

Determinants of Tax Revenue Performance in Morocco: Evidence from an ARDL Model

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ABSTRACT: Based on the ARDL framework, this research investigates the factors that characterize tax revenue performance in Morocco during 2000–2023. Potential overparameterization in the small annual sample is addressed through a parsimonious Autoregressive Distributed Lag (ARDL) (1,0,2,0,1,0,0) specification that captures dynamic relationships among the variables. The results indicate that tax revenue is persistent, as the lagged dependent variable is positive and highly significant. Political stability has a significant contemporaneous relationship with tax revenue, while the Real Effective Exchange Rate (REER) shows a positive contemporaneous effect followed by a negative lagged effect. Under the same specification, Gross Domestic Product (GDP) growth and foreign direct investment (FDI) are not statistically significant, whereas unemployment is negatively associated with tax revenue at the 10% significance level. The exact finite-sample bounds F-test provides inconclusive evidence of a long-run level relationship, and the complementary bounds t-test does not support cointegration. Accordingly, the reported long-run multipliers are interpreted as conditional model-implied estimates rather than established equilibrium effects. Overall, tax revenue performance in Morocco is better characterized by persistence and short-run macroeconomic and institutional dynamics than by a statistically established long-run relationship. The findings also underscore the need for caution when drawing causal policy conclusions from a small annual sample.

Keywords: Tax revenue, ARDL, Political stability, Real effective exchange rate, Unemployment, Morocco.

I. INTRODUCTION

Tax revenue allocation is a key way to support economic policy. It directly allows for financing government spending. For example, in the case of Morocco, government development programs come through taxation [1]. While there is a tax reform agenda, the performance of the system remains highly sensitive to macroeconomic conditions. Thus, it is extremely important to understand that the impact of government development programs (including concerns regarding inequality) is contingent on a particular macroeconomic environment [2].

In recent history, Morocco has embarked on an extensive agenda of fiscal and administrative reforms aimed at increasing efficiency in its tax system. Such measures include simplification of tax procedures, computerization of tax processes, widening of the tax base, and harmonizing tax policies with international conventions [3, 4]. Although tax revenue is prone to volatility, it is subject to various macroeconomic influences. Such influences include changes in economic growth rates, inflation rates, financial transfers, and exchange rate volatility. It is possible that instability and strength of institutional factors, including government stability and taxpayer compliance, may contribute to volatility [5–7].

This discussion is meant to emphasize the significance of increasing knowledge regarding the mechanisms that form tax revenue. Economic, financial, institutional and social elements could interact to reinforce the capacity or limit the ability of the government to harness domestic revenues. It is important to analyze such mechanisms not only because it will enable one to understand the short-run behavior of tax revenues following economic shocks but also the long-run mechanisms which support fiscal capacity. The significance of such an analysis is illustrated in the case of reforms in Morocco where fiscal resources have become a priority [4, 8, 9].

This study examines the economic, institutional, and macroeconomic factors associated with tax revenue performance in Morocco over the period 2000–2023. More specifically, it investigates the dynamic relationships between tax revenue and GDP growth, inflation, political stability, the real effective exchange rate, unemployment, and foreign direct investment. The research question is therefore formulated as follows: What economic, institutional, and macroeconomic factors are associated with tax revenue performance in Morocco, and how do these relationships evolve dynamically over time? The empirical analysis covers the period 2000–2023 and employs an Autoregressive Distributed Lag (ARDL) framework to examine the dynamic relationships between tax revenue and its main economic, institutional, and macroeconomic determinants in Morocco. More specifically, the study pursues the following objectives:

- To examine the association between political stability and tax revenue performance.
- To assess the effects of GDP growth, inflation, the real effective exchange rate, and foreign direct investment on tax revenue dynamics.
- To evaluate the relationship between unemployment and tax revenue performance.
- To distinguish short-run dynamic effects from conditional long-run relationships within a parsimonious ARDL specification.

The remainder of the study is organized into the literature review, methodology, results, discussion, and conclusion.

II. LITERATURE REVIEW

The performance of tax revenues has received much attention in empirical and theoretical literature, stressing the diversity of the factors affecting this performance, as well as the diversity of its consequences. The literature indicates that macroeconomic and monetary factors, as well as trust in institutions, education, and remittances affect the performance of the state's ability to mobilize resources in a dynamic way. In order to address the contribution of the current study, the following literature review has been structured in accordance with three major categories.

1. ECONOMIC AND MONETARY DETERMINANTS

The economic foundations of tax revenue provide a vital starting point for evaluating the fiscal performance of a country. From recent studies, it can be observed that the effect of the Real Effective Exchange Rate (REER) varies across regions. As regards the African continent, all the empirical studies reveal a negative correlation. For example, in Kenya, [10] reveals that there is a substantial drop in tax revenues due to the depreciation of the exchange rate, while [11] reveals that there is a negative effect of the instability of the exchange rate on revenue performance.

In sharp contrast, however, there have been some empirical studies in Asia, which have found a positive relation. With regard to East Asian and Pacific economies, the positive relation between depreciation and Goods and Services Tax (GST) revenues is found in [12], while for the Indian economy, this positive relation is found in [13]. For the middle-income economies, the effect of depreciation on GST revenues depends upon sectors, and is positive in the agricultural sector but negative in the manufacturing sector [14].

The relationship between inflation and tax revenue collection is another example where there is considerable heterogeneity. As an illustration, several studies reveal a negative effect in accordance with the Olivera-Tanzi hypothesis. In Turkey, [15] show that high inflation leads to a reduction in real revenues. On the other hand, [16, 17] found the same pattern among developing countries. There is also a negative effect on particular taxes such as income tax and Value-Added Tax (VAT) in Indonesia [18]. Conversely, some

studies document positive or neutral effects. Various Indonesian studies report heterogeneous effects depending on the tax category [7, 19, 20]. That is to say, the impact of inflation is conditioned by fiscal style and the extent of indexation.

However, in general terms, Foreign Direct Investment (FDI) tends to have a positive impact upon tax revenues but can depend on institutional and regional nuances. Evidence from Indonesia indicates that FDI can support tax mobilization [21]. While in Association of Southeast Asian Nations (ASEAN) countries, [22] and [23] show that FDI is positively related to revenue, but regulatory quality has a negative moderating impact. For developing economies, [24] differentiate between greenfield FDI (which deepens fiscal capacity) and brownfield FDI (which erodes the tax base). The same follows in Sub-Saharan Africa and South Asia, as far as effects are concerned: good governance amplifies the positive effect [12, 25]. FDI is related to tax evasion and profit shifting [26, 27] in the sectors of sub-Saharan Africa. Negative effects are attributed to institutional weaknesses in Brazil, Russia, India, China, and South Africa (BRICS) [28]. FDI effects diverge in magnitude and by type, governance quality, and level of development [29].

Direct effects of interest rates on tax revenues are typically weak or not significant. In some Southeast Asian nations, higher rates of interest decrease output by lowering spending and investment. However, several studies find mixed evidence or no relationship at all, including those for Indonesia [28], Kenya [29] and multi-country regional analyses [30–32]. Unlike in Peru [33], there are studies with only short-term effects without significant long-term impact [7]. Interest rates, meanwhile, impact revenues indirectly via monetary policy channels which influence firms' costs of financing and tax behavior [34, 35]. In general, their effect stays context-specific and rather small.

2. POLITICAL AND INSTITUTIONAL DETERMINANTS

Importantly, political factors impact fiscal performance, both through the intensity of pressure to tax and the quality of governance. It is well-known that the relationship between tax pressure and tax revenues has a nonlinear nature. Many studies find an optimal tax rate consistent with the Laffer curve [36, 37]. Another important determinant is fiscal structure, including the composition of consumption taxes, income taxes, and social contributions in advanced economies [38]. Excessive tax pressure can constrain growth and investment, which in turn may reduce revenues [39]. In contrast, moderate and well-designed increases in tax pressure can reinforce mobilization when combined with administrative reforms and tax-base expansion (as evidenced for India, Russia, and Nepal [40–42]). In unindexed tax systems, inflation may also increase revenues through fiscal drag [43]. For instance, in developing countries (like China), higher tax pressure can enhance revenue performance but distort local fiscal behavior [44, 45].

Corruption has consistently been highlighted as an important fiscal capacity constraint. In effect, countries with high corruption collect almost 6% of GDP less in tax revenue than those countries with better institutions [46]. For instance, in Africa, improving the corruption index by four points would increase direct taxes by more than 7% of GDP [47]. The impact is even more pronounced for taxes that involve direct interaction between taxpayers and administrators [28, 48]. Mechanisms consist of evasion, fraud, discretionary exemptions and systematic under-reporting [49]. By contrast, strong governance which encompasses transparency, the rule of law and administrative efficiency has a large positive impact on fiscal performance in Africa [31], the Middle East [32], the Group of Twenty (G20) countries [33] and Central Europe. Administrative modernization and anti-corruption reforms can improve tax collection by increasing the overall capacities of the public sector [50].

3. SOCIAL DETERMINANTS

Social determinants are another key dimension of fiscal performance. Education emerges as a significant factor. Higher educational attainment increases voluntary compliance and higher education levels improve taxpayers' understanding of their duties. Tax compliance is supported by greater trust in public institutions and perceptions of fairness, while outreach programs and fiscal inclusion can broaden the tax base [51].

On the other hand, inequality and poverty decrease the contributive capacity resulting in lower tax performance [52]. Corruption can further reduce taxpayers' trust and create incentives to evade [53, 54]. But this impact can be offset by strong governance. Remittances are an important social determinant. Such

spending promotes consumption and expands the base of indirect taxes (especially VAT). However, their influence is contingent on informality and the quality of institutions; in contexts where governance is weak, they may have no effect or an adverse one [55]. In general, a stronger long-term fiscal performance requires improvements in education, institutional trust, social cohesion and governance.

III. METHODOLOGY

Using the Autoregressive Distributed Lag (ARDL) framework, this study aims to investigate the factors determining tax revenue performance in Morocco, including economic, institutional, and macroeconomic factors. The ARDL approach is suitable when the variables to be analyzed are of mixed integration orders $I(0)$ and $I(1)$, provided that none of the series is integrated of order two, $I(2)$. It also provides a flexible form of contemporaneous and lagged dynamics in the single-equation framework.

Our empirical strategy is a bounds-testing technique [56]. Importantly, this analysis does not presuppose the existence of a long-run relationship. Instead, both the bounds F-test and the complementary bounds t-test are formulated to test for a level relationship. So as not to overstate evidence of cointegration, finite-sample critical values are used together with the conventional asymptotic bounds.

1. MODEL SPECIFICATION

The empirical model explains Tax Revenue (TR) as a function of GDP Growth Rate (GDP), Inflation Rate (INF), Political Stability (PS), Real Effective Exchange Rate (REER), Unemployment Rate (UNEMP) and Foreign Direct Investment (FDI):

$$TR_t = f(GDP_t, INF_t, PS_t, REER_t, UNEMP_t, FDI_t)$$

The general ARDL($p, q_1, \dots, q_k$) representation is:

$$TR_t = \alpha_0 + \sum_{i=1}^p \phi_i TR_{t-i} + \sum_{j=0}^{q_1} \beta_{1j} GDP_{t-j} + \sum_{j=0}^{q_2} \beta_{2j} INF_{t-j} + \sum_{j=0}^{q_3} \beta_{3j} PS_{t-j} + \sum_{j=0}^{q_4} \beta_{4j} REER_{t-j} + \sum_{j=0}^{q_5} \beta_{5j} UNEMP_{t-j} + \sum_{j=0}^{q_6} \beta_{6j} FDI_{t-j} + \varepsilon_t \quad (1)$$

In the case of bounds testing, the model is reparameterised as an unrestricted error-correction model (UECM), which combines differenced terms prior to the short-run dynamics with lagged-level terms that enter into the joint level relationship test. Hence individual lagged coefficients are never unconditionally interpreted as long-run effects. Long-run multipliers are calculated separately. We do not include Tax Pressure (TP) in the empirical specification as its construction may create mechanical overlap with Tax Revenue and/or potential endogeneity. Excluding it further promotes model parsimony, a consideration especially necessary because of the small annual sample.

2. ESTIMATION PROCEDURE

The empirical analysis proceeds sequentially. Initially, Augmented Dickey–Fuller (ADF) unit-root tests [57] are carried out for the integration properties of the variables. Second, multicollinearity is checked by observing pairwise correlations and variance inflation factors (VIFs). Third, alternative ARDL lag structures are examined with parsimony and the Bayesian Information Criterion (BIC) in mind. Fourth, residual diagnostic tests are performed on the model chosen. Fifth, the long-run level relationship is examined with the bounds F-test [56, 58] and complementary bounds t-test [59] for which finite-sample critical values are used because of the constrained effective sample. Sixth, we estimate short-run multipliers, conditional long-run multipliers, and the error-correction representation. Finally, we test for structural stability using structural-break tests.

3. DATA AND VARIABLE DESCRIPTION

The dataset includes 24 annual observations for the period (2000–2023) in Morocco. In dynamic estimations, the effective number of observations is smaller because lagged variables cause the loss of initial observations.

Table 1. Variables used in the empirical model.

Symbol	Variable	Definition
TR	Tax Revenue	Indicator of tax revenue performance
GDP	GDP Growth Rate	Annual percentage growth of real gross domestic product
INF	Inflation Rate	Annual rate of change in the general price level
PS	Political Stability	Political stability and absence-of-violence indicator
REER	Real Effective Exchange Rate	Trade-weighted exchange rate against trading partners
UNEMP	Unemployment Rate	Share of the labor force that is unemployed
FDI	Foreign Direct Investment	Foreign direct investment inflows

Note: In the R database, Tax Revenue is coded as RF, Political Stability as PoliSta, Unemployment Rate as Unemploy, and Foreign Direct Investment as IDE. The standardized English abbreviations are used in the manuscript.

IV. RESULTS

1. DESCRIPTIVE STATISTICS

Table 2 reports the descriptive characteristics of the variables retained in the empirical analysis. All variables contain 24 annual observations over the 2000–2023 period.

Table 2. Descriptive statistics of the dataset.

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
TR	24	19.1387	4.4450	0.0000	24.0688
GDP	24	3.7228	2.9971	-7.1782	8.1547
INF	24	1.8912	1.6193	0.3034	6.6570
PS	24	-0.3743	0.1249	-0.5713	-0.0367
REER	24	102.3954	4.9566	95.3824	114.8529
UNEMP	24	10.0773	1.2769	8.9100	13.5800
FDI	24	2.5838	1.3298	1.1000	7.1600

The descriptive statistics reveal substantial heterogeneity in the behavior of the explanatory variables. GDP growth averages 3.72% but ranges from -7.18% to 8.15%, while inflation remains moderate on average at approximately 1.89%. Political Stability remains negative throughout the sample. REER averages approximately 102.40, the Unemployment Rate averages 10.08%, and FDI ranges from 1.10 to 7.16.

2. CORRELATION AND MULTICOLLINEARITY ANALYSIS

Pairwise correlations, which are not interpreted causally, provide a preliminary assessment of linear association but do not allow for assessing the nature or extent of any such associations. The results show that Tax Revenue has a negative correlation with Political Stability (-0.585), REER (-0.687) and specifically Unemployment Rate (-0.782). The correlation between REER and Unemployment is 0.852, which indicates that there is a high correlation between them.

The VIF output in this paragraph is corrupted/incomplete. Confirm the intended VIF values and their corresponding variables.] The available output nevertheless indicates strong collinearity between REER and unemployment, so the corresponding coefficients should be interpreted cautiously.

3. UNIT ROOT AND STATIONARITY TESTS

The stationarity properties of variables were analyzed using the Augmented Dickey–Fuller test before estimation. The bounds-testing framework allows for both I(0) and I(1) variables but is inconsistent when using I(2) series.

Table 3. Augmented dickey-fuller unit root test results.

Variable	Level specification	ADF level	5%	ADF first difference	5%	Assessment
TR	Intercept + trend	-1.6989	-3.60	-3.8142	-3.00	I(1)
GDP	Intercept	-2.9408	-3.00	-5.8893	-3.00	I(1)
INF	Intercept	-2.2730	-3.00	-2.1237*	-1.95	I(1)
PS	Intercept	-4.4031	-3.00	-	-	I(0)
REER	Intercept + trend	-1.1832	-3.60	-2.8492	-3.00	I(1)
UNEMP	Intercept + trend	-2.2865	-3.60	-3.4668	-3.00	I(1)
FDI	Intercept	-2.9821	-3.00	-4.1791	-3.00	I(1)

The results show a mixture of integration properties. Tax Revenue, GDP Growth, Unemployment and FDI are stationary after first differencing whilst Political Stability is stationary in levels. Inflation and REER are more sensitive across specifications. In any case, none of the tests provides evidence that the variables should be considered I(2) instead of I(1); this allows ARDL estimation but warrants caution in terms of cointegration inference later.

4. ARDL MODEL SPECIFICATION AND ESTIMATION

Due to the relatively small sample size, a parsimonious dynamic specification was selected while keeping all six independent variables in each model. In the estimated model ARDL(1,0,2,0,1,0,0), the lag order corresponds, respectively, to TR, GDP, INF, PS, REER, UNEMP, and FDI. The effective estimation sample comprises 22 observations.

Table 4. Estimated ARDL(1,0,2,0,1,0,0) model.

Regressor	Estimate	Std. Error	t-statistic	p-value
Intercept	2.79273	9.23504	0.302	0.7680
TR(t-1)	0.70153	0.14531	4.828	0.0005
GDP	0.02585	0.07264	0.356	0.7286
INF	0.13820	0.11742	1.177	0.2640
INF(t-1)	0.10630	0.14973	0.710	0.4925
INF(t-2)	0.20261	0.23330	0.868	0.4037
PS	-6.13906	2.65741	-2.310	0.0413
REER	0.40899	0.12629	3.238	0.0079
REER(t-1)	-0.33692	0.09961	-3.382	0.0061
UNEMP	-0.67026	0.37034	-1.810	0.0977
FDI	-0.23758	0.27168	-0.874	0.4005

The lagged dependent variable is positive and highly significant, implying persistence in tax revenue performance. political stability has a negative significant contemporaneous coefficient at the 5% level. REER has statistically significant contemporaneous and one-period-lagged coefficients of opposite sign, suggesting the presence of dynamic (rather than purely contemporaneous) exchange-rate effects. unemployment is negative and weakly significant at the 10% level. GDP growth and FDI are not statistically significant in this conditional dynamic specification. The model has $R^2 = 0.9132$ and adjusted $R^2 = 0.8343$; however, these fit measures are not treated as evidence of model validity on their own.

5. DIAGNOSTIC TESTS OF THE SELECTED ARDL MODEL

Before proceeding to the bounds-testing and dynamic interpretation, the adequacy of the selected ARDL(1,0,2,0,1,0,0) specification was assessed using standard residual diagnostic tests. Particular attention was paid to residual serial correlation to ensure the adequacy of the dynamic specification.

Table 5. Diagnostic tests of the selected ARDL model.

Diagnostic test	Statistic	p-value	Conclusion
Breusch–Godfrey			
Lagrange Multiplier (LM)(1)	2.6392	0.1043	No serial correlation
Breusch–Godfrey LM(2)	5.5655	0.0619	No serial correlation at 5%
Breusch–Pagan	10.013	0.4394	No heteroskedasticity
Jarque–Bera	0.0812	0.9602	Normality not rejected
Ramsey Regression			
Equation Specification Error Test (RESET)	2.6739	0.1226	No functional-form misspecification

The diagnostic results support the adequacy of the selected ARDL specification. The Breusch–Godfrey LM tests do not reject the null hypothesis of no serial correlation at the 5% level for either one or two lags. Similarly, the Breusch–Pagan test provides no evidence of heteroskedasticity, while the Jarque–Bera test indicates that residual normality cannot be rejected. The Ramsey RESET test also provides no evidence of functional-form misspecification.

6. BOUNDS TESTS FOR A LEVEL RELATIONSHIP

The ARDL bounds F-test was applied under Case III, which includes an unrestricted intercept and no deterministic trend. Given the small effective sample size ($T = 22$), the interpretation is based primarily on the exact finite-sample critical values.

Table 6. ARDL bounds F-test.

Significance level	F-statistic	I(0)	I(1)	Decision
10%	4.1115	2.7316	4.2116	Inconclusive
5%	4.1115	3.4145	5.1613	Inconclusive
1%	4.1115	5.4014	7.7603	Fail to reject the null of no level relationship

The results show that the F-statistic of 4.1115 lies between the lower and upper bounds at both the 10% and 5% significance levels. Therefore, the bounds F-test provides inconclusive evidence of a long-run relationship. This conclusion is reinforced by the exact bounds t-test ($t = -2.0541$, $p = 0.597$), which does not support cointegration. Accordingly, the study does not claim a statistically confirmed long-run relationship among the variables.

7. SHORT-RUN DYNAMICS, CONDITIONAL LONG-RUN MULTIPLIERS, AND ERROR-CORRECTION MODEL (ECM)

Because the finite-sample bounds evidence is inconclusive, the estimated long-run multipliers are reported as conditional model-implied quantities rather than as firmly established cointegrating effects.

Table 7. Short-run and conditional long-run multipliers.

Variable	Short-run estimate	Short-run p-value	Long-run estimate	Long-run p-value
GDP	0.0259	0.7286	0.0866	0.7368
INF	0.1382	0.2640	1.4980	0.2380
PS	-6.1391	0.0413	-20.5681	0.1766
REER	0.4090	0.0079	0.2415	0.5256
UNEMP	-0.6703	0.0977	-2.2456	0.1556

FDI	-0.2376	0.4005	-0.7960	0.4257
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In the short run, political stability is statistically significant at the 5% level and REER is significant at the 1% level, while unemployment is marginally significant at the 10% level. None of the calculated conditional long-run multipliers is statistically significant at conventional levels. These findings reinforce the need to distinguish short-run dynamic associations from long-run equilibrium effects.

The restricted error-correction representation produces an error-correction coefficient of -0.2985 (Standard Error [SE] = 0.0448, $p < 0.001$). Its negative sign is mechanically consistent with adjustment toward the model-implied equilibrium, corresponding to an estimated adjustment of approximately 29.8% per year. Nevertheless, because the exact finite-sample bounds tests do not establish cointegration, this coefficient should not be used by itself as proof of a stable long-run equilibrium relationship. Within the ECM, $\Delta REER$ is positive and highly significant (0.4090, $p < 0.001$), whereas the first lagged change in Inflation is negative and marginally significant (-0.2026, $p = 0.081$).

8. STRUCTURAL STABILITY AND BREAK TESTS

Diagnostic testing is particularly important in this small sample. Model selection emphasizes parsimony and residual adequacy in order to limit overparameterization and residual serial correlation. The structural-change analysis using the supremum F (supF) test does not reject parameter stability (supF = 6.8748, $p = 0.8918$). A single-break search did not identify a statistically supported breakpoint, and the BIC favored the no-break representation over the one-break partition. Thus, there is no empirical basis in these results for imposing a specific crisis-year or coronavirus disease 2019 (COVID-19) dummy mechanically. The structural-stability results provide no evidence of a statistically significant parameter break over the sample period. Together with the residual diagnostic tests reported above, these findings support the adequacy of the selected ARDL specification.

V. DISCUSSION

In this case, the ARDL results offer a conservative reading of the determinants of tax revenue in Morocco. One of the most robust results is tax revenue persistence, as indicated by the sizeable and highly significant positive coefficient on the lagged dependent variable ($\beta = 0.702$, $p < 0.001$). This outcome aligns with the dynamic frameworks discussed by Yossinomita et al. [7] and Garg et al. [13], which highlight the importance of temporal dynamics in explaining fiscal revenue behavior.

One of the most notable dynamics concerns the Real Effective Exchange Rate. The contemporaneous coefficient is positive and significant ($\beta = 0.409$, $p = 0.008$), while the lagged coefficient is negative and also significant ($\beta = -0.337$, $p = 0.006$). The positive contemporaneous effect is broadly consistent with Wahyuni and Wijaya [12] and Garg et al. [13], who report favorable short-run exchange-rate effects on tax revenues in Asian economies. By contrast, the negative lagged effect is more consistent with the findings of M'maroo et al. [10] and Ofori et al. [11], which document negative exchange-rate effects on revenue performance in African settings. Thus, the Moroccan result suggests that exchange-rate effects may operate differently across short horizons.

The political stability variable has a contemporaneous negative and statistically significant coefficient ($\beta = -6.139$, $p = 0.041$). This result differs from the broader institutional literature, which generally reports a positive relationship between good governance and tax mobilization. Governance quality is identified as an important determinant of fiscal performance by Abebe and Fikre [46], Epaphra and Massawe [47], and Ajaz and Ahmad [60]. Political stability, however, is not equivalent to overall governance quality or corruption control. Therefore, the negative coefficient should be interpreted as a conditional relationship specific to Morocco and not as evidence that improving overall institutional quality reduces tax revenue.

The relationship between tax revenue and unemployment is negative ($\beta = -0.670$, $p = 0.098$). This association is marginally significant at the 10% level and is economically plausible because higher unemployment can reduce taxable labor income and household consumption. This interpretation is consistent with the aggregate perspective that labor-market conditions can affect tax receipts, as discussed

by Ranatarisza and Arrendamento [18]. Nevertheless, the high correlation between REER and unemployment means that their separate coefficients should be interpreted cautiously.

GDP growth does not have a statistically significant coefficient in the estimated model. This does not imply that growth is irrelevant to tax revenue; the non-significant coefficient may reflect growth composition, informality, sectoral differences, or lags between economic activity and tax collection.

Inflation is statistically insignificant in the ARDL specification, although the lagged change in inflation is marginally significant in the ECM. This result differs from the findings of Serin and Demir [15] and Maulid et al. [16]. Moroccan evidence therefore provides only weak support for the Olivera–Tanzi hypothesis and emphasizes that the fiscal effect of inflation also depends on the structure and indexation of the tax system.

FDI is not statistically significant in either the short-run or conditional long-run estimates. In contrast, FDI can positively affect tax revenues according to Wijaya and Dewi [21], Anwar and Wijaya [22], and Eng and Lim [23]. Other studies, however, indicate that the fiscal effect of FDI depends on governance, investment type, tax incentives, and profit shifting. Evidence from Sub-Saharan Africa and BRICS countries therefore suggests that the relationship is context-dependent.

Third, the exact finite-sample bounds F-test is inconclusive, and the complementary bounds t-test does not support cointegration. Therefore, the study cannot claim a statistically validated long-run equilibrium relationship. The sizeable error-correction coefficient should accordingly be interpreted as a dynamic adjustment parameter rather than as standalone evidence of cointegration. This cautious interpretation is consistent with the bounds-testing approach of Pesaran, Shin, and Smith [56].

Overall, tax revenue performance in Morocco is characterized mainly by persistence, short-run macroeconomic dynamics, and institutional variables. The results partly conform with earlier studies while also identifying important differences for REER, inflation, and FDI. These divergences emphasize the importance of country-specific economic structures and caution against overgeneralized or causal interpretations.

VI. CONCLUSION

Using annual data for 2000–2023, this paper examines the economic, institutional, and macroeconomic determinants of tax revenue performance in Morocco. Tax pressure was omitted to avoid potential mechanical endogeneity with the dependent variable; the dynamic lag structure was kept parsimonious to limit overparameterization; the integration properties of the variables were evaluated; short-run and conditional long-run effects were estimated separately; and both asymptotic and exact finite-sample bounds tests were applied. Structural stability was also examined.

The selected ARDL(1,0,2,0,1,0,0) specification indicates substantial persistence in tax revenue performance, as shown by the positive and statistically significant coefficient of the lagged dependent variable. Political stability has a significant contemporaneous relationship with tax revenue, while REER shows a distinct dynamic pattern with a positive contemporaneous coefficient and a negative lagged coefficient. Tax revenue is negatively associated with unemployment at the 10% significance level. In contrast, GDP growth and FDI have statistically insignificant coefficients, while the evidence for inflation is relatively weak and is largely limited to short-run error-correction dynamics.

A key finding concerns the evidence for cointegration. Under the exact finite-sample critical values, the bounds F-test is inconclusive, while the complementary bounds t-test does not support cointegration. Consequently, the long-run multipliers are interpreted as conditional model-implied quantities rather than established long-run equilibrium effects, and none is statistically significant at conventional levels. Although the estimated error-correction coefficient is negative and highly significant, its interpretation as a speed of convergence must remain conditional because cointegration is not statistically established.

This research examines the fiscal and macroeconomic determinants of tax revenue in Morocco during 2000–2023. The dynamic behavior of REER, the relationship with unemployment, and the institutional coefficient suggest that revenue mobilization occurs within a broader macroeconomic and institutional framework. Thus, labor-market stability, macroeconomic stability, efficient fiscal administration, and

institutional quality and predictability may support a more robust fiscal framework. However, the current estimates do not imply causal effects, and the policy implications should be interpreted as consistent with observed associations rather than as direct causal prescriptions.

The paper also highlights methodological caution when relatively short annual samples are used in dynamic time-series models. The dataset contains only 24 observations, and the use of lagged variables reduces the effective estimation sample to 22 observations. This reduces statistical power, limits the number of parameters that can be estimated reliably, and increases sensitivity to individual observations and model specification. Furthermore, the high degree of co-movement between REER and unemployment may reduce the precision with which their separate contributions can be estimated.

These limitations may be addressed in future research by extending the time dimension where consistent historical data are available or by using quarterly fiscal data; separating direct from indirect tax revenues; accounting for informality and tax compliance; and disaggregating the sectoral composition of economic activity. Methods that directly address possible endogeneity could also be considered. These extensions would help assess whether the short-run relationships identified here persist under alternative specifications and whether a stable long-run fiscal relationship emerges with a broader information set.

In conclusion, the empirical evidence suggests that tax revenue performance in Morocco from 2000 to 2023 is driven primarily by persistence and dynamic short-run associations rather than by a statistically established long-run equilibrium relationship. This finding is consistent with the finite-sample econometric evidence and cautions against interpreting the estimated relationships as causal or as conclusive long-run effects.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

Conceptualization, N.Y., N.M., A.F.E., K.O., K.S., M.M., and E.-S.M.; methodology, N.Y.; software, N.Y.; validation, N.Y., A.F.E., and E.-S.M.; formal analysis, N.Y.; investigation, N.Y.; data curation, N.Y.; writing—original draft preparation, N.Y.; writing—review and editing, N.M., A.F.E., K.O., K.S., M.M., and E.-S.M.; visualization, N.Y.; supervision, N.M., A.F.E., K.O., K.S., M.M., and E.-S.M. All authors have read and agreed to the published version of the manuscript.

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