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## Assessing the effectiveness of monetary policy in reducing fiscal deficits: An econometric study of Morocco

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### Abstract

This study examines the effectiveness of monetary policy in reducing Morocco's budget deficit over the period 2000–2024. Using the ARDL approach and annual data, it explores both short- and long-term relationships between fiscal balance and key monetary and macroeconomic variables such as interest rates, inflation, exchange rates, public debt, and government revenue. The results confirm the existence of a long-run equilibrium and highlight the significant short-term effects of monetary variables on fiscal performance. Findings underline the importance of policy coordination to ensure fiscal sustainability. This research contributes to the literature by identifying the main transmission channels and offering recommendations to improve the coherence between monetary and fiscal policies in Morocco.

**Keywords:** Effectiveness, Fiscal deficit, Macroeconomic policy, Monetary policy, Morocco.

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### 1. Introduction

Public finance is a fundamental pillar of state functioning and development, as it underpins the planning, implementation, and evaluation of economic and social policies [1, 2]. Effective and disciplined management of public resources is essential not only for ensuring macroeconomic stability but also for financing public services, reducing inequalities, and promoting inclusive growth. This imperative becomes even more pressing in developing countries like Morocco, where financial resources are limited while social needs continue to expand [3-5].

Against this backdrop, the budget deficit emerges as a clear symptom of deeper structural and institutional tensions in public financial governance. It places the country in a critical position, where it becomes necessary to mobilize all available

economic, institutional, and political to prevent further deterioration of fiscal balances [6-9]. This situation raises important questions about fiscal sustainability, the effectiveness of monetary policy, and the strategic role that such policy can play in managing macroeconomic imbalances and preserving financial stability [10, 11].

Monetary policy, through instruments such as interest rate management, inflation targeting, and exchange rate stabilization, has the potential to influence fiscal dynamics and play a corrective role in addressing budgetary imbalances [12-14]. By affecting key macroeconomic variables, it can indirectly ease pressures on public finances. Understanding how these interactions function in practice is particularly relevant for Morocco, where persistent fiscal deficits coexist with an evolving monetary policy framework [12-19].

This context raises several key questions: To what extent does Morocco's monetary policy effectively influence the budget deficit? Through which channels can its instruments contribute to deficit reduction, and what limitations constrain this process? Addressing these questions and critically examining the underlying mechanisms can provide valuable insights for policymakers and contribute to improving fiscal governance. Ultimately, this research aims to identify actionable solutions to reinforce public finance management and ensure long-term fiscal sustainability. To guide this analysis, the study sets out the following objectives:

- i. To assess the short-term and long-term impact of key monetary and macroeconomic variables on the budget deficit in Morocco.
- ii. To evaluate the effectiveness of monetary policy instruments in reducing fiscal deficits through their influence on debt servicing costs, revenue generation, and economic growth.
- iii. To determine the existence and strength of a long-run equilibrium relationship between the budget deficit and its macroeconomic determinants, using an ARDL-based error correction framework.

To address these objectives, this study employs the ARDL modelling approach, which allows for the analysis of both short-term dynamics and long-term relationships between macroeconomic variables. Using annual data from 2000 to 2024, the model examines how monetary policy tools influence Morocco's budget deficit, while accounting for key factors such as public debt, government revenue, and economic growth.

This research provides insights into the transmission mechanisms of monetary policy and contributes to ongoing debates on macroeconomic coordination. It offers empirical evidence on policy effectiveness and proposes recommendations to strengthen fiscal-monetary coherence in the Moroccan context.

In sum, this research contributes to the literature in three key ways. First, it reviews the relevant theoretical and empirical literature on the relationship between monetary policy and fiscal deficits. Second, it presents the methodology, including the model specification, data sources, and estimation strategy. Finally, it presents and discusses the empirical results before concluding with key findings, policy implications, and directions for future research.

## **2. Theoretical Framework**

In the context of increasing fiscal instability, renewed inflationary pressures, and persistent tensions in monetary markets, the effectiveness of monetary policy in containing budget deficits has become a central issue in contemporary macroeconomic debates. While fiscal policy has traditionally been viewed as the principal instrument for adjusting public balances, the modern consensus emphasizes the necessity of close coordination between fiscal and monetary authorities to achieve coherent and sustainable macroeconomic management. Monetary policy affects fiscal outcomes through both direct and indirect channels. The direct channels include its influence on debt servicing costs through interest rate adjustments and on the valuation of government debt. Indirect channels operate via their impact on macroeconomic aggregates such as tax revenues, investment, and economic growth. Moreover, clarifying the distinction between structural and cyclical deficits would enhance the interpretability of fiscal responses. Thus, a nuanced understanding of these interaction mechanisms is fundamental to the design and implementation of sound public policy [6, 16, 20].

Building on this context, the theoretical literature provides essential insights into the monetary-fiscal policy nexus. Sargent and Wallace [21] demonstrate that persistent deficits without credible fiscal adjustment may eventually compel the central bank to monetize debt, a scenario described as "unpleasant monetarist arithmetic," where monetary policy loses its effectiveness in controlling inflation. This phenomenon, known as fiscal dominance, contrasts with monetary dominance, where price stability is prioritized and fiscal authorities are compelled to adjust accordingly. Building on this, Sargent [22] highlights the importance of fiscal expectations in shaping monetary policy outcomes, underscoring the strategic complexity of fiscal-monetary interactions. These expectations, including future inflation and default risks, play a crucial role in determining current policy credibility and investor behavior.

Further deepening our understanding, Leeper [23] advances this discourse by classifying regimes according to the activism of monetary and fiscal policy. His work shows that the specific regime configuration profoundly affects the economy's response to shocks. The implication is clear: robust macroeconomic stability is closely linked to the nature and degree of fiscal-monetary policy coordination. Concrete illustrations of these regimes, such as emerging economies subject to IMF constraints or Eurozone members adhering to fiscal rules, help contextualize this typology.

Turning to the empirical dimension, recent studies have explored the transmission mechanisms through which monetary policy impacts fiscal outcomes, especially in economies characterized by significant public debt and open capital markets. For instance, Billi [24] illustrates that the direct impact of higher interest rates, by raising borrowing costs and reducing the value of long-term government bonds, can amplify fiscal vulnerabilities. Kassem [25] in a panel analysis of selected MENA countries, including Morocco, a statistically significant and negative relationship between interest rates and budget deficits was found, indicating that tighter monetary conditions can worsen fiscal pressures. At the same time, the indirect effects, such as lower investment and slower growth, also contribute to deteriorating fiscal outcomes. These results

reinforce the critical importance of interest rate channels in the fiscal-monetary policy nexus, particularly in emerging and developing economies. Additionally, expected growth trajectories can shape interest rate trends and affect future deficit paths.

Beyond interest rate channels, empirical evidence also highlights the pivotal role of the exchange rate. Exchange rate fluctuations directly impact the local currency value of public debt, the cost of imports, and the competitiveness of exports, with significant implications for government revenues and expenditures. This constitutes both a direct channel, affecting the domestic burden of external debt, and an indirect one, through trade balances and economic activity. Currency appreciation may lower the domestic cost of servicing foreign-currency-denominated debt and moderate imported inflation, providing temporary fiscal relief. Conversely, overreliance on an appreciating exchange rate can erode export competitiveness and undermine long-term fiscal sustainability. Depreciation, meanwhile, may increase the cost of debt service and imported goods, but in some contexts may not sufficiently stimulate export revenues to offset these costs [26, 27]. These dynamics are particularly salient for emerging and developing economies, where external sector shocks are often more pronounced. The impact of such fluctuations is amplified or mitigated by market expectations and institutional credibility.

In addition to the roles of interest rates and exchange rates, a large body of research documents the destabilizing effects of high inflation on fiscal balances. Inflation erodes the real value of tax revenues, an effect described by Tanzi [28] while increasing nominal expenditures, especially in contexts where public spending is indexed to prices, attempts to use inflation as a tool for fiscal adjustment are typically unsustainable, as any initial fiscal relief is offset by rising interest rates, higher debt service costs, and the risk of inflation expectations becoming unanchored [29].

Furthermore, studies from both developed and developing countries show that persistent budget deficits, particularly those financed through monetary expansion, are closely associated with episodes of fiscal dominance and sustained inflation [30, 31]. Conversely, the adoption of credible inflation-targeting regimes has been found to promote fiscal discipline and improve public debt management [32, 33].

Despite this extensive coverage, several important dimensions remain underdeveloped. Firstly, the role of economic growth as a determinant of the budget deficit deserves further theoretical attention. Although it is often seen as a consequence of fiscal dynamics, growth itself fuels the fiscal system by increasing revenues and reducing the need for countercyclical spending. However, this relationship is not linear. As Minea and Villieu [34] point out, the positive impact of growth on fiscal sustainability diminishes at high debt levels, when debt-servicing constraints begin to crowd out productive spending. Understanding these thresholds is essential for designing policy strategies that adapt to the different phases of the growth and debt cycle.

Secondly, theoretical models often do not sufficiently explore the role of public revenue generation as a driver of fiscal dynamics. A more robust framework would incorporate how revenues respond to macroeconomic conditions, including the elasticity of the tax base, the structure of taxation, and the distributional impact of fiscal instruments. Ko [35] using a Kaleckian growth model, this analysis highlights how different types of taxation, particularly on capital income, can influence both short-term demand and long-term growth, thereby shaping fiscal balances. Furthermore, examining how taxation interacts with income inequality and consumption behavior can enhance budget modeling and improve the relevance of policy recommendations.

Finally, when fiscal positions deteriorate due to persistent deficits or high debt, monetary policy is often called upon to restore macroeconomic equilibrium. Here again, the direct channel involves interest rate hikes or monetary tightening to curb inflation, while the indirect effect can be seen in how such policy shifts influence market expectations, investment sentiment, and economic performance. This underscores the close interdependence of monetary effectiveness and fiscal discipline [36, 37]. The Fiscal Theory of the Price Level (FTPL) posits that the general price level is primarily determined by the dynamics of public debt and fiscal policy choices regarding taxation and expenditure [20]. Without effective policy coordination, unchecked fiscal deficits risk undermining the ability of monetary authorities to achieve price stability.

This context raises several key questions: To what extent does Morocco's monetary policy effectively influence the budget deficit? Through which channels can its instruments contribute to deficit reduction, and what limitations constrain this process? Addressing these questions and critically examining the underlying mechanisms can provide valuable insights for policymakers and contribute to improving fiscal governance. Ultimately, this research aims to identify actionable solutions to reinforce public finance management and ensure long-term fiscal sustainability. To guide this analysis, the study tests three main hypotheses:

*Hypothesis 1: Expansionary monetary policy, characterized by lower interest rates, contributes to the reduction of the budget deficit in the short term by stimulating economic growth and increasing government revenue.*

*Hypothesis 2: The appreciation of the real effective exchange rate temporarily improves the fiscal balance by reducing foreign debt servicing costs and mitigating imported inflation, but over the long term, it may harm export competitiveness and fiscal sustainability.*

*Hypothesis 3: Rising public debt has a persistent negative impact on the budget deficit due to increased debt servicing costs and the strain it places on public finances.*

These hypotheses will be tested through the ARDL modeling approach, which captures both short-term dynamics and long-term relationships between key monetary and macroeconomic variables. By investigating these relationships, this study seeks to contribute to a deeper understanding of the transmission mechanisms of monetary policy and its role in improving fiscal governance in Morocco.

### 3. Methodology

The objective of this study is to investigate the dynamic relationship between monetary policy and the budget deficit in Morocco over the period 2000 to 2024. Specifically, the study seeks to explore short-term and long-term interactions between selected macroeconomic variables that have been widely recognized in the literature as key determinants of fiscal outcomes in emerging economies. The variables include indicators of monetary policy stance, fiscal capacity, and economic performance, all chosen for their relevance to the Moroccan policy environment. Through this analysis, the study aims to produce actionable insights for policymakers seeking to improve macroeconomic coordination, manage fiscal imbalances, and promote long-term fiscal sustainability.

#### 3.1. Data description

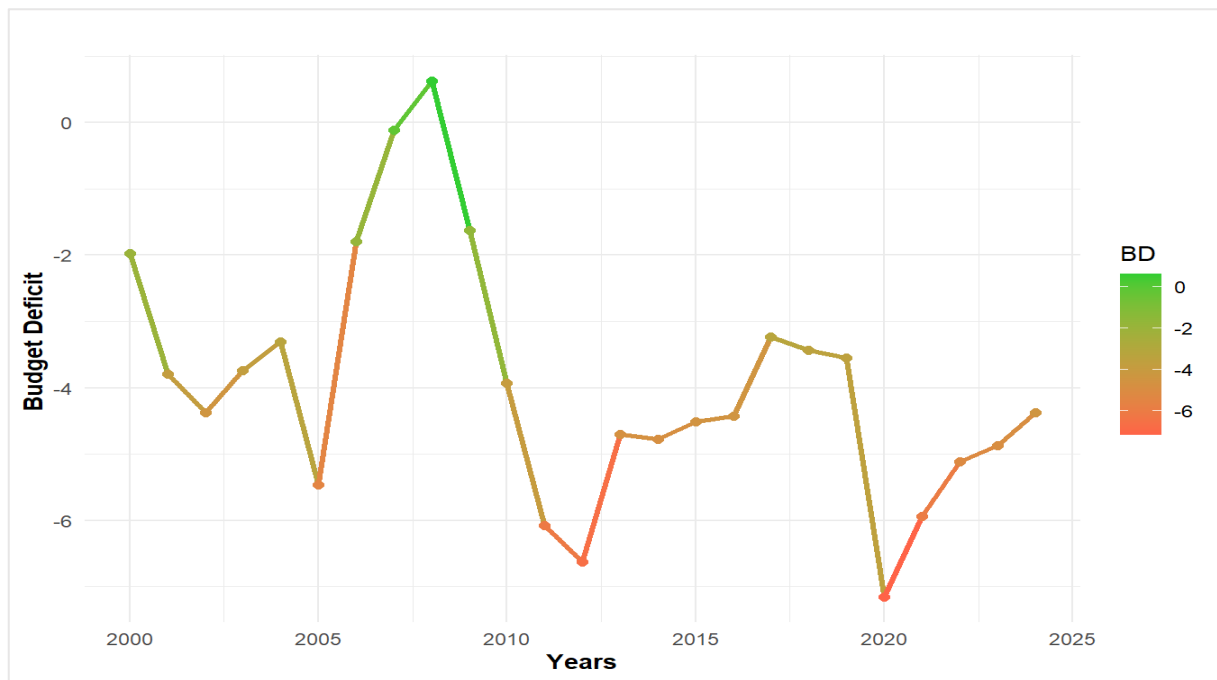
The empirical analysis covers the period from 2000 to 2024. This timeframe captures the most relevant phase of Morocco's economic transformation, including key monetary reforms, fiscal restructuring, and integration into global markets. Morocco was selected not only for the availability of consistent macroeconomic data for this period but also for its strategic role in North Africa as a regional economic hub connecting Europe, Sub-Saharan Africa, and the Middle East. The country's commitment to monetary stability and gradual fiscal consolidation further strengthens its relevance as a case study for examining monetary-fiscal interactions.

While the available data from 2000 onward are sufficiently detailed and reliable for meaningful empirical analysis, an important limitation of this study is the lack of consistent historical data prior to 2000. This limits the ability to extend the analysis over a longer historical horizon but does not undermine the relevance or validity of the selected study period, which covers multiple economic cycles and policy regimes. Table 1 provides an overview of the variables included in the analysis, along with their definitions and data sources.

**Table 1.**  
Variables description.

Variable	Description	Source
BD	Budget Deficit: The central government's net lending or borrowing as a percentage of GDP. Negative values indicate a deficit, while positive values indicate a surplus. This reflects the government's overall fiscal position.	IMF
INF	Inflation: The annual percentage change in the Consumer Price Index, capturing domestic price level dynamics and fluctuations in purchasing power.	IMF
IR	Interest Rate: The key monetary policy rate set by Bank Al-Maghrib, used to influence credit conditions, liquidity, and inflation expectations.	BAM
REER	Real Effective Exchange Rate: An index measuring Morocco's international competitiveness, adjusted for relative inflation differentials with trading partners.	WDI
GROWTH	Economic Growth: The annual rate of change in real Gross Domestic Product, reflecting the overall performance of the economy and its business cycle.	WDI
DEBT	Public debt: The total stock of government debt as a percentage of GDP, indicating fiscal sustainability and debt burden.	IMF
REVENUE	Government Revenue: Total government revenue, excluding grants, expressed as a percentage of GDP, reflecting the government's domestic resource mobilization capacity.	IMF

The data used in this study are sourced from reliable institutions such as the International Monetary Fund (IMF), the World Bank (via the World Development Indicators - WDI), and Bank Al-Maghrib (BAM). These databases provide accurate and up-to-date information on the key macroeconomic indicators required for the analysis.



**Figure 1.**  
Morocco's Fiscal Balance Dynamics.

Over the period 2000–2024, Morocco's budget balance has experienced alternating phases of improvement and deterioration. After starting the 2000s with moderate deficits ranging from -2% to -4% of GDP, the country managed to reduce its fiscal imbalance, achieving a small surplus of +0.63% in 2008. However, this progress was short-lived, as the deficit widened sharply in the following years, reaching -6.63% of GDP by 2012, largely due to the combined effects of the 2008 global financial crisis, rising international commodity prices, and increased public spending on subsidies and social programs. From 2013 to 2019, the fiscal situation stabilized somewhat, with the deficit fluctuating between -3% and -4%, but without returning to surplus.

The outbreak of the COVID-19 pandemic in 2020 triggered a new fiscal shock, pushing the deficit to a record high of -7.15%. In the following years, the fiscal position improved progressively, with the deficit narrowing to around -4% by 2024. Despite these efforts, Morocco's fiscal balance remains structurally weaker than the pre-crisis levels, signaling the need for continued reforms and stronger fiscal management to ensure long-term sustainability.

### 3.2. Model and Methodological Approach

In this study, we employ the Autoregressive Distributed Lag (ARDL) modeling framework to explore how monetary policy and other macroeconomic factors influence Morocco's budget deficit over time. Our choice of the ARDL approach is motivated by its ability to handle variables that are integrated of different orders, which is particularly relevant given the nature of our dataset. To determine whether a stable long-term relationship exists between the budget deficit and the selected explanatory variables, we apply the Bound Testing procedure developed by Pesaran et al. [38].

We specify the ARDL model in its general form as follows:

$$BD_t = \alpha_0 + \sum_{i=1}^p \phi_i BD_{t-i} + \sum_{j=0}^{q_1} \beta_j INF_{t-j} + \sum_{k=0}^{q_2} \delta_k IR_{t-k} + \sum_{l=0}^{q_3} \theta_l REER_{t-l} + \sum_{m=0}^{q_4} \eta_m GROWTH_{t-m} + \sum_{n=0}^{q_5} \lambda_n DEBT_{t-n} + \sum_{o=0}^{q_6} \gamma_o REVENUE_{t-o} + \varepsilon_t$$

Here,  $\alpha_0$  represents the constant term, capturing the baseline level of the budget deficit when all other factors are held constant. The parameters  $\phi_i$ ,  $\beta_j$ ,  $\delta_k$ ,  $\theta_l$ ,  $\eta_m$ ,  $\lambda_n$ , and  $\gamma_o$  capture the dynamic short- and long-term effects of the lagged values of the budget deficit and the explanatory variables on the current budget deficit. The term  $\varepsilon_t$  represents the error term, capturing unobserved factors affecting the budget deficit in period  $t$ .

After testing for cointegration using the Bound Testing procedure, we re-specify the model as a Restricted Error Correction Model (RECM) to capture short-term dynamics while maintaining the long-term equilibrium relationship. The RECM is expressed as follows:

$$\Delta BD_t = \alpha_0 + \sum_{i=1}^{p-1} \phi_i \Delta BD_{t-i} + \sum_{j=0}^{q_1-1} \beta_j \Delta CPI_{t-j} + \dots + \sum_{o=0}^{q_6-1} \gamma_o \Delta REVENUE_{t-o} + \psi ECT_{t-1} + \varepsilon_t$$

In this reparameterized form,  $\Delta$  denotes the change in the variables, allowing us to focus on short-term adjustments. The key parameter in this model is  $\psi$ , which represents the speed of adjustment toward long-term equilibrium. A negative

and statistically significant value of  $\psi$  indicates that deviations from the long-run relationship are corrected over time, bringing the system back toward equilibrium.

To ensure that our model captures the most relevant dynamics without unnecessary complexity, we rely on automatic model selection based on the Akaike Information Criterion (AIC). This approach allows us to determine the optimal lag structure in a data-driven manner, avoiding arbitrary lag choices that could bias our results.

**Table 2.**

Summary of the Descriptive Statistics of the Study Variables.

Statistics	BD	REER	GROWTH	DEBT	INF	IR	REVENUE
N.Obs	25	25	25	25	25	25	25
Min	-7.15	95.38	-7.19	41.99	0.24	1.50	19.80
Max	0.63	114.85	7.93	72.25	6.65	5.00	28.57
Mean	-3.93	102.33	3.63	57.64	1.86	2.92	24.18
Median	-4.37	100.76	3.53	58.56	1.49	3.00	24.52
Std. Dev	1.87	4.86	2.92	8.42	1.48	0.76	2.26
Skewness	0.63	0.77	-1.75	-0.18	1.56	0.42	-0.31
Kurtosis	0.02	-0.17	5.03	-0.90	2.24	0.68	-0.74
Normality	0.316	0.124	0.000	0.393	0.001	0.034	0.395

All estimations and diagnostic tests are carried out using R software, which provides us with advanced, reliable, and reproducible tools for time series econometric analysis. This choice enables us to ensure methodological transparency and to validate the robustness of our findings through rigorous statistical testing.

## 4. Results

### 4.1. Descriptive Analysis

The descriptive analysis of the variables provides several important insights into the distribution, variability, and normality of the data used in this study. The results are summarized in Table 2.

The results reveal considerable variability across the variables, reflecting Morocco's economic fluctuations over the study period. For instance, the budget deficit ranges from -7.15 percent to 0.63 percent of GDP, confirming the alternating phases of fiscal consolidation and widening deficits. Similarly, the public debt ratio shows a substantial range from 41.99 percent to 72.25 percent of GDP, indicating significant debt accumulation over time.

The inflation rate displays wide variation, ranging from 0.24 percent to 6.65 percent, which reflects Morocco's exposure to both domestic and external price shocks. The interest rate set by Bank Al-Maghrib ranges from 1.5 percent to 5 percent, demonstrating notable shifts in monetary policy stance during the period analyzed.

The skewness and kurtosis indicators show that most variables deviate from perfect normality. Specifically, the growth rate exhibits high negative skewness and excess kurtosis, suggesting the presence of extreme values or outliers during certain economic cycles. This is confirmed by the Shapiro-Wilk normality test, where the p-values for GROWTH, INF, and IR are below the 0.05 threshold, indicating a rejection of the null hypothesis of normality for these variables.

On the other hand, variables such as BD, REER, DEBT, and REVENUE show p-values above 0.05, suggesting that their distributions do not significantly deviate from normality at the 5 percent significance level.

### 4.2. Correlation Analysis

The correlation matrix presented in Table 3 provides useful insights into the strength and direction of the linear relationships between the key macroeconomic variables considered in this study.

**Table 3.**

Correlation analysis.

	BD	REER	GROWTH	DEBT	INF	IR	REVENUE
BD	1.00	0.40	0.37	-0.55	0.24	0.47	0.01
REER	0.40	1.00	0.17	0.03	0.08	0.63	-0.60
GROWTH	0.37	0.17	1.00	-0.42	0.01	0.34	-0.24
DEBT	-0.55	0.03	-0.42	1.00	0.13	-0.41	-0.11
INF	0.24	0.08	0.01	0.13	1.00	0.09	0.37
IR	0.47	0.63	0.34	-0.41	0.09	1.00	-0.41
REVENUE	0.01	-0.60	-0.24	-0.11	0.37	-0.41	1.00

The results reveal that the budget deficit is moderately associated with several key macroeconomic variables, showing both positive and negative statistical relationships that reflect the complex dynamics of fiscal performance. Among these, the positive correlation with the real effective exchange rate (0.40) stands out, suggesting that periods marked by currency appreciation tend to be accompanied by improvements in the fiscal balance.

In addition, the analysis highlights a positive correlation with economic growth (0.37), indicating that stronger economic performance is generally linked to lower deficits or even surpluses. However, this favorable relationship is

counterbalanced by the negative and relatively strong correlation with public debt (-0.55). This finding suggests that rising debt levels are typically associated with a worsening fiscal position, underlining the fiscal vulnerability that accompanies high debt burdens.

Turning to inflation, the results reveal a positive but weak correlation (0.24) with the budget deficit, pointing to a limited statistical link that does not appear to be a primary driver of fiscal outcomes in the Moroccan context. On the other hand, the policy interest rate shows a more notable positive correlation (0.47), which emerges as the strongest positive association in the analysis. This suggests that periods of tighter monetary policy may coincide with efforts to stabilize public finances. Finally, the correlation between the budget deficit and government revenue is virtually non-existent (0.01), indicating no meaningful linear association in the data.

Beyond the relationship with the fiscal balance, the correlation matrix also provides useful information on the linear associations between the explanatory variables themselves. The highest correlation among them is 0.63 between the policy interest rate and the real effective exchange rate, which remains below the commonly accepted multicollinearity threshold of 0.80. Other correlations, such as those between economic growth and public debt (-0.42) or between government revenue and the exchange rate (-0.60), are moderate and do not indicate excessive linear dependence.

#### 4.3. Stationarity Test

To assess the integration properties of the variables used in this study, we applied three standard unit root tests: the Augmented Dickey-Fuller (ADF) test, the KPSS test, and the Phillips-Perron (PP) test. Table 4 summarizes the stationarity results at the level for all the variables considered.

**Table 4.**  
Stationarity test.

Variable	ADF Test	KPSS Test	PP Test	Order of Integration
BD	Non-stationary	Stationary	Non-stationary	I(1)
REER	Non-stationary	Non-stationary	Non-stationary	I(1)
GROWTH	Stationary	Stationary	Stationary	I(0)
DEBT	Non-stationary	Non-stationary	Non-stationary	I(1)
INF	Non-stationary	Stationary	Non-stationary	I(1)
IR	Stationary	Stationary	Non-stationary	I(0)
REVENUE	Non-stationary	Non-stationary	Non-stationary	I(1)

As shown in Table 4, the results of the unit root tests present mixed outcomes for certain variables, which is common in small samples or borderline cases. Specifically, GROWTH is clearly identified as stationary at level (I(0)), with all three tests supporting this result. In contrast, REER, DEBT, and REVENUE are consistently found to be non-stationary at the level, suggesting they are integrated of order one (I(1)).

For BD, INF, and IR, the results are less conclusive, with conflicting classifications across the three tests. Based on the predominance of evidence and standard practice, BD and INF are classified as I(1). For IR, both the ADF and KPSS tests support stationarity at the level, with only the PP test suggesting otherwise. We therefore classify IR as I(0), a decision further supported by the economic rationale that monetary policy rates typically fluctuate around a target or equilibrium level.

These classifications, along with the confirmed stationarity or non-stationarity of the other variables, validate the use of the ARDL and RECM approaches, which are specifically designed to accommodate variables with mixed integration orders.

#### 4.4. ARDL Model and Bounds Test Results

In line with the ARDL procedure, Table 5 presents the estimation results of the best-fitting ARDL model selected based on the AIC. While the table provides detailed coefficient estimates for both short-term and long-term lags, our focus remains on confirming the existence of a long-term relationship through the Bounds Test, the results of which are presented in Table 6.

**Table 5.**  
ARDL Model Estimation Results.

Variable	Estimate	Std. Error	t-value	p-value	Significance
Intercept	-21.29718	12.27819	-1.735	0.15784	
L(BD, 1)	-0.14208	0.12435	-1.143	0.31695	
REER	0.81774	0.11928	6.855	0.00237	**
L(REER, 1)	-0.18810	0.11050	-1.702	0.16392	
L(REER, 2)	-0.37283	0.07521	-4.957	0.00772	**
INF	0.43449	0.18065	2.405	0.07394	.
L(INF, 1)	0.34121	0.14109	2.418	0.07289	.
L(INF, 2)	0.22975	0.08985	2.557	0.06285	.
IR	-3.47622	1.35093	-2.573	0.06177	.
L(IR, 1)	-1.31207	0.67542	-1.943	0.12401	
L(IR, 2)	0.45181	0.37733	1.197	0.29726	
DEBT	-0.03555	0.08495	-0.418	0.69708	
L(DEBT, 1)	-0.14526	0.08441	-1.721	0.16040	
REVENUE	0.75419	0.13191	5.718	0.00463	**
L(REVENUE, 1)	-0.98786	0.15822	-6.244	0.00335	**
L(REVENUE, 2)	0.41916	0.12852	3.262	0.03104	*
GROWTH	0.79794	0.18018	4.429	0.01143	*
L(GROWTH, 1)	0.73972	0.18191	4.066	0.01527	*
L(GROWTH, 2)	0.38555	0.12106	3.185	0.03338	*

Note: \*, \*\*, \*\*\* are rejections of the null hypothesis of non-stationarity at the 1%, 5%.

**Table 6.**  
Bounds Test for Cointegration.

Test Statistic	F-Statistic	p-value	Conclusion
Bounds F-Test	28.453	< 0.01	Evidence of cointegration found

The F-statistic exceeds the critical values at the 1% level, supporting the existence of a long-run relationship between the budget deficit and its determinants.

Given the confirmation of a long-term relationship through the Bounds Test, we proceed to estimate and interpret the RECM derived from the ARDL specification. This model captures both the short-term adjustments and the long-term equilibrium dynamics relevant to Morocco's fiscal balance.

#### 4.5. RECM Results with Robust Standard Errors

After estimating the RECM model, the Breusch-Godfrey test indicated the presence of first-order autocorrelation ( $p = 0.0452$ ), which could bias the standard error estimates and affect inference.

**Table 7.**  
Diagnostic tests.

Test	p-value	Conclusion
Breusch-Godfrey test	0.0452	Serial autocorrelation
Breusch-Pagan test	0.3822	No heteroscedasticity
Jarque-Bera test	0.5529	The residuals follow a normal distribution

To address this issue, we applied heteroskedasticity- and autocorrelation-consistent (HAC) standard errors using the Newey-West (HAC) correction method. This adjustment ensures that the estimated standard errors are robust to both autocorrelation and heteroskedasticity, thereby improving the reliability of statistical inference.

The corrected coefficient estimates and robust standard errors are reported below as the final specification of the RECM model, which will serve as the basis for interpreting short-term dynamics and long-term adjustments.

**Table 8.**  
RECM Model Estimation Results.

Variable	Estimate	Std. Error	t-value	p-value	Significance
$\Delta$ (REER)	0.8177	0.0480	17.03	2.98e-09	***
$\Delta$ (L.REER, 1)	0.3728	0.0344	10.83	3.32e-07	***
$\Delta$ (INF)	0.4345	0.0577	7.53	1.16e-05	***
$\Delta$ (L.INF, 1)	-0.2297	0.0448	-5.13	0.00033	***
$\Delta$ (IR)	-3.4762	0.2643	-13.15	4.52e-08	***
$\Delta$ (L.IR, 1)	-0.4518	0.1892	-2.39	0.03595	*
$\Delta$ (DEBT)	-0.0355	0.0115	-3.08	0.01039	*
$\Delta$ (REVENUE)	0.7542	0.0449	16.81	3.42e-09	***
$\Delta$ (L.REVENUE, 1)	-0.4192	0.0348	-12.05	1.11e-07	***
$\Delta$ (GROWTH)	0.7979	0.0207	38.50	4.39e-13	***
$\Delta$ (L.GROWTH, 1)	-0.3856	0.0387	-9.97	7.63e-07	***
Error Correction (ECT)	-1.1421	0.0512	-22.33	1.64e-10	***

Note: \*, \*\*, \*\*\* are rejections of the null hypothesis of non-stationarity at the 1%, 5%.

Table 8 presents the final estimation results of the RECM, corrected for autocorrelation using HAC robust standard errors. The results provide insights into the short-term dynamics of the budget deficit and confirm the existence of a long-term adjustment mechanism, as indicated by the significant error correction term.

Starting with the short-term dynamics, the results indicate that variations in the REER have a positive and highly significant impact on the budget balance. Both the immediate change  $\Delta$ (REER) and its first lag  $\Delta$ (L(REER, 1)) show positive and statistically significant effects at the 1% level, highlighting the role of exchange rate appreciation in enhancing fiscal performance in the short run.

Turning to INF, the current change exerts a positive and significant influence on the fiscal balance. However, the lagged inflation effect  $\Delta$ (L(INF, 1)) appears negative and significant, pointing to a potential reversal or short-term instability in fiscal outcomes following inflationary pressures.

The IR is associated with a strong and negative short-term effect, both in the current period  $\Delta$ (IR) and at its first lag  $\Delta$ (L(IR, 1)). These results indicate that higher monetary policy rates tend to weaken fiscal performance, likely due to increased debt servicing costs or reduced economic activity in response to tighter monetary conditions.

The analysis also reveals that DEBT exerts a negative and significant impact, confirming the fiscal strain associated with rising debt levels. This result is consistent with concerns over fiscal sustainability risks when debt accumulation outpaces fiscal consolidation efforts.

As for REVENUE, the current change  $\Delta$ (REVENUE) shows a positive and highly significant effect, improving the fiscal balance in the short term. Nevertheless, the lagged revenue change  $\Delta$ (L(REVENUE, 1)) presents a negative and significant effect, indicating that revenue gains may not be fully sustained over successive periods.

Regarding GROWTH, the findings reveal a strong and positive short-term impact, as evidenced by the highly significant coefficient of  $\Delta$ (GROWTH). However, the lagged growth effect  $\Delta$ (L(GROWTH, 1)) becomes negative and significant, suggesting cyclical adjustments or fiscal corrections following periods of rapid expansion.

Finally, the ECT is negative, highly significant, and large in magnitude (-1.14). This result provides strong evidence of a long-run equilibrium relationship, with the high adjustment speed indicating that over 100% of short-term deviations are eliminated within one period. Such rapid correction demonstrates the strength of the fiscal adjustment mechanism and the stability of the long-term relationship between the budget deficit and its key macroeconomic drivers.

## 5. Discussion

The empirical findings of this study provide substantive evidence on the dynamic relationship between monetary policy and fiscal outcomes in Morocco, offering valuable confirmation and extension of established theoretical insights. By situating Morocco's experience within the broader context of contemporary macroeconomic debates, this analysis highlights the relevance of monetary-fiscal interactions in an emerging market setting.

First, the results reaffirm the significant impact of the policy interest rate on the fiscal balance. Consistent with the theoretical propositions articulated by Sargent and Wallace [21] and further developed by Leeper [23] the analysis demonstrates that increases in the policy rate are associated with a widening budget deficit. This effect largely operates through the channel of higher government debt servicing costs, underscoring the fiscal vulnerabilities that can arise in environments with substantial public debt. The findings echo the view that effective macroeconomic management requires central banks to carefully weigh the fiscal implications of monetary tightening, particularly in economies where debt ratios are elevated [24, 25].

The real effective exchange rate also emerges as a key determinant of fiscal performance. The positive association between REER appreciation and improvements in the budget balance is consistent with international evidence suggesting that currency appreciation can temporarily alleviate fiscal pressures by reducing the local currency cost of servicing foreign-currency-denominated debt and moderating imported inflation [26, 27]. Nevertheless, as emphasized in the

theoretical framework, sustained reliance on currency appreciation risks undermining export competitiveness and, consequently, long-term fiscal sustainability.

Inflation presents a more nuanced influence on the budget deficit. In the short term, rising inflation appears to improve the fiscal balance by boosting nominal government revenues. However, this effect dissipates over time, as evidenced by the negative impact of lagged inflation on the deficit. This pattern reflects the Tanzi [28] whereby inflation-induced collection lags erode the real value of tax receipts. Such findings reinforce those of Grömling and Matthes [29] who warn against relying on inflation as a durable solution to fiscal imbalances due to the attendant risks of higher borrowing costs and macroeconomic instability.

Public debt remains a major driver of fiscal vulnerability in Morocco. The results demonstrate a persistent negative relationship between rising debt and fiscal outcomes, consistent with recent empirical studies from other emerging economies [30, 31]. These findings highlight the need for prudent debt management and structural reforms to ensure long-term fiscal sustainability.

Government revenue and economic growth provide temporary support for fiscal consolidation, but the observed negative lagged effects suggest that expansionary episodes may introduce cyclical vulnerabilities if not anchored by robust fiscal frameworks. This underscores the importance of not only leveraging periods of economic growth for fiscal improvement but also ensuring that revenue gains are sustained and matched with expenditure discipline.

Finally, the rapid speed of adjustment captured by the error correction term indicates that Morocco's fiscal system possesses a notable degree of resilience. Despite significant shocks, including the global financial crisis and the COVID-19 pandemic, the Moroccan policy framework has demonstrated an ability to restore fiscal equilibrium in a relatively short period. This resilience may be attributed to ongoing efforts to strengthen institutional frameworks and improve policy coordination, in line with best practices outlined in the recent literature [12, 37].

## 6. Conclusion

In conclusion, this study offers robust empirical evidence on the determinants of the budget deficit in Morocco, emphasizing the central role of monetary policy variables, particularly the policy interest rate and the real effective exchange rate, in shaping fiscal outcomes. The results highlight the importance of close policy coordination. While monetary tightening may be warranted to contain inflation or stabilize the exchange rate, it can also lead to higher debt servicing costs and increased fiscal pressures. On the other hand, effective management of the exchange rate can provide greater fiscal space. However, relying too heavily on currency appreciation may undermine competitiveness and limit long-term growth prospects.

The analysis of inflation's impact further cautions against viewing inflation as a sustainable means of fiscal adjustment, given the transient nature of its benefits and the potential for longer-term fiscal slippage. The negative consequences of rising public debt underscore the need for ongoing fiscal discipline and structural reforms to ensure debt sustainability.

For policymakers, the findings suggest that macroeconomic stability in Morocco depends on the careful calibration of both monetary and fiscal levers, as well as the implementation of reforms that strengthen revenue mobilization and support sustainable economic growth. The rapid adjustment mechanism identified in the study is encouraging, but should not lead to complacency; rather, it highlights the need for proactive, forward-looking policies capable of addressing future shocks and maintaining fiscal health.

Ultimately, achieving lasting fiscal sustainability in Morocco requires that fiscal and monetary authorities maintain close coordination and a unified policy direction. Through such collaborative efforts, Morocco will be better equipped to manage the uncertainties of global economic integration and safeguard the stability of its public finances.

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