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Original Article

Analysing the Effects of Macroeconomic Factors on The Value-Added Tax Revenue Performance in Togo: The Moderating Role of Control of Corruption

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Abstract: *The VAT is a key source of government revenue, particularly in developing economies. However, the VAT Gap in Togo remains substantial, impacting tax revenue performance. Although researchers have examined either the VAT revenue performance or the determinants of the VAT Gap in Togo, they have not addressed macroeconomic factors and the moderating effect of governance factors. This study examines the impact of macroeconomic factors, including economic growth, inflation, and unemployment, on the performance of Value-Added Tax (VAT) revenue in Togo, while also investigating the moderating role of corruption control. The study is motivated by the persistent VAT Gap in Togo, as reflected in the relatively low average C-efficiency ratio of 44%, significantly below the OECD average of 58%, despite steady economic growth and tax administration reforms. Employing an explanatory research design and utilizing a quantitative approach to analyze annual time-series data spanning from 1996 to 2024, the study employs both descriptive and inferential statistical methods. Data were obtained from the World Governance Indicators (WGI) and World Development Indicators (WDI) of the World Bank, Central Bank of West African States (BCEAO), and the Ministry of Finance of Togo. The results of model 1 demonstrate that economic growth has a strong and statistically significant positive impact on VAT performance. Furthermore, the implementation of the Togolese Revenue Authority significantly improved VAT collection efficiency, highlighting the importance of institutional reform.*
In contrast, inflation and unemployment were found to have statistically insignificant effects on VAT performance in the Togolese context. Critically, the study reveals that corruption control significantly moderates the relationship between economic growth and VAT performance, enhancing the effectiveness of economic growth in improving tax outcomes. However, no significant moderating effects were found between corruption control and either inflation or unemployment. The study is grounded in the Keynesian Theory of Taxation, the institutional trust theory, and the Laffer Curve Theory, and recommends inclusive economic growth and broader administrative and governance reforms. The study also proposes further research on additional institutional variables and comparative regional analyses to deepen the understanding of VAT performance dynamics in sub-Saharan Africa.

Keywords: *Value-Added Tax (VAT) revenue, Macroeconomic factors, Corruption control, Fiscal Performance, Tax Policy, Revenue Mobilization, Public Finance.*

I. INTRODUCTION

Tax revenue for most countries constitutes the largest share of resources financing the state budget, and one of the largest sources of state tax revenue is the Value Added Tax (European Commission, 2023). Value-added tax (VAT) is a consumption tax, levied at each stage of the consumption chain and borne by the final consumer of the product or service. The importance of VAT as a revenue source is evident across different economies (Zídková, 2014). However, this tax is also one of the most vulnerable, as the state continues to face fraudulent practices involving VAT schemes, part-turnover evasion, and the issue of false VAT invoices to reduce VAT liability (Bikas & Malikonytė, 2020).

Some international organizations, such as the International Monetary Fund (IMF), Organization for Economic Co-operation and Development (OECD), European Commission, World Bank Group (WBG), and United Nations Conference on Trade and Development (UNCTAD), have adopted their own program to estimate the member countries' VAT revenue performance. Despite efforts to reduce it over time, the size of global VAT Gaps remains significant. According to OECD estimates for the 2018-2020 period, the average annual losses due to unpaid or uncollected VAT are approximately $427 billion globally, equivalent to around 12% of total potential collections worldwide.

Togo's tax system is made up of two main categories, namely direct and indirect taxes. Direct taxes include personal and corporate income tax at a rate of 27%. Indirect taxes, led by VAT at a standard rate of 18%, constitute a substantial portion of revenue, representing 41% of revenue in 2021 (OECD, 2023), 42,0% in 2022 and 2023 (OTR Performance Report, 2023). Togo

introduced VAT in 1995 at a rate of 18%, which has remained unchanged, except for certain exonerated sectors, which are taxed at a rate of 10%.

Tax revenue in Togo plays a vital role in maintaining public finances and facilitating socio-economic development projects. The C-efficiency ratio, a key indicator of VAT revenue performance, was recorded at 46.17% in 2020, 46.15% in 2021, 40.39% in 2022, and 46.78% in 2024 (BCEAO, 2024). Despite these figures, the average remains around 44% (World Bank, 2018; ATAF, 2021), which is considered low compared to the OECD average of 58%, indicating significant room for improvement in VAT collection efficiency, (African Union Commission, 2024), although the economy has shown resilience in the face of persistent shocks since the COVID-19 pandemic, achieving an average growth rate of 6.1% from 2021 to 2023, bolstered by fiscal stimulus measures (The World Bank, 2025).

Additionally, Household consumption represents a significant portion of the national economy, driven by factors such as income, consumption patterns, and the economic structure, and plays a central role in determining tax revenues, including VAT revenues. Also, many businesses are not registered for VAT or fail to collect VAT on transactions (IMF, 2020). A significant part of the economy in Togo is informal, which impacts VAT collection, as informal sectors typically do not comply with tax regulations (OECD, 2019). This implies that a large part of the potential VAT on consumption from this sector remains uncaptured by the tax administration, contributing to the VAT revenue.

Moreover, the Inflation rates in Togo have fluctuated, with a notable decline from 7.6% in 2022 and 5.3% in 2023 to 2.9% in 2024 (Akinocho, 2025). While this reduction may alleviate the Tanzi effect, the historical volatility of inflation continues to pose challenges to the stability of tax revenue. The high inflation and stark disparities in economic opportunities between rural and urban areas impede progress in alleviating poverty and inequality (World Bank, 2025). Additionally, the youth unemployment rate, estimated at 3.43% in 2024 (O'Neill, 2025), suggests that a considerable segment of the population is not contributing to the tax base, which is further exacerbated by high levels of informal employment.

Furthermore, Togo has ratified international conventions and has implemented a national anti-corruption strategy. These actions signal a commitment to good governance. However, challenges persist, including the need to ensure freedom of expression, effectively enforce existing laws, address overlapping governmental responsibilities, and improve the implementation of ratified international standards (PPLAAF, 2024).

Despite the established link between macroeconomic factors and VAT revenue performance, much of the existing empirical research is either regionally aggregated or focused on larger economies, providing limited insights into the unique dynamics affecting developing nations, such as Togo. Moreover, there is a notable lack of studies that explore how the control of corruption may moderate the effects of macroeconomic variables on VAT revenue performance, particularly in the context of Togo.

This study aims to address this gap by investigating the effects of economic growth, inflation, and unemployment on VAT revenue performance in Togo, while also examining the moderating role of corruption control. The analysis of the effect of the macroeconomic factors on VAT revenue performance in Togo is significant due to the importance of VAT in the country's revenue generation and economic stability. Understanding the effect of economic growth, inflation, unemployment, and the moderating effect of control of corruption on the relationship between these factors and VAT revenue performance will benefit the Togolese Revenue Authority (OTR), the tax policymakers, and the broader researchers and scholars by providing insights into fiscal risk assessment and help develop targeted compliance strategies, assess whether tax revenue is responding proportionately to economic conditions, to improve the structure and timing of tax reforms that are aligned with economic realities. This is important since tax revenue is a major source of government funding.

The remainder of this article is organized into three sections. Section two provides an overview of the literature review, the third section emphasizes the methodological approach, data, and their sources. The fourth section focuses on presenting, analyzing, and discussing the results, while the final section concludes and proposes some administrative and tax policy measures.

II. LITERATURE REVIEW

This section presents a review of the literature on the Value Added Tax revenue performance, making a theoretical as well as empirical analysis of the factors affecting the Value Added Tax revenue performance, addressed by different authors about various countries, including Togo.

A) Overview of the Theoretical Literature

The Keynesian theory of taxation, first articulated by John Maynard Keynes in his seminal 1936 work" The General Theory of Employment, Interest, and Money", underscores the critical role of fiscal policy, particularly taxation and government expenditure, in stabilizing economic activity. Keynes challenged the classical notion of self-regulating markets, arguing instead

that insufficient aggregate demand during downturns can lead to persistent unemployment and sluggish growth. To counter these conditions, he advocated for counter-cyclical fiscal interventions, including tax reductions and increased public spending, aimed at stimulating demand, boosting employment, and fostering economic resilience. Within this framework, taxation is not merely a revenue-generating tool but a macroeconomic instrument used to manage demand and support long-term stability. This theory is highly relevant to VAT revenue performance, as a well-structured, demand-sensitive fiscal policy can stabilize consumption and ensure consistent VAT collection, even during economic fluctuations.

Complementing this is the theory of institutional trust, a sociological framework introduced by Eric M. Uslaner in The Moral Foundations of Trust (2002), which posits that the level of public trust in institutions, such as governments, legal systems, and financial bodies, directly influences individual compliance behavior. High levels of institutional trust are associated with increased tax compliance, reduced corruption, and enhanced policy effectiveness. In the context of VAT revenue, institutional trust plays a pivotal role in minimizing evasion, enhancing taxpayer cooperation, and ultimately strengthening revenue performance.

Additionally, the Laffer Curve theory, developed by Arthur Laffer in 1974, offers an economic perspective on the relationship between tax rates and tax revenue. The theory suggests that there exists an optimal tax rate that maximizes revenue without discouraging economic activity. Excessively high VAT rates can reduce consumer spending, encourage tax evasion, and negatively impact revenue, while excessively low rates may fail to generate sufficient income. Studies applying the Laffer Curve to VAT systems have demonstrated that rate adjustments can influence both compliance and revenue, particularly when aligned with broader economic conditions. Furthermore, inflation and economic growth also interact with VAT performance, affecting the real value and predictability of revenue. Understanding behavioral responses to tax rates is essential for policymakers aiming to strike a balance that ensures both fiscal efficiency and equity.

Integrating the Keynesian approach to fiscal management, the sociological insights of institutional trust, and the economic logic of the Laffer Curve provides a comprehensive framework for enhancing VAT revenue performance. These theories collectively inform the design of resilient, equitable, and growth-supportive tax systems that respond effectively to macroeconomic dynamics, improve compliance, and sustain long-term public revenue. Such an integrated approach is important for minimizing the VAT Gap and fostering economic stability.

B) Overview of the Empirical Review

Value-Added Tax (VAT) is an important source of revenue for most countries, but the VAT revenue performance remains below its potential AMEDANOU, (2019), resulting in the persistent issue of VAT Gap in many countries. The size of this gap varies widely across different regions and has significant implications for government budgets and public sector confidence. It is likely for this reason that the analysis of VAT revenue performance has consistently generated considerable interest in economic analyses. Numerous studies have been conducted by researchers worldwide on macroeconomic factors and their impact on VAT revenue performance. This review synthesizes findings from various studies, emphasizing the relationship between macroeconomic factors and VAT revenue performance.

C) Economic Growth and VAT Revenue Performance

Economic Growth is often associated with an increase in a country's income, which theoretically should lead to higher tax revenues, including value-added tax (VAT) revenue. However, the presence of a VAT Gap, which is the shortfall in VAT revenue performance, may be due to several factors. As economies grow, the capacity to collect taxes should improve; however, discrepancies may still exist due to several factors.

Some authors have linked this gap to economic growth in their research. For instance, Medina and Schneider (2019) estimate the size of the shadow economy in various countries (158 countries all over the world, from 1991 to 2015), linking it to economic growth and the VAT Gap. They find that in developing countries, economic growth often correlates with an expansion in the VAT base. However, the VAT Gap tends to remain significant, especially in countries with a high level of informality. The study concludes that one of the causes of the negative relationship between economic growth and VAT revenue performance is the informal sector, which may still evade VAT obligations. However, the influence of economic growth rate was statistically confirmed by the study of Majerová (2016), using the regression analysis on data from 2000 to 2011, which confirms the positive relationship between the GDP growth rate and the VAT Gap.

Moreover, the book "Tax havens: How globalization really works" by Palan et al. (2010) explores the relationship between economic growth and tax avoidance strategies. They concluded that while economic growth generally leads to higher VAT revenues, globalization and tax havens also allow multinational corporations to reduce their VAT liabilities, resulting in the high VAT Gap in countries with high economic growth but low tax enforcement.

D) Inflation and VAT Revenue Performance

The relationship between inflation and VAT revenue performance has been a focal point of fiscal policy research across various economies. Studies indicate that while inflation may temporarily boost tax revenues, especially in nominal terms, its long-run consequences for VAT revenue tend to be adverse, particularly in developing countries with weak fiscal structures.

Pagán et al. (2001) used a Vector Autoregression (VAR) model for Mexico to analyze the dynamic interaction between government spending, inflation, the VAT rate, and VAT revenue. The results of their impulse response functions and variance decompositions suggest that increases in the VAT rate directly contribute to higher government tax receipts. Notably, they also found that tax collections themselves influence movements in inflation, indicating a bidirectional relationship between inflation and VAT.

Besides, Mansour and Keen (2009) examined VAT performance across African countries and found that inflation can improve VAT revenue collection in the short run. However, in the long term, persistent inflation erodes the real value of VAT collections. This study underscores the vulnerability of VAT systems in countries with high inflation and weak institutional frameworks, where administrative lags and compliance challenges compound revenue instability.

Moreover, in the context of the Democratic Republic of the Congo, John (2025) conducted a study using national and international data sources to analyze the impact of inflation on tax revenue between 2005 and 2014. The findings reveal that although certain tax types, such as VAT and trade taxes, may benefit from inflation in the short term, they eventually decline as inflation reduces the real purchasing power of consumers, which in turn adversely affects consumption and, by extension, VAT revenues.

Furthermore, Wulandari and Rahmawati (2023) focused on Indonesia during the COVID-19 pandemic in their study titled "Pandemic's VAT Revenue: Inflation, Exchange Rates, and Population Challenges." Using multiple linear regression on time series data from 2018 to 2020, they found that inflation, alongside exchange rates and population growth, significantly affected VAT revenue collection. This result highlights how macroeconomic shocks, like inflation surges during crises, interact with demographic and trade factors to influence VAT performance. Another study in Indonesia analyzed tax revenue data, inflation, and economic growth in Bengkulu Province from 2010 to 2016. Using panel data regression, the study concluded that both GDP growth and inflation significantly impacted VAT and income tax revenue.

E) Unemployment and VAT Revenue Performance

The relationship between unemployment and value-added tax (VAT) revenue performance has received growing attention in recent economic literature. This relationship is particularly relevant for understanding the macroeconomic and fiscal dynamics in both developed and developing economies, as unemployment may affect household consumption and, consequently, Value Added Tax collection.

Dossa et al. (2024) examined the impact of digitalization on tax evasion across WAEMU countries using panel data from 2002 to 2019. Their findings suggest that increases in unemployment are associated with rising levels of tax evasion in the region. Since VAT compliance is directly affected by evasion levels, this implies an indirect negative relationship between unemployment and VAT revenue. The authors advocate for comprehensive strategies aimed at improving living standards, education, and reducing unemployment to enhance overall tax revenue performance, including VAT.

F) Control of Corruption and Macroeconomic Factors

Corruption, broadly understood as the abuse of public power for private gain, has significant implications for macroeconomic performance, governance quality, and labor market outcomes. A significant body of research identifies corruption as a driver of inefficiencies in tax administration, which, in turn, affects the government's capacity to finance employment-generating programs and deliver public services. In the context of the European Union, Pluskota (2022) examined the impact of various determinants on the VAT gap and found that corruption is a key factor in tax non-compliance. Interestingly, his study showed that while corruption influences VAT gaps across the EU, its effect differs in Poland, suggesting that institutional and cultural contexts may mediate this relationship.

Besides, Bikas and Malikonytė (2020), using the regression analysis model, incorporating seven potential VAT gap determinants in Lithuania, found that a one-point increase in the Corruption Index would increase the compliance of VAT gap by approximately 1.18 percentage points if the Corruption Index increased by one point and the other indicators remained. This implies that reductions in corruption enhance tax revenue performance, which could indirectly support employment through increased fiscal capacity. Majerová (2016) further reinforced this view, identifying the Corruption Perception Index (CPI) as the most significant variable affecting VAT gap levels in selected EU countries, even more so than GDP or tax burden.

Moreover, beyond revenue collection, corruption disrupts macroeconomic stability, particularly through inflation and reduced investment, two factors closely linked to unemployment. Braun (2004) demonstrated that inflation variability increases

monitoring costs and provides greater opportunities for corrupt behavior, which, in turn, reduces investment and lowers growth. A one-standard-deviation increase in inflation variance was shown to increase corruption by 0.12 standard deviations and reduce growth by 0.33 percentage points.

III. METHODOLOGY

To analyze the effects of the macroeconomic factors on VAT revenue performance in Togo, as well as the moderating effects within this relationship, while describing the relationship between these variables, the explanatory research design, which is time series in nature, with a quantitative approach, and time series method using secondary data, was adopted, applying descriptive and inferential analyses.

A) Measurement and Sources of Variables

a. Dependent Variable: VAT Revenue Ratio (VRR)

The dependent variable in this study is the VAT revenue performance, which employs the top down approach to measure the VAT revenue performance, through the VAT Revenue Ratio (VRR) indicator as performed by the Revenue Statistic in Africa, (2024), which define the VRR as the ratio of actual VAT revenues to the product of final consumption and the standard VAT rate, to provides insights into VAT revenue loss. The calculation is shown below:

$$VRR = \frac{\text{VAT revenues}}{(\text{final consumption expenditure} - \text{VAT revenues}) \; x \; \text{standard VAT rate}}$$

A high VAT Revenue Ratio (Above 100%) indicates that the country is efficiently collecting VAT. The ratio of 100% indicates an ideal scenario where the government is collecting VAT exactly in line with its potential. Conversely, a ratio lower than 100% suggests that the country is not collecting as much VAT revenue.

b. Independent Variables

Three independent variables are involved in the study:

EG = Economic Growth

The Economic Growth was captured by the GDP growth rate (annual), which is the percentage change in the value of a country's economic output from one period to another, gathered from the BCEAO's data and the Ministry of Economy and Finance.

INF = Inflation

Inflation was measured using the Consumer Price Index (CPI), which represents the annual percentage change in the cost of a fixed basket of goods and services typically purchased by the average consumer.

UNPL= Unemployment:

Unemployment was measured as the percentage of the total labour force that is without work but actively available for and seeking employment, based on International Labour Organization (ILO) modelled estimates. This indicator reflects the share of individuals within the labour force who meet the ILO definition of unemployment.

c. Moderating variable: Control of Corruption (CC)

The moderating variable, Control of Corruption, was measured using the estimates provided by the World Bank's Worldwide Governance Indicators. This standardized metric reflects aggregated assessments of governance quality. Each country's score is expressed as an estimate on a standard normal distribution, ranging from approximately -2.5 to +2.5. Higher values (closer to +2.5) indicate stronger control of corruption, while lower values (closer to -2.5) reflect weaker governance and more pervasive corruption.

d. Control Variable: OTR

OTR is a dummy variable indicating the existence of the Togolese Revenue Authority (OTR) at time t. It takes the value 1 when the OTR is implemented and 0 otherwise. The data for this variable is sourced from the Ministry of Finance of Togo.

Table 1: Operationalization of the study variables

Variable	Type	Indicators	Source	Data collection instrument	Analysis method
Economic growth	Independent variable	GDP growth rate	BCEAO	Data Collection Schedule	• descriptive analysis • inferential analysis

Inflation	Independent variable	Consumer Price Index	BCEAO	Data Collection Schedule	• descriptive analysis • inferential analysis
Unemployment	Independent variable	Percentage of the total labour force	WDI	Data Collection Schedule	• descriptive analysis • inferential analysis
Control of corruption	Moderating variable	WDI Estimate	WGI	Data Collection Schedule	• descriptive analysis • inferential analysis
OTR	Control variable	Dummy variable ▪ 1 for yes ▪ 0 for no	Minister of Economy	Data Collection Schedule	• descriptive analysis • inferential analysis
VAT revenue performance	Dependent variable	▪ VAT revenue ▪ Standard VAT rate ▪ final consumption expenditure	• Ministry of Economy • BCEAO	Data Collection Schedule	• descriptive analysis • inferential analysis

B) Model Specifications

The econometric model initially specified in the study is as follows:

$$\mathbf{VRRt = \beta 0 + \beta 1EGt + \beta 2INFt + \beta_3 UNPLt + \beta_4 OTR_t + \varepsilon_t}$$

The econometric model with the moderation effect specified in the study is as follows:

$$\mathbf{VRRt = \beta 0 + \beta 1EGt + \beta 2INFt + \beta 3UNPLt + \beta 4OTRt + \beta 5(EGt \cdot CCt) + \beta 6(INFt \cdot CCt) + \beta 7(UNPLt \cdot CCt) + \varepsilon t}$$

Where:

- VRRt represents VAT revenue performance at time t
- EG represents Economic Growth at time t
- INF represents Inflation at time t
- UNPL represents Unemployment at time t
- OTR represents the establishment of the Togolese Revenue Authority at time *t*.
- CC represents Control of Corruption at time t
- - ε_t represents the Error term
- at time *t*

IV. RESULTS AND DISCUSSION

Table 2 below presents the descriptive statistics of the key variables used in the analysis over the period under study.

Table 2: Descriptive statistics of variables

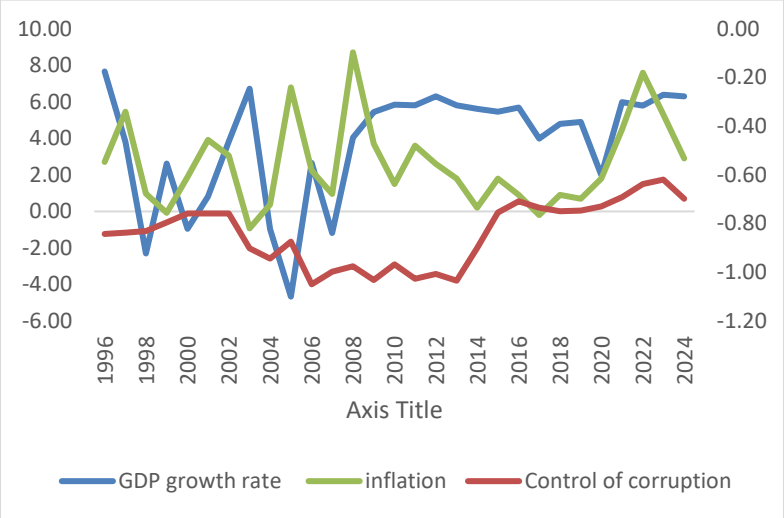
Variable	Obs	Mean	Std. dev.	Min	Max
VAT Revenue Performance	29	31.96	10.55	17.50	47.56
GDP growth rate	29	3.73	3.12	-4.67	7.67
Inflation	29	2.61	2.39	-0.93	8.72
Unemployment Rate	29	3.06	0.89	1.94	4.23
Corruption Control	29	-0.84	0.13	-1.05	-0.62

Source: *Author estimation (2025)*

The GDP growth rate shows a mean of 3.73% with a relatively high variability (standard deviation of 3.12%), ranging from -4.67% to 7.67%, suggesting notable economic fluctuations during the period. Inflation averaged 2.61%, with a minimum of -0.93% and a maximum of 8.72%, indicating episodes of both deflation and inflationary pressures. The unemployment rate remained relatively stable, with a mean of 3.06% and a low standard deviation of 0.89%, ranging between 1.94% and 4.23%. Finally, the control of corruption index recorded a negative average value of -0.84, with a narrow range from -1.05 to -0.62, reflecting persistent governance challenges in this area.

The performance in collecting VAT, as captured by the VAT coverage rate, is shown in the graph below.

Figure 3: Macroeconomic factors and VAT revenue performance rate



Source: *Author estimation (2025)*

The analysis of the VAT revenue performance in Togo over the period 1996 to 2024 reveals a clear upward trend, with the rate increasing from 17.5% in 1996 to 47.6% in 2024. This progression reflects a steady improvement in VAT recovery performance. Over the entire period, the average VAT coverage rate stands at 32.0%, accompanied by a standard deviation of 10.5%, indicating a moderate degree of variability in the data. The minimum and maximum observed values, 17.5% and 47.6%, respectively, demonstrate a substantial 30.1 percentage point increase, highlighting the progress made in tax administration. Notably, the analysis points to a structural change beginning in 2014, coinciding with the operationalization of the Togolese Revenue Authority. This shift is evident in the comparison of the average VAT coverage rate before and after 2014: the rate increased significantly from 24.7% during the period 1996–2013 to 43.8% between 2014 and 2024. This stark contrast suggests that 2014 marked a turning point in the efficiency of VAT collection. These statistics provide an overview of the distribution and variability of the variables, laying the groundwork for further econometric analysis.

C) Model Summary

The regression analysis was conducted to assess whether a statistically significant relationship exists between the independent and dependent variables. The results revealed a strong model fit under both Model 1 and Model 2 specifications.

Table 4: Model summary

Model	R- Square	Adjusted R Square	Std. Error of the Estimate
Basic model	0.787	0.761	16.946
Extended model	0.981	0.975	5.479

Source: *Author estimation (2025)*

In the basic model (Model 1), the R-Square is 0.787, indicating that 78.7% of the variation in the dependent variable is explained by the model. In contrast, the extended model (Model 2) has an R-Square of 0.981, meaning it explains 98.1% of the variation, an exceptionally high value that suggests a strong model fit. The adjusted R-Square for the basic model is 0.761, slightly lower than the R-Square due to the adjustment for the number of predictors. Meanwhile, the extended model's adjusted R-Square is 0.975, which remains very close to its R-Square. This implies that the additional predictors (Control of corruption) in the extended model contribute meaningfully to the explanation of variance without merely inflating the model's performance through overfitting.

The standard error of the estimate for the basic model is 16.946, indicating that, on average, the residuals deviate by about 17 units from the actual values. In the extended model, the standard error decreases significantly to 5.479, indicating a substantially higher level of prediction precision.

The extended model accounts for significantly more variance than the basic model, indicating that the inclusion of the control of corruption has notably enhanced its explanatory power. The high adjusted R-Square in the extended model further confirms that this improvement is not merely the result of overfitting, but rather reflects a model that generalizes well to the data. Additionally, the lower standard error of the estimate suggests that the extended model yields more accurate predictions, with residuals that are much closer to the actual observed values.

D) Correlation Analysis

The table below displays the correlation coefficients among the variables used in the study.

Table 5: Correlation matrix

	VRR	EG	INF	UNPL	OTR	CC
VRR	1					
EG	**0.428***	1				
INF	-0.030	-0.010	1			
UNPL	0.100	-0.171	-0.209	1		
OTR	**0.851***	0.332	0.003	0.083	1	
CC	0.241	-0.105	0.142	0.069	0.165	1

Source: *Author estimation (2025)*

The VAT Revenue Ratio (VRR) is positively and significantly correlated with Economic Growth (EG) (r = 0.428, significant at 5%) and strongly correlated with the establishment of OTR (r = 0.851), suggesting that improvements in tax administration and economic expansion are associated with higher VAT performance. The correlation between VRR and Inflation (INF) is weak and negative (r = -0.030), indicating little to no direct linear relationship. Similarly, the correlation between VRR and Unemployment (UNPL) is weakly positive (r = 0.100), also suggesting minimal association.

CC*EG has a positive correlation with VRR (r = 0.295), CC*INF has a negative correlation with VRR (r = -0.334), and CC*UNPL shows a weak positive relationship (r = 0.125). These interaction effects suggest that the influence of macroeconomic variables on VAT performance may vary depending on the level of corruption control. No issues of strong multicollinearity are evident from the table, as the correlations among the independent variables remain within acceptable ranges.

E) Regression Coefficients

Since the study period encompasses only 29 observations, the OLS model can produce unstable coefficients or high variance in the estimates, resulting in unreliable predictions. To address these shortcomings, the RIDGE model, which incorporates a penalty to reduce the amplitude of the coefficients, stabilizes the estimates, and subsequently reduces the variance at the expense of a slight bias, was employed. To capture the macroeconomic determinants of VAT collection performance, two models were estimated using the generalized least squares (GLS) method of RIDGE.

Table 6: Model regression results

	Modèle 1	**Modèle 2**
Economic growth	4.078***	7.247***
	(4.310)	(18.240)
Inflation	0.082	-0.311
	(0.060)	(-0.670)
Unemployment	5.478	2.730
	(0.610)	(0.910)
OTR	21.004***	13.832***
	(2.910)	(4.340)
Corruption Control		17.020*
		(1.970)
Economic Growth * Corruption Control		-7.029***
		(-13.830)
Unemployment * Corruption Control		-55.889
		(-0.860)
Inflation * Corruption Control		-10.001
		(-0.520)
Wald Test	81.686	1044.972
P-Value > Chi2(5)	0.000	0.000
F-Test	20.422	130.622
P-Value > F(5 , 22)	0.000	0.000

(Buse 1973) R2 Adjusted	0.631	0.721
Raw Moments R² Adjusted	0.761	0.975
Number of observations	29	29

t statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results presented in Model 1 indicate that, among the variables included in the analysis, only real economic growth and the implementation of the OTR have a statistically significant impact on VAT revenue performance (VRR). Specifically, the coefficient for economic growth $\beta_1 = 4.078$, with a t-statistic of 4.310, is statistically significant at the 1% level ($p < 0.01$). This confirms that a 1 percentage point increase in economic growth, all else being equal, leads to a 4.1 percentage point increase in VAT revenue performance. Based on this result, the null hypothesis H01 is rejected, which stated that economic growth has no significant effect on VAT revenue performance in Togo.

Similarly, the implementation of the OTR shows a coefficient β_2 of 21.004, with a t-statistic of 2.910, also significant at the 1% level ($p < 0.01$). This suggests that the reform has contributed to an increase of approximately 21 percentage points in VAT revenue coverage.

In contrast, the inflation rate (coefficient $\beta_3 = 0.082$; $t = 0.060$) and the unemployment rate (coefficient $\beta 4 = 5.478$; $t = 0.610$) are statistically insignificant in Model 1, as their coefficients are not significantly different from zero. Therefore, the null hypotheses H02 and H03 are accepted, implying that there is no statistically significant effect of inflation or unemployment on VAT revenue performance in Togo based on this model.

Model 2 introduces corruption control and its interaction with macroeconomic variables, providing additional insights. The coefficient for economic growth increases to 7.247 ($t = 18.240$), maintaining strong significance at the 1% level ($p < 0.01$). This shows that when corruption control is considered, the positive impact of economic growth on VAT revenue performance is even stronger, increasing by 3.1 percentage points compared to Model 1. Thus, H01 remains rejected in Model 2 as well. The impact of OTR implementation decreases slightly to 13.832 ($t = 4.340$), but remains statistically significant at the 1% level, indicating that corruption control moderates the effect of the OTR reform.

The corruption control variable itself has a coefficient of 17.020, with a t-statistic of 1.970, statistically significant at the 10% level ($p < 0.1$). This indicates that improving corruption control independently contributes to enhancing VAT revenue performance. Crucially, the interaction between economic growth and corruption control is negative ($\beta_5 = -7.029$) and highly significant ($t = -13.830$, $p < 0.01$). This confirms that corruption control moderates the effect of economic growth on VAT revenue performance, as corruption control improves, the marginal effect of growth decreases. Accordingly, the hypothesis H04a, which stated that there is no moderating effect of corruption control on the relationship between economic growth and VAT revenue performance, is rejected.

On the other hand, the interaction terms between corruption control and inflation (coefficient $\beta_6 = -10.001$; $t = -0.520$) and between corruption control and unemployment (coefficient $\beta_7 = -55.889$; $t = -0.860$) are not statistically significant. Therefore, hypotheses H04b and H04c are accepted, suggesting that corruption control does not significantly moderate the relationship between inflation, unemployment, and VAT revenue performance.

Considering these three moderation effects together, the evidence partially supports a moderating role of corruption control. While it significantly moderates the effect of economic growth, it does not have the same effect on inflation or unemployment. Consequently, the general hypothesis H04 (that corruption control moderates the effects of growth, inflation, and unemployment on VAT performance) is partially rejected, specifically due to the significant moderation of growth, but not of the other two variables.

Regarding overall model performance, Model 2 clearly outperforms Model 1. The adjusted R^2 (Buse 1973) improves from 0.631 to 0.721, and the Raw Moments adjusted R^2 increases substantially from 0.761 to 0.975, reflecting a much stronger explanatory capacity. Both models are globally significant, with F-test statistics of 20.422 (Model 1) and 130.622 (Model 2), and p-values < 0.001, indicating that the group of explanatory variables significantly influences VAT revenue performance. The Wald test statistic also confirms this improvement, increasing from 81.686 in Model 1 to 1044.972 in Model 2.

F) Discussion of the Key Findings

This section discusses the key empirical findings of the study, which examined the relationship between VAT revenue performance and macroeconomic factors in Togo, with a focus on the moderating role of corruption control. The discussion examines the significance and implications of the results in the context of Togo's fiscal policy and macroeconomic environment, linking the findings to relevant theoretical and empirical literature.

a. Economic Growth and VAT Revenue Performance

The analysis confirms a strong and positive relationship between economic growth and VAT revenue performance. In both models, economic growth was found to be a statistically significant predictor, with coefficients of 4.078 (Model 1) and 7.247 (Model 2), both significant at the 1% level. This implies that for every 1 percentage point increase in GDP growth, VAT revenue performance increases by approximately 4 to 7 percentage points, depending on whether corruption control is taken into account.

This finding aligns with economic theory, such as the Keynesian theory of taxation, which posits that economic expansion increases taxable consumption and production, thereby enhancing VAT revenues. It also supports empirical studies, such as those by Kolahi et al. (2016), which revealed a positive relationship between VAT and the level of economic growth. But conversely, the OECD (2019) investigates VAT Gaps in different countries, suggesting that in high-growth economies, the VAT Gap often narrows due to better compliance mechanisms and stronger institutional frameworks. However, in low-income countries, the VAT Gap tends to widen with economic growth as informal and small businesses grow without entering the formal tax base.

b. Impact of the Togolese Revenue Authority (OTR)

The establishment of the Togolese Revenue Authority (OTR) in 2014 is shown to have had a substantial and statistically significant positive effect on VAT performance. The coefficients on OTR are 21.004 in Model 1 and 13.832 in Model 2, both significant at the 1% level. This suggests that the implementation of OTR resulted in a 13–21 percentage point increase in VAT revenue performance, confirming its role as a turning point in Togo's tax administration reform. The descriptive analysis also supported this, showing that VAT performance rose from an average of 24.7% before 2014 to 43.8% after the OTR's operationalization. This aligns with global evidence that revenue authority reforms improve tax collection efficiency and reduce leakages through institutional strengthening.

c. Inflation and Unemployment Effects

Contrary to expectations, neither inflation nor the unemployment rate was found to have a statistically significant effect on VAT revenue performance in either model. Inflation had coefficients of 0.082 (Model 1) and -0.311 (Model 2), both of which were insignificant. Besides, Unemployment had coefficients of 5.478 (Model 1) and 2.730 (Model 2), which were also statistically insignificant. These findings suggest that, in the Togolese context, fluctuations in inflation and unemployment do not meaningfully affect VAT collections. This may be due to the relatively low and stable inflation environment, as well as the structural nature of unemployment, which limits its variability and impact on taxable consumption. This finding doesn't align with the literature, which has shown that inflation significantly affects VAT revenue collection, as noted by Wulandari and Rahmawati (2023). However, the findings of Mansour and Keen (2009) and John (2025) contradict this theory, suggesting that inflation can improve VAT revenue collection in the short term, but in the long term, persistent inflation erodes the real value of VAT collections. Moreover, the OECD (2008) and Bikas and Andruškaite (2013) conversely found a negative relationship between unemployment and VAT revenue.

d. Moderating Role of Corruption Control

Corruption control emerged as a significant moderating factor, particularly for economic growth. The interaction between economic growth and corruption control was negative and highly significant (-7.029), suggesting that as corruption control improves, the marginal benefit of economic growth on VAT revenue diminishes. This could indicate that in a less corrupt environment, tax administration becomes more efficient, reducing the relative dependence on economic expansion to boost VAT performance.

However, the interactions of corruption control with inflation (-10.001) and unemployment (-55.889) were not statistically significant, suggesting no moderating effect on these variables.

Overall, the hypothesis that corruption control moderates macroeconomic effects on VAT revenue performance is partially supported; only the interaction with economic growth is statistically significant.

e. Model Comparison and Explanatory Power

Model 2, which included moderation effects, greatly outperformed Model 1. The Adjusted R^2 improved from 0.761 to 0.975, showing a significant increase in the model's ability to explain the variation in VAT performance. The F-test and Wald test both confirmed the statistical significance of the overall models. These results suggest that incorporating governance variables, such as corruption control, provides a more comprehensive and accurate model of VAT performance in Togo.

V. CONCLUSION

The primary objective of this study was to examine the influence of macroeconomic factors, namely economic growth, inflation, and unemployment, on the performance of Value-Added Tax (VAT) revenue in Togo, while also investigating the

moderating role of corruption control in these relationships. In addition, the analysis accounted for the structural impact of the implementation of the Togolese Revenue Authority (OTR) as a control variable.

The findings provide robust evidence that economic growth and the implementation of the OTR have had a significant and positive effect on VAT revenue performance, thereby fulfilling the first research objective (Objective 1). The substantial increase in VAT performance following the establishment of OTR underscores the critical role of institutional reforms in strengthening tax administration and revenue mobilization.

In line with the fourth objective (Objective 4), the study found that corruption control plays a significant moderating role in the relationship between economic growth and VAT revenue performance, but in an opposite direction. This suggests that the effectiveness of the Togolese Revenue Authority is more pronounced in contexts where corruption is effectively controlled, rather than being dependent on economic growth. However, corruption control was not found to significantly influence the relationship between inflation or unemployment and VAT performance, partially supporting the broader moderation hypothesis.

Conversely, the effects of inflation (Objective 2) and unemployment (Objective 3) on Value Added Tax revenue performance were found to be statistically insignificant. This implies that these two macroeconomic factors have limited or no direct impact on VAT collection in the Togolese context, possibly due to the country's relatively stable inflation rates and structurally persistent unemployment.

Overall, the results highlight the central importance of economic expansion and institutional reforms, particularly through the establishment of autonomous revenue authorities and the strengthening of governance frameworks, in improving VAT performance. These findings suggest that while sound macroeconomic policies are important, their effectiveness is greatly enhanced when coupled with sustained efforts to combat corruption and improve the transparency and efficiency of public institutions. Future fiscal policy in Togo should therefore prioritize not only macroeconomic stability but also governance reforms to optimize tax collection and ensure sustainable domestic resource mobilization.

A) Recommendations

This study, which examined the impact of macroeconomic factors on VAT performance in Togo, yielded insightful findings. Based on these results, it is important to propose targeted recommendations aimed at enhancing the efficiency and effectiveness of VAT revenue collection.

B) Policy Implications

The findings of this study underscore the critical role of economic growth and institutional reform in enhancing VAT revenue performance. Policymakers in Togo should prioritize policies that stimulate inclusive and sustainable economic growth, as this directly contributes to improved tax revenue outcomes. For example, strengthening self-employment policies for young people and women, policies to promote industrial agriculture, etc. Moreover, the significant impact of the Togolese Revenue Authority (OTR) reform highlights the importance of further strengthening tax institutions through autonomy, transparency, and performance-based accountability frameworks. Finally, continue to improve policies to eradicate corruption in order to improve the efficiency of tax administration.

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