–2012, adopting the endogenous threshold method. The results identified a fiscal deficit threshold of 5.1% of GDP below which expansionary policies stimulate economic growth, but above which they become harmful. Extending the analysis to Nigeria, Aero and Ogundipe (2016) adopted a TAR model over the period 1981–2014 to determine an endogenous fiscal deficit threshold. The results showed that a deficit of less than 5% of GDP can be beneficial for growth, but that above this threshold, the effects become negative.

In Morocco, Dkhissi and Khariss (2017) analyzed the relationship between fiscal policy and economic growth using a non-linear approach based on threshold models over the period 1960–2015. The results showed that the effect of the fiscal deficit on growth varies across regimes. When the deficit is less than or equal to 4.6% of GDP, public spending positively supports economic growth, while fiscal contraction becomes recessive. On the other hand, above the 4.6% threshold, the effect of public spending becomes negative, suggesting that fiscal austerity can then have expansionary effects. Similarly, El-Ghazi and Elgazzar (2023) identified the effects of the fiscal deficit on economic growth in Egypt between 1995 and 2021 using a threshold

regression model. The results confirmed the existence of a non-linear relationship. When the deficit exceeds –9.5% of GDP, it has a negative effect on growth, which is even more pronounced for deficits between –9.5% and 0%. On the other hand, a budget surplus of at least 1% of GDP has a positive and significant effect, thereby strengthening macroeconomic stability and investor confidence.

Using a dynamic panel model estimated by the generalized method of moments (GMM), Fayou and Daali (2024) studied the impact of the fiscal deficit on the dynamics of middle-income economies, including Morocco, over the period 1990–2020. The results showed that, on average, the fiscal deficit has a negative and significant effect on growth. However, the non-linear analysis revealed an optimal threshold estimated at 3.5% of GDP. Below this threshold, the effect of the deficit is positive, but above it, its impact becomes negative.

All empirical studies show that the impact of the fiscal deficit on economic growth varies depending on the economic context. In some cases, the fiscal deficit acts as a lever to stimulate economic activity, resulting in a positive relationship between deficit and growth. Conversely, other studies highlight negative effects. However, several studies also conclude that there is no significant relationship, suggesting that the fiscal deficit may be neutral with regard to growth. Finally, some of the literature highlights more complex dynamics, characterized by non-linear relationships or threshold effects, according to which the impact of the fiscal deficit on growth changes beyond a certain critical deficit level.

Based on these empirical results, the objective of this study is to analyze how the fiscal deficit affects economic growth in Morocco in both the short run and the long run, formulating the following hypotheses:

H1: The fiscal deficit exerts a significant effect on economic growth in the short run.

H2: The fiscal deficit exerts a significant effect on economic growth in the long run.

H3: The fiscal deficit exerts different effects depending on the time horizon.

2. METHODS

To analyze the effects of the fiscal deficit on economic activity and deduce its influence on economic growth, we employed an autoregressive distributed lag model (ARDL) proposed by Pesaran et al. (2001). In theory, the Keynesian approach suggests that the fiscal deficit can stimulate economic growth in the short term by boosting aggregate demand. In contrast, the neoclassical approach highlights the crowding-out effect of the deficit, leading to a reduction in savings and productive investment, which slows long-term growth. However, the Ricardian approach posits that deficits have a neutral effect on economic activity. Thus, ARDL allows these theoretical predictions to be tested empirically by simultaneously capturing the short-term and long-term dynamic relationships between economic growth and the fiscal deficit, which fully meets the objective of this study. From an econometric point of view, the ARDL model, unlike other models commonly used in macroeconomic time series analysis, has specific advantages that justify its use in this study. Indeed, this model is suitable for small samples, while guaranteeing robust estimates. In addition, ARDL allows for the integration of mixed order variables I(0) and I(1) and guarantees optimal selection of lags using statistical information criteria.

In this study, the choice of model variables is based on economic literature and has been widely applied in several empirical studies, notably by Fatima et al. (2012), Hassan and Akhter (2014) and Van and Sudhipongpracha (2015), where gross domestic product (GDP) was regressed against the fiscal deficit, inflation rate, real interest rate, real effective exchange rate, and gross investment. In this study, we use GDP growth rather than GDP levels. This choice is explained by its ability to reflect both short-term cyclical fluctuations and long-term economic performance. In addition, this choice is in line with institutional practice, since public authorities and international institutions systematically use growth as a key indicator for evaluating fiscal policies. Finally, from an econometric point of view, the use of the growth rate limits non-stationarity issues and ensures more robust estimates. The model is expressed as follows:

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$$GR_t = \varphi + \sum_{i=1}^{p} \alpha_i GR_{t-i} + \sum_{j=0}^{q} \beta_j X_{t-i} + e_t, \quad (1)$$

where φ is the constant of the ARDL model; GDP_t is the Gross Domestic Product; X_t includes the inflation rate, the real interest rate, the real effective exchange rate, the fiscal deficit, and gross investment; e_t is the stochastic error term; α_i and β_j are the coefficients of the variables.

In this study, we seek to determine the effects of our variable of interest (the fiscal deficit (FD)) on the dependent variable (the economic growth rate (GR)) while taking into account the other control variables (the inflation rate (INF), the real interest rate (RIR), the real effective exchange rate (REER), and the gross investment (GI)). Indeed, we try to estimate an ARDL model for the following function:

$$GR = f\left(FD, INF, REER, RIR, GI\right), \quad (2)$$

This study is based on annual time series data for the period 1985 to 2024. However, data for some of the model's variables were not directly available in the databases. To overcome this constraint, proxy variables were selected on the basis of their ability to reflect the dynamics of the variables in our model. Table 1 summarizes these substitutions and justifies the choice of proxy variables.

After using the proxy variables in our model, the function to be estimated for the model becomes:

$$GR = f\left(BD, INF, EXG, CRD, GI\right), \quad (3)$$

The data were collected from multiple official sources, including the World Bank's World Development Indicators (WDI) database and the dashboards of the Moroccan Ministry of the Economy and Finance. Table 2 presents a summary of the variables included in the empirical model, along with their definitions and data sources.

3. RESULTS AND DISCUSSION

Before estimating our model in order to examine the effect exerted by the fiscal deficit (the variable of interest) on the rate of economic growth (the dependent variable), it is essential to conduct a series of preliminary steps to guarantee the reliability, consistency, and robustness of the empirical findings.

3.1. Stationarity of series

The study of stationarity is an essential step in order to carry out a robust econometric analysis, insofar as if the stationarity of the series is not verified, fallacious regressions may occur. In this study, we will test the stationarity of the series using the Augmented Dickey Fuller (ADF) and Philippe Perron (PP) unit root tests.

The results obtained in Table 3 show that the variables GR, INF, and LnGI are stationary in level,

Table 1. Model variables and proxy variables

Model variable	Proxy variable	Justification for the choice of proxy variable
Real interest rate (RIR)	Rate of credit granted to the private sector as a % of GDP (CRD)	The rate of credit to the private sector is strongly correlated with the cost of financing and indirectly reflects the real interest rates prevailing in the economy
Real effective exchange rate (REER)	Exchange rate of the US dollar against the Moroccan dirham (EXG)	The US dollar is the reference currency for many of Morocco's international trade transactions. This simplification is justified by the availability of data and the MAD's strong dependence on the USD

Table 2. Description of variables and data sources

Variable	Description	Source
GR	Real growth rate	WDI Database
FD	Fiscal deficit as % of GDP	Ministry of the Economy and Finance of Morocco
INF	Inflation rate	WDI Database
EXG	Exchange rate of the US dollar against the Moroccan dirham	WDI Database
CRD	Rate of Credit granted to the private sector as a % of GDP	WDI Database
LnGI	Gross Investment (in Natural Logarithm)	WDI Database

Table 3. Unit root test

Variables	At level		At First differentiation		Order of integration
	ADF	PP	ADF	PP	
GR	–11.7092*	–10.9744*	–	–	I (0)
	(0.0000)	(0.0000)	–	–	
FD	–2.4821	–2.4581	–7.7240*	–8.4621*	I (1)
	(0.1254)	(0.1313)	(0.0000)	(0.0000)	
INF	–3.3026*	–3.3147*	–	–	I (0)
	(0.0196)	0.0190	–	–	
EXG	–1.7558	–1.4772	–5.2701*	–5.1879*	I (1)
	(0.3980)	(0.5375)	(0.0001)	(0.0001)	
LnGI	–4.4541*	–8.8735*	–	–	I (0)
	(0.0007)	(0.0000)	–	–	
CRD	–0.868	–0.9047	–6.8361*	–6.8916*	I (1)
	(0.7909)	(0.7794)	(0.0000)	(0.0000)	

Note: (.): Probability; *: stationary at 1%; ** stationary at 5%; *** stationary at 10%.

i.e., they are integrated of order I(0), while the variables FD, EXG, and CRD are stationary in first difference, i.e., they are integrated of order I(1).

These results indicate that the series used are stationary either at level I(0) or after the first differentiation I(1). This allows us to use the ARDL model in this study.

3.2. Verification of the endogeneity of the fiscal deficit

One methodological difficulty lies in the potentially endogenous nature of the fiscal deficit. Indeed, the literature highlights that economic growth can influence the budget balance through tax revenues and automatic stabilizers, while the deficit itself can affect growth through debt channels, crowding-out effects, or the multiplier effects of Keynesian stimulus. This simultaneity can introduce estimation bias in an ARDL model if it is not addressed.

In order to verify the exogeneity and the relevance and validity of the instruments used, we applied the Durbin-Wu-Hausman (DWH) test, the Cragg-Donald instrumental weakness test, and the Sargan/Hansen over-identification test. The Durbin-Wu-Hausman (DWH) test was used to assess the potential endogeneity of the fiscal deficit. The results in Table 4 (χ^2 = 1.4572; *p*-value = 0.2274) indicate that the null hypothesis of exogeneity cannot be rejected, suggesting that the DB variable does not present a significant endogeneity problem.

The relevance of the instruments used was examined using the Cragg-Donald test. The *F*-statistic value obtained in Table 5 (16.04) remains slightly below the strict critical threshold of 10% (16.38), but remains well above the Stock-Yogo thresholds for 15% (8.96) 20% (6.66), and 25% (5.53). This confirms that the instruments selected are sufficiently correlated with the instrumented variable.

Table 5. Weak instrument diagnostics

Cragg-Donald F-stat:	16.04098
Stock-Yogo critical values (size):	Value
10%	16.38
15%	8.96
20%	6.66
25%	5.53

Finally, the validity of the instruments was verified using the Sargan/Hansen over-identification test (J-test). The results in Table 4 (*J*-statistic =

Table 4. Durbin-Wu-Hausman and Sargan/Hansen over-identification tests

J-statistic test	Value	Probability
Difference in J-stats	1.4572	0.2274
Restricted J-statistic	1.4572	
Unrestricted J-statistic	0.0000	

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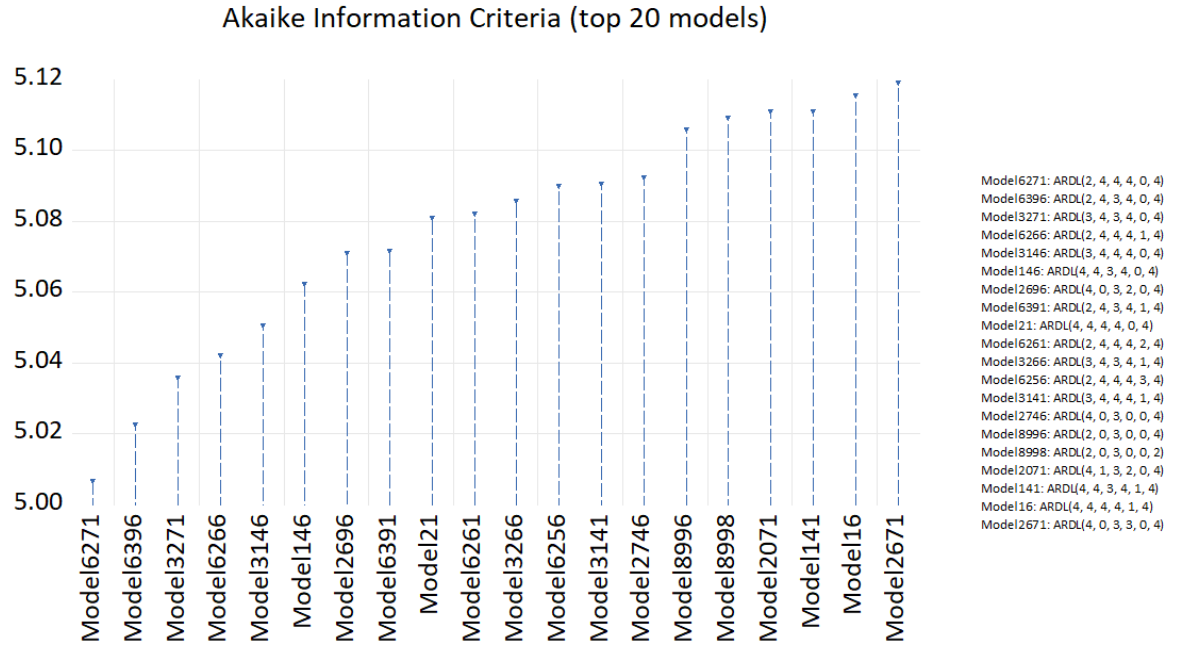


Figure 1. Akaike information criterion

1.4572; *p*-value = 0.2274) show that the null hypothesis of instrument validity can be accepted, confirming that the selected instruments (crd, inf, lngi, exg, fd(–1)) are orthogonal to the error term and are therefore appropriate for estimation.

Overall, these tests confirm that the fiscal deficit is exogenous to growth in our specification. The ARDL model can therefore be estimated without resorting to an instrumental version (ARDL-IV).

3.3. Determination of optimum lags

Before modelling the growth rate function using the ARDL model, it is necessary to determine the optimal lag number for each variable using the AIKAIKE information criterion (AIC).

The results in Figure 1 show that following the imposed order of variables (GR, FD, CRD, INF, EXG, LNGI), the most parsimonious model is an ARDL (2,4,4,4,0,4).

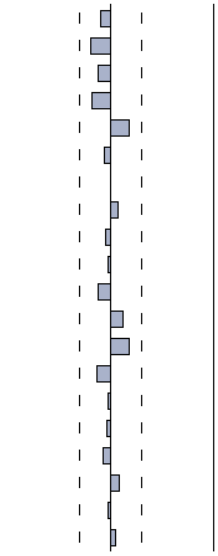
3.4. Estimation and validation of ARDL model

After determining the number of optimal lags, the ARDL (2,4,4,4,0,4) model is estimated. The estimation results are presented in Table 6.

Table 6. Estimation of ARDL model

Variable	Coefficient	Std. Error	t–Statistic	Prob.*
GR(–1)	–1.001237	0.201148	–4.977615	0.0001
GR(–2)	–0.556735	0.223711	–2.488633	0.0242
FD	–0.750619	0.409298	–1.833917	0.0853
FD(–1)	0.090347	0.446852	0.202186	0.8423
FD(–2)	0.182297	0.361622	0.504108	0.6211
FD(–3)	–0.278173	0.35346	–0.786999	0.4428
FD(–4)	–0.746206	0.342135	–2.18103	0.0444
CRD	–0.097332	0.178278	–0.545958	0.5926
CRD(–1)	0.287015	0.272116	1.054752	0.3072
CRD(–2)	–0.211824	0.275619	–0.768539	0.4534
CRD(–3)	0.432548	0.277625	1.558029	0.1388
CRD(–4)	0.218964	0.20984	1.043482	0.3122
INF	0.280179	0.39914	0.701957	0.4928
INF(–1)	0.089116	0.332516	0.268005	0.7921
INF(–2)	0.422665	0.278221	1.519169	0.1482
INF(–3)	0.238901	0.372287	0.641711	0.5301
INF(–4)	0.710585	0.327862	2.167328	0.0456
EXG	–0.431372	0.776919	–0.555234	0.5864
LNGI	41.14281	22.00158	1.869994	0.0799
LNGI(–1)	13.99967	32.41604	0.431875	0.6716
LNGI(–2)	–44.82084	30.49479	–1.469786	0.161
LNGI(–3)	–1.757488	29.27722	–0.060029	0.9529
LNGI(–4)	–41.62181	19.32104	–2.154223	0.0468
C	350.5498	116.2356	3.015856	0.0082
R-squared	0.718402			
Adjusted R-squared	0.577603		–	
F-statistic	5.102317			
Prob (F-statistic)	0.000344			

Sample: 1985 2024
Q-statistic probabilities adjusted for 2 dynamic regressors



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.100	-0.100	0.4268	0.514
		2	-0.199	-0.211	2.1861	0.335
		3	-0.126	-0.181	2.9072	0.406
		4	-0.196	-0.307	4.7058	0.319
		5	0.183	0.031	6.3102	0.277
		6	-0.063	-0.204	6.5083	0.369
		7	-0.004	-0.090	6.5092	0.482
		8	0.076	-0.034	6.8149	0.557
		9	-0.056	-0.063	6.9849	0.639
		10	-0.019	-0.122	7.0043	0.725
		11	-0.124	-0.195	7.8972	0.722
		12	0.129	0.034	8.8927	0.712
		13	0.191	0.107	11.171	0.597
		14	-0.138	-0.116	12.404	0.574
		15	-0.017	-0.002	12.424	0.647
		16	-0.036	0.031	12.514	0.708
		17	-0.077	-0.118	12.952	0.739
		18	0.086	-0.036	13.511	0.760
		19	-0.032	-0.016	13.591	0.807
		20	0.053	-0.006	13.829	0.839

Figure 2. Error correlogram

Once the ARDL model has been estimated, a series of tests need to be carried out to validate the estimated model.

3.5. Error autocorrelation

Figure 2 shows a total absence of error autocorrelation. In fact, whether in the case of simple or partial autocorrelation, all the error terms lie within the confidence interval. As a result, the null hypothesis of no error autocorrelation is accepted. There is therefore no error autocorrelation.

3.6. Heteroscedasticity

According to Table 7, the probability of *F*-statistic is well above 0.05. This means that the errors are homoscedastic.

Table 7. Breusch-Pagan-Godfrey test

F-statistic	1.332167
Obs*R-squared	26.27782
Scaled explained SS	3.026170
Prob. F(23,16)	0.2806
Prob. Chi-Square(23)	0.2879
Prob. Chi-Square(23)	1.0000

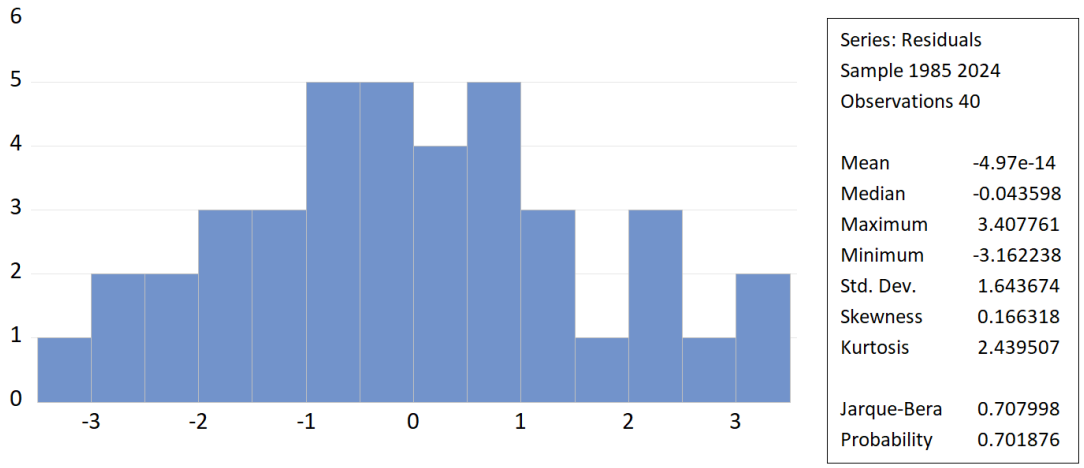


Figure 3. Jarque-Bera test

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3.7. Normality of errors

Figure 3 indicates that the errors are normally distributed, since the Jarque-Bera probability is greater than 0.05. The errors are therefore normally distributed.

3.8. Model stability

Figures 4 and 5 show that the results of the CUSUM and COSUMSQ tests indicate that the model parameters and error variance are stable over time, since both curves lie within the confidence interval at the 5% threshold. The model is therefore considered stable.

3.9. Bounds test

To examine the existence of a cointegrating relationship, we will use the Pesaran et al. (2001) test. The Fisher *F*-statistic calculated during the test will be compared with the critical values of the bounds.

Table 8. F-Bounds test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	8.143976	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

According to Table 8, the results of the bounds test confirm the existence of a cointegrating relationship between the variables in the model where the value of *F*-statistic (8.143976) is greater than the value of the upper bound at all thresholds. This model allows us to estimate the long-term effects of the explanatory variables on the dependent variable.

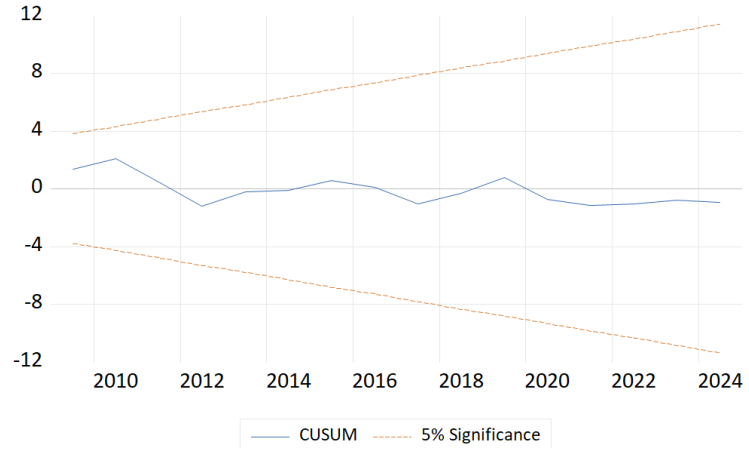

Figure 4. COSUM test

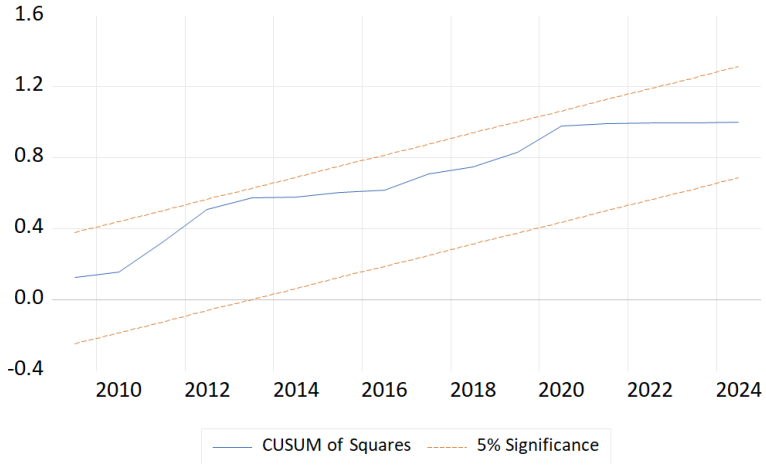

Figure 5. Test of COSUM of squares

3.10. Short- and long-run coefficients

Table 9. Short-run estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(–1))	0.5567	0.1740	3.2005	0.0056
D(FD)	–0.7506	0.2923	–2.5681	0.0206
D(FD(–1))	0.8421	0.2679	3.1428	0.0063
D(FD(–2))	1.0244	0.2739	3.7394	0.0018
D(FD(–3))	0.7462	0.2465	3.0267	0.0080
D(CRD)	–0.0973	0.1290	–0.7547	0.4614
D(CRD(–1))	–0.4397	0.1480	–2.9715	0.0090
D(CRD(–2))	–0.6515	0.1641	–3.9703	0.0011
D(CRD(–3))	–0.2190	0.1423	–1.5392	0.1433
D(INF)	0.2802	0.2212	1.2664	0.2235
D(INF(–1))	–1.3722	0.2480	–5.5338	0.0000
D(INF(–2))	–0.9495	0.2306	–4.1174	0.0008
D(INF(–3))	–0.7106	0.2310	–3.0768	0.0072
D(LNGI)	41.1428	15.4270	2.6669	0.0169
D(LNGI(–1))	88.2001	20.1671	4.3735	0.0005
D(LNGI(–2))	43.3793	17.2645	2.5126	0.0231
D(LNGI(–3))	41.6218	13.7129	3.0352	0.0079
CointEq(–1)	–2.5580	0.2889	–8.8536	0.0000

Table 10. Long-run estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD	–0.5873	0.2514	–2.3359	0.0328
CRD	0.2460	0.0649	3.7898	0.0016
INF	0.6808	0.2848	2.3907	0.0295
EXG	–0.1686	0.2964	–0.5690	0.5773
LNGI	–12.9234	3.6273	–3.5628	0.0026
C	137.0421	39.4923	3.4701	0.0032

Tables 9 and 10 show, respectively, the short-term and the long-term coefficients. From Table 9, we see that the adjustment coefficient (CointEq(–1)) is negative and statistically significant, reflecting the effect of an error correction mechanism and therefore verifying the hypothesis of the existence of cointegration between the variables in the model. The model converges rapidly to long-term equilibrium after a shock, with a speed of 255.80% per year. The main results obtained in this analysis are as follows.

The lagged effect of the growth rate is positive and significant, indicating that part of the growth lagged by one period is passed on to the next year. Economic growth is therefore persistent.

The fiscal deficit has an immediate and significant negative effect on economic growth, suggesting that its financing, often based on public debt, can exacerbate macroeconomic imbalances. However, the lagged coefficients of the deficit become positive and significant, indicating that the fiscal stimulus ultimately stimulates economic activity after a certain delay. This result is consistent with Keynesian logic, according to which public spending supports aggregate demand and real output in the short term. In the long run, however, the effect of the fiscal deficit becomes negative and significant, indicating that it is detrimental to economic growth. This result is consistent with neoclassical logic and suggests that an increase in the fiscal deficit may increase the government's financing needs, pushing up interest rates and thus crowding out productive investment. In addition, persistent deficits lead to an accumulation of public debt, which can reduce investor confidence and hamper growth. Thus, the fiscal deficit has a contrasting time profile, being expansionary in the short term but restrictive in the long term, highlighting the need for prudent and sustainable fiscal management.

For gross investment, it has a positive and significant effect in the short term. Investment is a key driver of economic growth through the accumulation of physical capital. Thus, economic growth is boosted by the effect of gross investment in the short term. However, this effect, which is favorable and stimulates growth in the short term, becomes negative and significant in the long term, indicating a change in the dynamics of its impact. This counterintuitive effect can be explained by the fact that investment has often been directed toward infrastructure or equipment projects with low direct economic returns, thus limiting its impact on growth. It is also possible that the long-term effect of investment has been reduced because the economy has not benefited from technological innovations or productivity gains. In addition, deficit and debt financing can crowd out private investment, reducing expected returns. Finally, the lack of strong industrialization and heavy dependence on imports of intermediate goods may also explain the negative effect of gross investment on long-term growth.

Although the coefficient associated with the immediate effect of credit granted to the private sector is negative for the current year, it is not significant. However, its delayed effects after one and two periods are negative and significant on

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economic growth. This can be explained by over-indebtedness of economic agents, i.e., households and businesses, or by poor allocation of financial resources that does not promote production. It is also possible that credit is being used for unproductive expenditure, which slows down growth. In the long term, the effect of credit granted to the private sector becomes positive and significant, indicating a favorable impact on long-term growth.

As for the coefficient associated with the immediate effect of inflation, it is positive for the current year but statistically insignificant, indicating that changes in price levels do not have an immediate impact on economic growth. On the other hand, its delayed effects after one, two, and three periods are negative and significant, suggesting that a rise in inflation ultimately weighs on economic activity after a certain time lag. This dynamic can be attributed to a decline in purchasing power, increased uncertainty among economic agents, and higher production costs, which dampen consumption, investment, and, consequently, growth. However, in the long term, the effect of inflation on growth becomes positive and significant, indicating that moderate inflation could reflect an expanding economy, dynamic domestic demand, or accommodative monetary and fiscal policies that promote real activity. Thus, while inflation penalizes growth in the short term, its long-term effects seem to be associated with a more dynamic macroeconomic environment conducive to production.

With regard to the effect of the exchange rate on economic growth, although neutral in the short term, it becomes negative but not significant in the long term. This neutrality reflects the weak transmission of the exchange rate to the real economy in the Moroccan context, probably due to the managed exchange rate regime, the structure of inelastic imports, and the low diversification of exports.

In light of the empirical results, it appears that hypotheses *H1*, *H2,* and *H3* are all confirmed. On the one hand, short-term estimates indicate that the fiscal deficit has a statistically significant effect on economic growth, thus validating hypothesis *H1*, in line with Awadzie et al. (2025) and Hassan and Akhter (2014). On the other hand, the long-term results show that the fiscal deficit also has a statistically significant effect on economic growth, confirming hypothesis *H2*, in line with the conclusions of Mohanty (2013) and Hettabi (2021). Finally, the evidence of differentiated effects depending on the time horizon provides solid empirical support for hypothesis *H3*, thus confirming the results of Sabr et al. (2021), Sore et al. (2024), Zoto and Berisha (2016), Nkrumah et al. (2016), and Rana and Wahid (2016).

CONCLUSION

The objective of this study is to assess the potential short- and long-term impact of the fiscal deficit on economic growth in Morocco.

The results confirm the existence of a relationship between the fiscal deficit and economic growth, in which the fiscal deficit has an immediate negative effect on growth, followed by delayed positive effects, before becoming unfavorable in the long term.

These results have important implications for economic policy. They suggest that the fiscal deficit can be used as a tool for short-term economic stabilization, provided that it is controlled and directed toward productive expenditure. On the other hand, excessive and prolonged reliance on the deficit is likely to undermine long-term growth.

It therefore appears necessary to improve the quality and efficiency of deficit-financed public spending, giving priority to productive investments with a high human capital, infrastructure, and innovation content in order to maximize the impact of the deficit on growth. It is also necessary to implement more prudent management of the fiscal deficit with a view to reducing it in order to avoid its negative effects on long-term economic growth.

Finally, future research prospects consist of deepening the analysis by adopting a disaggregated approach to the fiscal deficit, distinguishing in particular between current expenditure and investment expenditure, as well as the methods of financing the deficit. Such an approach would make it possible to identify more precisely the channels through which fiscal policy influences economic growth and to better understand the conditions under which the fiscal deficit can sustainably support growth without compromising macroeconomic stability.

AUTHOR CONTRIBUTIONS

Conceptualization: Mohammed Hennach.
Data curation: Mohammed Hennach.
Formal analysis: Mohammed Hennach.
Investigation: Mohammed Hennach.
Methodology: Mohammed Hennach.
Project administration: Mohammed Hennach, Abdellah Echaoui.
Resources: Mohammed Hennach.
Software: Mohammed Hennach.
Supervision: Abdellah Echaoui.
Validation: Abdellah Echaoui.
Visualization: Mohammed Hennach.
Writing – original draft: Mohammed Hennach.
Writing – review & editing: Mohammed Hennach, Abdellah Echaoui.

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