



Analyzing the Factors Influencing Sovereign Credit Ratings in East Africa

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Abstract

This study utilizes an ordered probit model to analyze the determinants of sovereign credit ratings for East African countries from 2010 to 2022, based on ratings from major agencies. The findings reveal that the impact of various macroeconomic factors—such as GDP growth, GDP per capita, external debt, current account balance, inflation, and unemployment—differs according to the income level of each country. In high-income countries, GDP and the rule of law are the most significant determinants, whereas in lower-middle-income countries, GDP and external debt are the key factors. Middle-income countries exhibit the highest number of significant variables, including annual GDP growth, inflation, and current account balance, reflecting the intricate interaction of economic and institutional factors in determining creditworthiness for this group. Notably, the study reveals a counterintuitive finding where higher levels of corruption are linked to factors that indirectly enhance creditworthiness in middle-income countries, suggesting that the negative effects of corruption may be outweighed by stronger economic factors. Across all income groups, GDP or GDP growth consistently emerges as a critical determinant, emphasizing the pivotal role of economic size and stability in shaping sovereign credit ratings. These insights provide East African countries with guidance on improving their credit ratings by focusing on the key drivers relevant to their specific income levels.

Subject Areas

Business Analysis

Keywords

Credit Rating, Sovereign Credit Rating, Income Levels, Ordered Probit Model

1. Introduction

A sovereign credit rating serves as a vital measure of a country's financial health and creditworthiness, determined by specialized credit rating agencies. These ratings provide a comprehensive evaluation of a nation's ability to meet its debt obligations, considering economic and political factors from both short-term and long-term perspectives. Expressed through alphanumeric scores, sovereign credit ratings specifically reflect a country's long-term foreign currency outlook. The publication of these ratings is a pivotal event, influencing investor confidence and economic stability, both at the time of release and in its aftermath [1]. Over the past few years, there has been a growing demand for credit ratings as a means for countries to assess their creditworthiness [2]-[4]. This enables them to access global capital markets and affects their borrowing costs. Countries without credit ratings are unable to secure loans from global capital markets and must rely on official loans from multilateral institutions or individual governments, as well as aid or grants [5]. The Credit Rating Agencies (CRAs) play an important role in this structure. Among them S&P, Moody's, and Fitch are particularly prominent, providing investors with assessments of credit risk in the form of ratings. According to the ratings agencies, lower-rated governments pose greater credit risks to investors. As a result, these governments face higher borrowing costs when they issue bonds [6]. The lack of a credit rating can hinder a sovereign's ability to invest in development projects, stimulate economic growth, and meet financial obligations [5]. The sovereign ratings provided by the major credit rating agencies typically cover more than 100 countries worldwide. However, it is noteworthy that many African countries receive lower ratings on the global scale. The importance of credit rating agencies in Africa has been highlighted during the recent discussions on the global Debt Service Suspension Initiative (DSSI), led by the World Bank and the International Monetary Fund (IMF). The DSSI was initiated in response to concerns about the sustainability of public sector debt burdens in many African countries, and aimed to alleviate some of these financial burdens [6]. While numerous studies have examined the factors that determine sovereign credit ratings in different economies, little attention has been paid to East African countries. Our research examines this gap by analyzing a sample of 7 countries in East Africa from 2010 to 2022 to assess the criteria and factors considered in assessing creditworthiness. The credit ratings of East African countries are particularly low for a number of reasons such as high debt levels and difficulties in managing debt obligations which can affect a country's creditworthiness and lead to lower credit ratings. To improve their credit ratings, governments should take a number of measures. First, governments should prioritize improving the long-term determinants of financial operations, such as improving the fiscal balance and external surplus, to enhance overall solvency. Second, East African countries should take steps to establish and support their own sovereign credit rating agencies and research organizations to enhance their presence in global markets. Third,

there is a need for increased financial and policy support for research initiatives focused on sovereign credit ratings. Fourth, it is imperative to implement continuous monitoring and early warning strategies to mitigate risks. In addition, countries need to consider changing the currency structure of loans and diversifying reserves [4]. Rating levels aren't solely determined by economic indicators; several other factors also play a role. For example, in evaluating sovereign ratings, take into account aspects such as the state of democracy, the quality of healthcare, the competitiveness of the education system, and security [7]. In addition, models that predict the future of corporate and sovereign ratings include other independent factors not just economic and financial variables [8]. Factors that determine sovereign ratings go beyond current economic and financial indicators and include factors that vary across rating categories and countries undergoing structural changes [9]. Therefore, a comprehensive consideration of factors beyond economic indicators is important when assessing and predicting rating levels.

2. Literature Review

In recent years, a list of publications has treated the subject of credit rating determinants and creditworthiness and categorized them into two different aspects, where the first aspect focuses on economic fundamentals as explanatory variables and the other aspect focuses on political fundamentals. In an early paper [10], a study was conducted on a cross-sectional analysis of Moody's and Standard & Poor's (S&P) ratings, and found that GDP growth, per capita income, inflation, external debt, and other explanatory dummy variables of economic development for the default history and foreign currency debt are significant explanatory variables for sovereign credit rating field. However, no significant correlation was found between the external balance or fiscal balance and sovereign credit rating. [11] [12] also found that sovereign credit ratings are primarily impacted by factors such as per capita income, government revenue, fluctuations in the real exchange rate, inflation rates, and historical instances of default. In the same way, [13] investigated the factors behind sovereign credit ratings issued by Moody's and S&P using a sample of 81 economies in 2001 and discovered the same characteristics that significantly influence ratings [14] conducted a study that examined the drivers of sovereign credit ratings in 95 countries from the end of 1995 to the end of 1996. They found that qualitative, political, and social indicators as well as economic factors such as GNP per capita and inflation, were significant. From the arguments that political variables should be incorporated, [15], in their study with the aim to distinguish the long-term and short-term effects of macroeconomic and fiscal variables on sovereign credit ratings, they emphasized the significance of qualitative variables. They argued that government effectiveness has a lasting impact on SCRs. In the same way, [16] conducted a study involving 36 developing countries from 1996 to 2006. They extended their research by introducing new political and institutional variables, such as adherence to the rule of law, protection of property rights, and the presence of a robust and independent judicial sys-

tem. Their findings indicated that political variables played a vital role in influencing and determining SCRs. Meanwhile, [17] in their study on Moody's, Standard Poor's, and Fitch sovereign rating models, sought to discover major factors of sovereign ratings. Moreover, the sovereign credit ratings are not affected by the estimation methodologies used. Economic strength, inflation, and governance are discovered to be the major predictors of sovereign credit ratings, before fiscal strength, domestic political risk, and banking system size. [18] in their study examining 50 developing countries from 1987 to 2003, their findings indicated that sovereign ratings are influenced significantly by economic factors, including inflation rate, default history, GDP growth rate, and commitment to trade [19]. They analyze the factors influencing sovereign credit ratings using panel data encompassing 86 countries from 1993 to 2013. Exploring whether the average credit ratings of nations vary based on regions and during periods of crisis and stability. They found that macroeconomic, external, governmental, and qualitative factors significantly impact sovereign credit ratings [20], in the case of developed and developing nations over the period between 2002 and 2016. They conclude that credit rating exhibits a positive correlation with per capita Gross Domestic Product (GDP), the degree of economic advancement, and export levels. Moreover, the research revealed a negative association between credit ratings and inflation rates, debt levels, and the history of defaults. According to [21], the determinants of sovereign credit ratings vary across African regions and income levels. Throughout all regions and income groups, the most important determinants were developmental indicators [21] found that the determinants commonly identified in the existing literature may not be as relevant to African sovereigns. Instead, developmental variables, income levels, and regional distinctions appear as crucial considerations when assessing sovereign credit ratings in Africa. Similarly, in the study [1], the relationship between sovereign credit ratings assigned by S&P (a well-known credit rating agency) and macroeconomic variables was investigated for different income groups in 105 countries. The study found that certain macroeconomic variables hold economic significance in determining sovereign credit ratings for different income groups of countries. For low-income and middle-income countries, the study revealed that per capita income, growth rate, inflation rate, government debt, budget balance, and current account balance were identified as significant macroeconomic variables. These factors played a crucial role in determining the sovereign credit ratings of these countries. On the other hand, for high-income countries, the study identified different significant macroeconomic variables, which include Per capita income, inflation rate, unemployment rate, and government-related factors. These variables were found to have a considerable impact on determining the sovereign credit ratings of high-income countries. According to [14], the assessment of ratings is not solely reliant on existing economic and financial indicators. Furthermore, the significance of economic variables differs among distinct rating categories, and financial indicators reveal variations based on countries' development levels. In highly-rated countries, economic

variables hold less importance, whereas in lower-rated countries, factors such as inflation, GNP per capita, foreign reserves, and current account balance play a significant role in determining sovereign ratings. From the proponents who advocate for limiting Sovereign Credit Rating (SCR) analysis to economic factors, [5] conducted a study on 53 countries to identify the factors that determine sovereign credit ratings. In their study, they utilized 9 macroeconomic variables and expanded their analysis by including 3 qualitative variables: history of default, economic development, and economic freedom. The outcomes of their study aligned with previous research, indicating that certain macroeconomic variables significantly influence credit ratings. Additionally, the variable of economic freedom played a crucial role in determining sovereign credit ratings. The existing literature on the determinants of sovereign credit ratings in East African countries appears to be limited, with most research focusing on other regions. One key research gap is the need for a more comprehensive understanding of how the importance of various factors, such as GDP growth, external debt, current account balance, inflation, and rule of law may differ across East African countries with varying income levels. While previous studies have examined macroeconomic variables and institutional quality as determinants of sovereign credit ratings, there is a lack of in-depth analysis on how these factors may be shaped by the income levels of the East African countries. A deeper exploration of the diverse effects of these variables, stratified by high-income, middle-income, and low-income countries, could provide valuable insights allowing for a better understanding of the unique drivers and constraints faced by East African countries at different stages of economic development when it comes to achieving favorable sovereign credit ratings. Addressing this research gap by explicitly incorporating the role of income levels as a moderating factor could yield important insights to guide policymakers and stakeholders in the region as they work towards enhancing their countries' creditworthiness and access to global financial markets.

3. Data

We use nine rating factors as independent variables in our model. We include GDP growth, GDP per capita, external debt, current account balance, inflation rate, unemployment, corruption, political stability, and rule of law. Based on a comprehensive analysis of various sources of information, it has been determined that the most reliable and credible source of a chronological sequence of macroeconomic indicators used as explanatory variables in our study is the World Development Indicators database and the IMF's Economic Outlook Indicators, which have emerged as the primary repository of this data. Nevertheless, there is a need to obtain data on credit ratings from the three international rating agencies, *i.e.*, Standard Poor's, Moody's, and Fitch, for an appropriate period of time. Data on sovereign credit ratings are obtained from <https://www.globaleconomy.com/> (see **Table 1**). To support data transparency, we added a source note highlighting how data quality may influence our findings and encouraging thoughtful inter-

pretation.

Table 1. Explanations of the explanatory variables.

Variable names	Explanations	Unit of measurement	Source
GDP growth	Annual growth rate of GDP	percent %	WB (WDI)
GDP per capita	Annual growth rate of GDP per capita	percent %	WB, OECD
External debt	Total external debt as a share of goods and services exported	US dollars	WB, IDS
Current account balance	Current account balance percentage of GDP	percent %	IMF, BoP Statistics
Inflation rate	Inflation, annual consumer price	percent %	IMF, IFS
Unemployment	Unemployment rate to the share of the labor force	Percent %	ILO
Corruption	Control of corruption	Estimate	WB (WGI)
Political stability	Political stability and absence of violence/terrorism	Estimate	WB (WGI)
Rule of law	Rule of law	Estimate	WB (WGI)

Our country selection is based on a geographical standpoint, with a particular focus on countries in the East Africa region. For example, Tanzania and Burundi were not included in our sample due to limited data availability. This implies that not all the countries encompassed by the East African sub-region were selected for our study. In total, our research covers 7 of the 21 countries listed under East Africa in the World Population Review. These 7 countries were classified into 3 groups: low, middle, and high-income. We use 13 years of information from 2010 to 2022. Our dataset comprises a well-balanced panel for East African developing countries, focusing on the 3 prominent rating agencies, Fitch, Standard & Poor's, and Moody's (see **Table 2**).

Table 2. The summary statistics report for each variable was generated across all of the observations that have S&P, Fitch, and Moody's ratings for the years 2010 to 2022.

	Min	1st Qu	Median	Mean	3rd Qu	Max
GDP_growth	-14.5974	3.8124	4.8769	5.1455	7.594	12.5505
Inflation(%)	-2.4046	3.0779	5.9243	6.9741	8.3906	33.25
External debt	-2.8E8	2612213721	9570705818	11048725015.66	1.60605E10	4.12E10
Current account	-28.4432	-9.7462	-6.1033	-6.588	-3.6907	11.8728
Corruption	-1.1766	-0.8351	-0.423	-0.163	0.5245	1.6981
Political Stability	0.1964	0.2152	0.2325	0.2302	0.2427	0.2836
Rule of law	-0.954	-0.4604	-0.322	-0.123	0.1683	1.024
Unemployment	0	0	0	3.0691	5.615	15.79
GDP per capital	335.4385	801.4196	1289.7808	4210.0374	9129.8827	16851.1198

Explanatory Variables

Given the data from the current literature, we establish a set of important macro-economic and qualitative factors that may influence sovereign credit rating.

- 1) GDP growth: A stronger GDP growth rate usually indicates a healthy and growing economy. Countries experiencing high GDP growth are seen as having improved creditworthiness, creating a safer atmosphere for investors.
- 2) GDP per capita: Nations boasting higher GDP per capita suggest greater income distribution among their populace, potentially facilitating smoother tax collection and debt servicing for the government. This aids the country's capacity to fulfill financial commitments and repay debts, thus enhancing its ability to manage financial obligations.
- 3) External Debt Stocks: Nations that possess a greater ratio of external debt to their GDP experience pressure on their government's financial resources. Elevated levels of external debt heighten the possibility of default, adversely affecting a country's creditworthiness.
- 4) Current account balance: Nations that maintain a surplus or effectively manage their current account balance are typically better equipped to withstand external disruptions like fluctuations in commodity prices, shifts in global interest rates, or sudden outflows of capital. This increased resilience lowers the likelihood of default and improves a country's ability to be considered credit-worthy.
- 5) Inflation: Elevated and fluctuating inflation diminishes a nation's currency buying strength, resulting in economic uncertainty that impacts consumer trust, investment choices, and the general stability of the economy. Credit rating agencies evaluate whether a country's inflation remains controllable and doesn't pose a risk to its economic stability.
- 6) Unemployment: Elevated levels of unemployment point towards inherent deficiencies within an economy. A continuous prevalence of high unemployment might indicate economic hurdles that could impact a nation's capacity for growth, prompting credit rating agencies to scrutinize the overall economic well-being more meticulously.
- 7) Corruption: Nations experiencing elevated corruption levels encounter difficulties in maintaining economic growth, executing impactful policies, and efficiently handling their finances. These issues may lead to a diminished credit rating. Conversely, initiatives aimed at tackling corruption and enhancing governance can have a positive impact on a country's economic stability and creditworthiness.
- 8) Political stability: A government that exhibits political stability is frequently associated with consistent economic growth and better opportunities for sustained long-term development. This positive trend in economic performance serves as a favorable signal when evaluating credit ratings.
- 9) Rule of law: Nations that uphold a robust rule of law guarantee the effective functioning of institutions, impartial enforcement of laws, and the safeguard-

ing of property rights. Credit rating agencies evaluate institutional strength as pivotal for economic administration, executing policies, and overseeing governance as a whole.

4. Methodology

This study employs a quantitative research methodology, using econometric models and statistical analysis techniques. The sample includes a selection of East African countries, and the analysis covers 13 years. The independent variables identified in the literature that influence sovereign credit ratings are tested for East African countries and their income groups by using various panel data techniques. Panel data methods are preferred because they will increase the number of observations and the type of data used in this study a combination of cross-section and time series. Using a multi-year ordered probit regression model, which allows us to incorporate time dynamics into our analysis and assess how the importance of different factors may evolve over years or economic cycles, pooling data over several years can potentially increase the sample size, provide more statistical power and reduce the impact of outliers, which may be particularly relevant in the context of East African countries where data may be limited or subject to volatility. Some determinants of sovereign credit ratings may have cumulative or lagged effects. An ordered probit model allows us to capture these dynamics and understand how past economic, financial, or political events affect current credit ratings. Our approach is similar to the cross-sectional multivariate ordered response model for analysis used by [22] to investigate the determinants of the level of non-work activities across different types of activities.

The ordered probit regression model.

Will take into account the latent variable equation:

$$y_{it}^* = \beta' x_{it} + \varepsilon_{it} \quad (1)$$

$$\begin{aligned} y_{it}^* = & \beta_0 + \beta_1 \text{Gdp_growth_it} + \beta_2 \text{Gdppercapita_it} + \beta_3 \text{ExternalStock_it} \\ & + \beta_4 \text{CurrentAccountBalance_it} + \beta_5 \text{inflation_it} \\ & + \beta_6 \text{Unemployment_it} + \beta_7 \text{Corruption_it} \\ & + \beta_9 \text{RuleOfLaw_it} + \beta_{10} \text{Year_t} + \varepsilon_{it} \end{aligned} \quad (2)$$

where:

y_{it}^* is the unobserved latent variable representing the creditworthiness of country i in year t . X is a vector of explanatory variables for example GDP growth, unemployment, external debt stock, etc. β is a vector of coefficients to be estimated, ε is the error term, assumed to follow a standard normal distribution. $\mu_1, \mu_2, \dots, \mu_{l-1}$ are the unknown threshold parameters representing the cutoff points between credit rating categories.

The observed ordinal credit rating, y_{it} , is then determined by the threshold parameters μ :

$$\begin{aligned} y_{it} = & 1 \text{ if } y_{it} \leq \mu_1 \\ y_{it} = & 2 \text{ if } \mu_1 < y_{it} \leq \mu_2 \end{aligned} \quad (3)$$

$$y_{it} = 3 \text{ if } \mu_2 < y_{it} \leq \mu_3$$

$$y_{it} = J \text{ if } y_{it} > \mu_{J-1}$$

$$P(y_{it} = k | x_{it}) = \Phi(k_k - \beta' x_{it}) - \Phi(k_{k-1} - \beta' x_{it})$$

Given that $\Phi(-\infty) = 0$ and $\Phi(+\infty) = 1$

The log-likelihood function for the sample is estimated using conditional probabilities, and the parameters that maximize this function are determined.

The factors influencing sovereign credit ratings can be significant if all countries undergo evaluation using a consistent approach that takes into account macroeconomic variables. Including country-specific characteristics as fixed or random effects in the model would undermine the study's objectives. Nonetheless, random effects ordered probit models are estimated to see how the potential estimation strategy affects the outcomes.

The random effect model using the maximum likelihood estimation is given as

$$P(y_{it} > k | k, x_{it}, v_i) = \Phi(\beta' x_{it} + v_i - k_k)^*$$

For $i = 1, \dots, n$ panels, where $t = 1, \dots, n_i$, v_i are independent and identically distributed (iid), $v_i \sim N(0, \sigma_v^2)$ and k is a set of cutpoints k_1, k_2, \dots, k_{q-1} where q is the number of possible outcomes; and $\Phi(\bullet)$ is the normal probability density function. From * we the probability of observing the outcome k for response y_{it} :

$$P(y_{it} = k | k, x_{it}, v_i) = \Phi(k_k - \beta' x_{it} + v_i) - \Phi(k_{k-1} - \beta' x_{it} + v_i)$$

Whose k_0 is taken as $-\infty$ and k_q as $+\infty$, we express the model in terms of the latent linear response, where y_{it} are generated from the latent continuous response such that;

$$y_{it}^* = \beta' x_{it} + v_i + \varepsilon_{it}$$

Since v_i is iid, and the correlation between successive disturbances is given as $\rho = \sigma_v^2 / (\sigma_v^2 + 1)$. The conditional probabilities for the rating outcomes of the countries can be written as:

$$P(y_{it} = k | k, x_{it}, v_i) = \Phi(k_k - \beta' x_{it} - v_i) - \Phi(k_{k-1} - \beta' x_{it} - v_i)$$

From the conditional probabilities, the conditional likelihood for a country is the product of all those probabilities for the available years T :

$$L(x_{it}; v_i) = \prod_{i=1}^T P(y_{it})$$

The probability functions in the conditional likelihood include the random country-specific component v_i . The unconditional likelihood is obtained by integrating the marginal likelihood over all possible values of v_i . Let $\tilde{v} = v_i / \sigma_v$, the likelihood function takes the form:

$$L(x_{it}; \tilde{v}_i) = \int_{\tilde{v}} \Phi(\tilde{v}_i) \prod_{i=1}^T P(y_{it}) d\tilde{v}_i$$

where

$$P(y_{it}) = \Phi \left(k_k - \beta' x_{it} - \tilde{v}_i \left(\frac{\rho}{1-\rho} \right)^{1/2} \right) - \Phi \left(k_{k-1} - \beta' x_{it} - \tilde{v}_i \left(\frac{\rho}{1-\rho} \right)^{1/2} \right)$$

4.1. Presentation of Results and Discussion

Table 3 presents and analyzes the relationship between sovereign ratings and several macroeconomic factors. The result regarding Annual GDP Growth, the coefficient is negative (-0.0655) and not statistically significant (p-value = 0.13), indicating that annual GDP growth does not have a significant impact on sovereign ratings in this model. The coefficient is positive (0.0008) and significant (p-value = 0.002), suggesting that higher GDP is associated with better sovereign ratings.

Concerning external stock, the coefficient is extremely small (6.55E-12) and insignificant (p-value = 0.721), implying no substantial impact on sovereign ratings.

The result of the Current Account Balance coefficient is positive (0.026) but not statistically significant (p-value = 0.507). However, the coefficient of inflation is slightly positive (0.0238) but not significant (p-value = 0.354), showing minimal impact.

The coefficient for unemployment is positive (0.0859) and significant (p-value = 0.047), suggesting that higher unemployment is linked to worse sovereign ratings. The coefficient for corruption is positive (2.7696) and highly significant (p-value = 0.005), indicating that higher levels of corruption significantly worsen sovereign ratings.

Besides, the political stability coefficient is negative (-9.7836) but not significant (p-value = 0.313), showing no significant impact. The result for the Rule of Law coefficient is small (0.0675) and not significant (p-value = 0.962). The coefficient for years is negative (-0.2794) and highly significant (p-value < 0.001), showing a trend over time, with ratings potentially worsening as time progresses whereas the Income coefficient is positive (2.7839) but not significant (p-value = 0.266), implying no significant impact based on income classification. The use of estimates for corruption, political stability, and the rule of law introduces objectivity and potential measurement impacting the accuracy of the estimations, as these control variables impact the business environment.

4.2. Discussion of Results in Table 3

In **Table 3**, we observe that GDP, unemployment, corruption and year are the only indicators that are significant in the estimation of the ordered probit model. Among the significant indicators, we observed that the sovereign credit rating decreases as the number of years increases, suggesting that there is a general trend of deteriorating credit ratings, perhaps due to increasing debt levels, political instability (see **Figure 1**), etc. while an increase in GDP leads to an increase in the sovereign credit rating suggesting that stronger economies with higher GDP are perceived as less risky and more capable of meeting their debt obligations. However, we found that corruption has a positive impact on creditworthiness in East

Africa, a counterintuitive finding that suggests that in the specific context of these countries, higher levels of corruption are associated with other factors that indirectly improve creditworthiness, or that the effect of corruption is overshadowed by more dominant positive factors such as economic growth. In addition, unemployment also shows a positive relationship with credit ratings, which is counterintuitive because higher unemployment is typically seen as a sign of weakness, which is expected to lower credit ratings (see **Figure 2**). In contrast, [23] concluded a study focusing solely on S&P's rating and found no discernible correlation between unemployment levels and credit ratings. Their findings suggest that the level of unemployment is not a significant factor in determining the rating. However, [24] expanded on this by stating that although the level of unemployment was insignificant in their models, the coefficient suggests that a low level of unemployment could potentially improve sovereign credit ratings. Moreover, in East Africa where some countries are still undergoing structural transformation, a temporary increase in unemployment may coincide with reforms that are viewed positively by rating agencies. These reforms include measures to improve the business environment, increase economic diversification, and enhance fiscal stability. In addition, in East African countries, the informal sector plays a significant role in economic activity which can contribute to economic resilience and flexibility, potentially having a positive impact on credit ratings. The positive association of both unemployment and corruption with credit ratings suggests a complex interaction of economic and socio-political factors. These factors include government spending: a high unemployment rate can lead to increased government spending on social programs and job creation initiatives. In countries where corruption is prevalent, such an increase in government spending could lead to more opportunities for corruption. However, if this spending is perceived as effective in stabilizing the economy or stimulating growth, the short- to medium-term impact on the credit rating could still be positive, despite the long-term implications of corruption. Other factors include political stability and reform, and investment and economic activity.

On the other hand, **Table 4** presents the results based on income classification (high, low, and middle income) and highlights how various macroeconomic factors influence sovereign ratings.

With regards to High-Income Countries, Annual GDP Growth with its coefficient is insignificant in both models. GDP is positive and significant, showing better ratings with higher GDP. External Stock is significant in the random effect model, indicating some impact on sovereign ratings. Rule of Law has a strong positive impact (12.1995, p -value < 0.001) in the probit model.

In line with Low-Income Countries, GDP per Capita is negative and significant in the probit model, indicating that as GDP per capita decreases, sovereign ratings worsen. The external stock is positive and significant, showing that higher external stock is associated with better ratings. However, rule of law is insignificant.



Figure 1. Demonstrating the estimated influence of political stability in different countries over a period of time. The red lines are 95% confidence bounds.

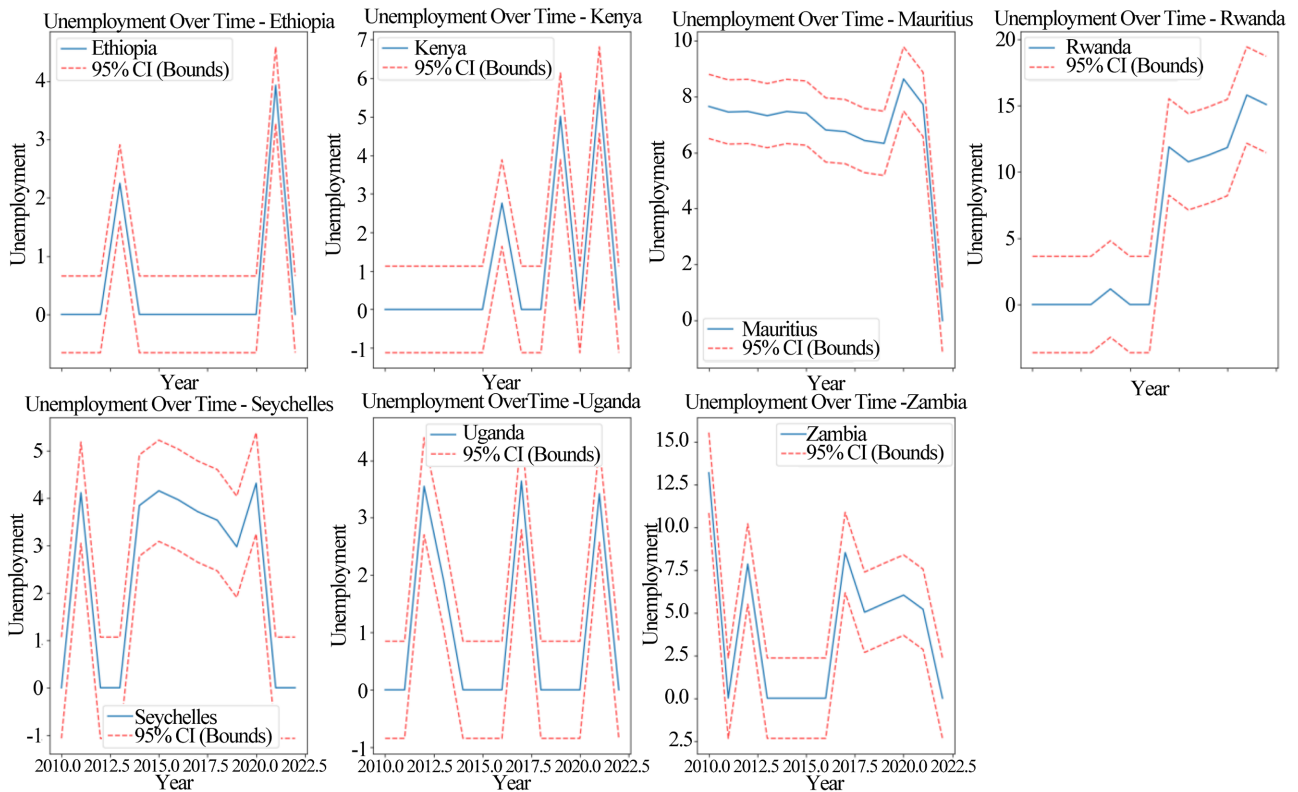


Figure 2. Demonstrating the estimated influence of unemployment in different countries over a period of time. The red lines are 95% confidence bounds.

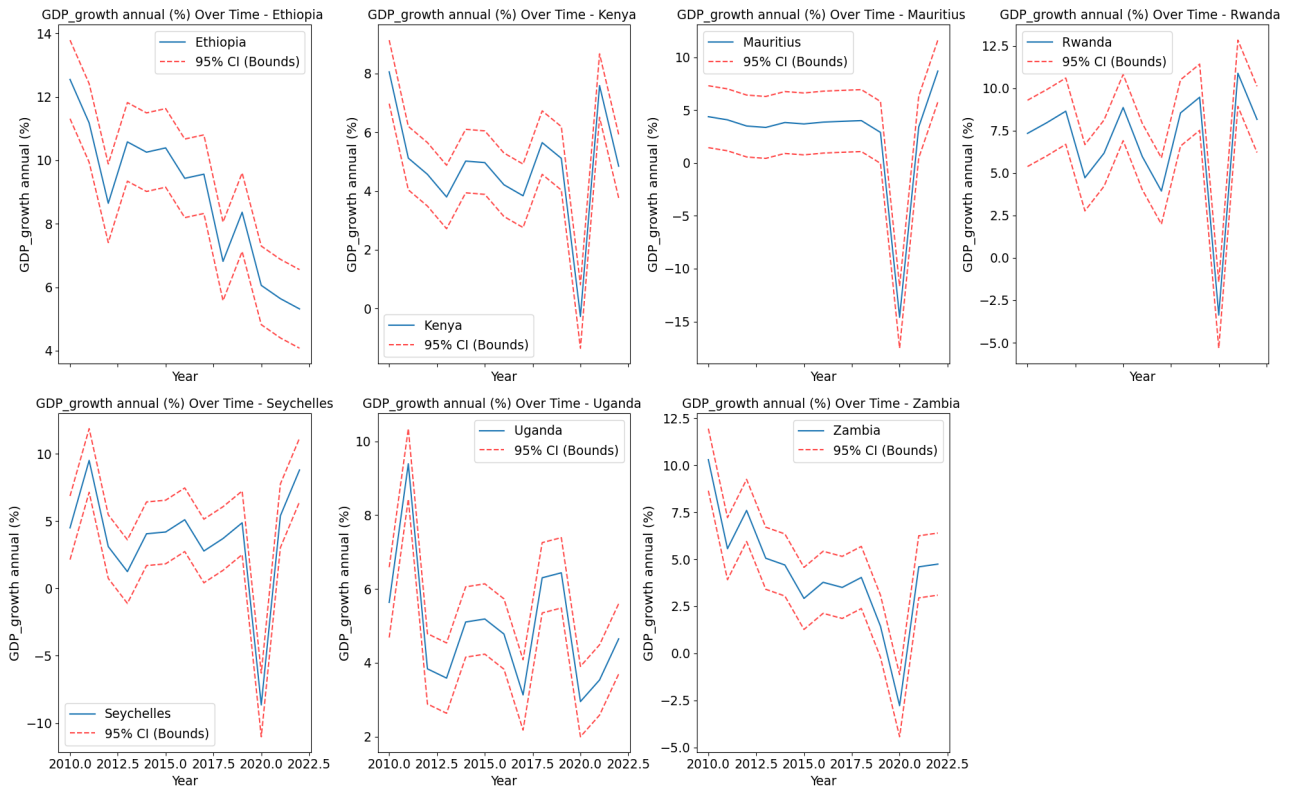


Figure 3. Demonstrating the estimated influence of GDP growth (annual %) in different countries over a period of time. The red lines are 95% confidence bounds.

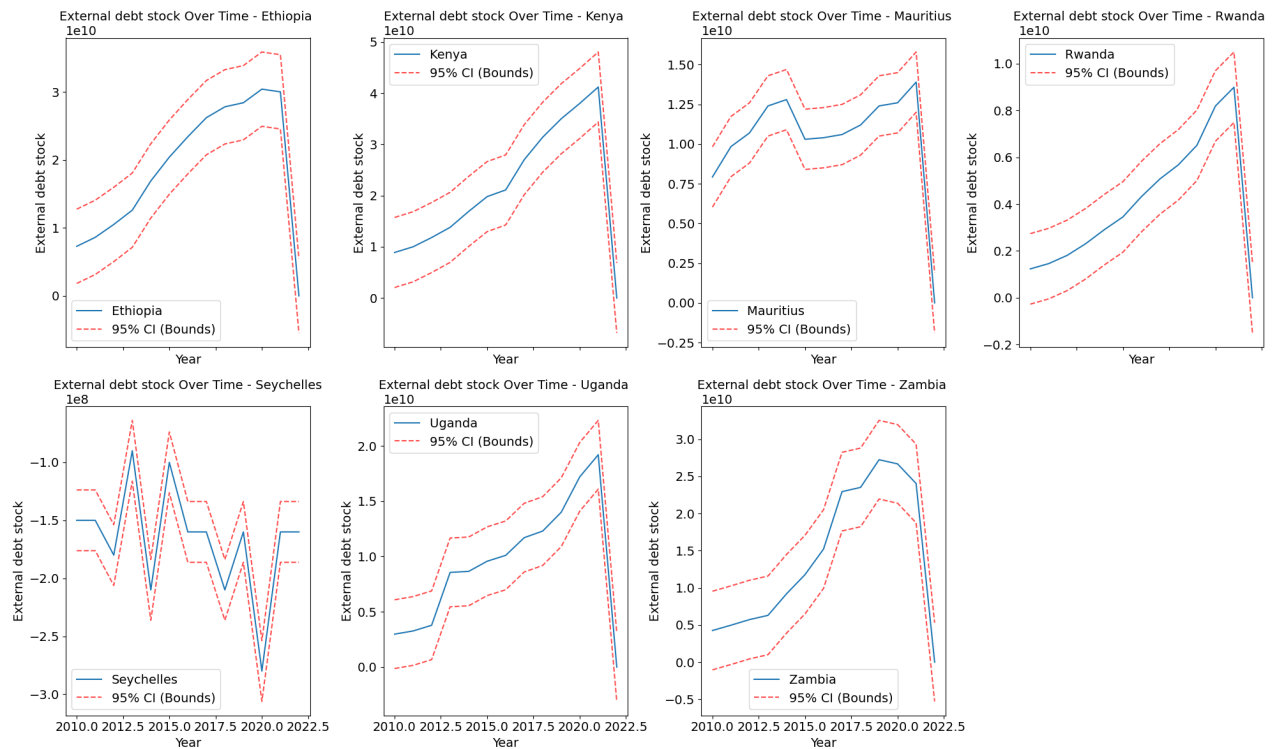


Figure 4. Demonstrating the estimated influence of external debt stock in different countries over a period of time. The red lines are 95% confidence bounds.

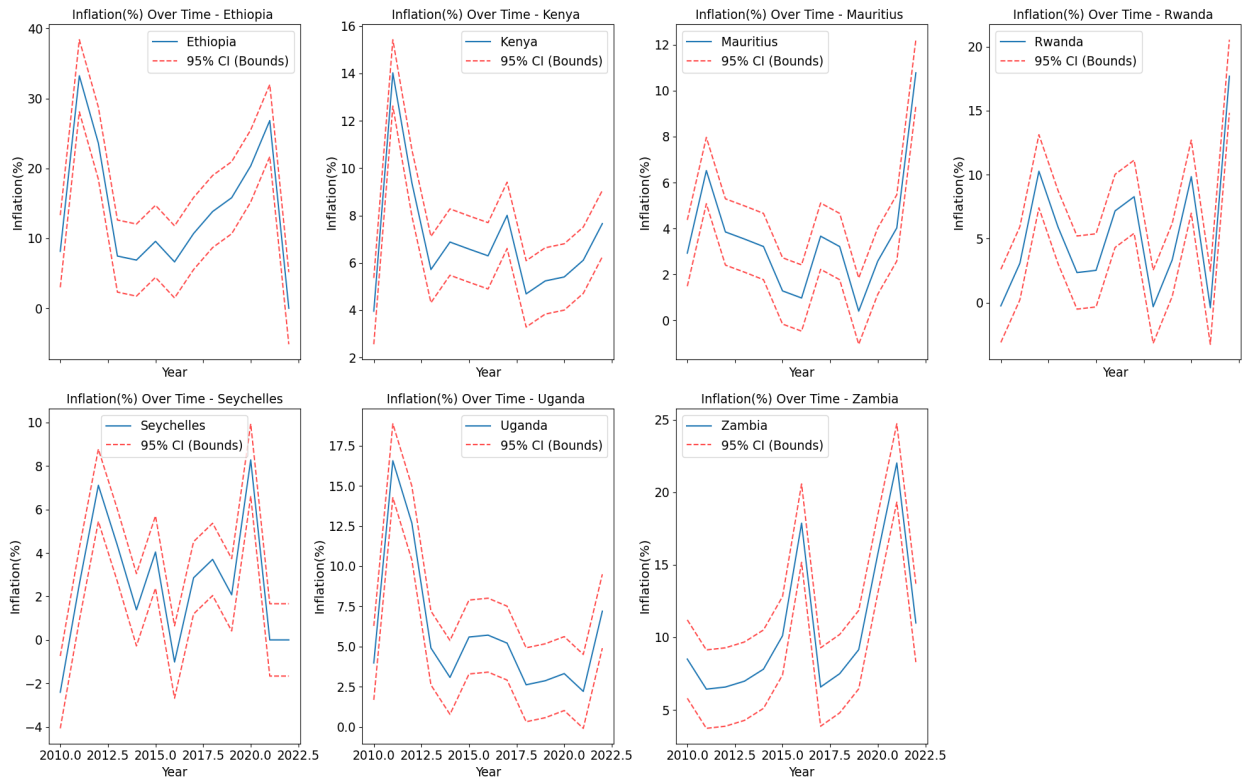


Figure 5. Demonstrating the estimated influence of inflation in different countries over a period of time. The red lines are 95% confidence bounds.

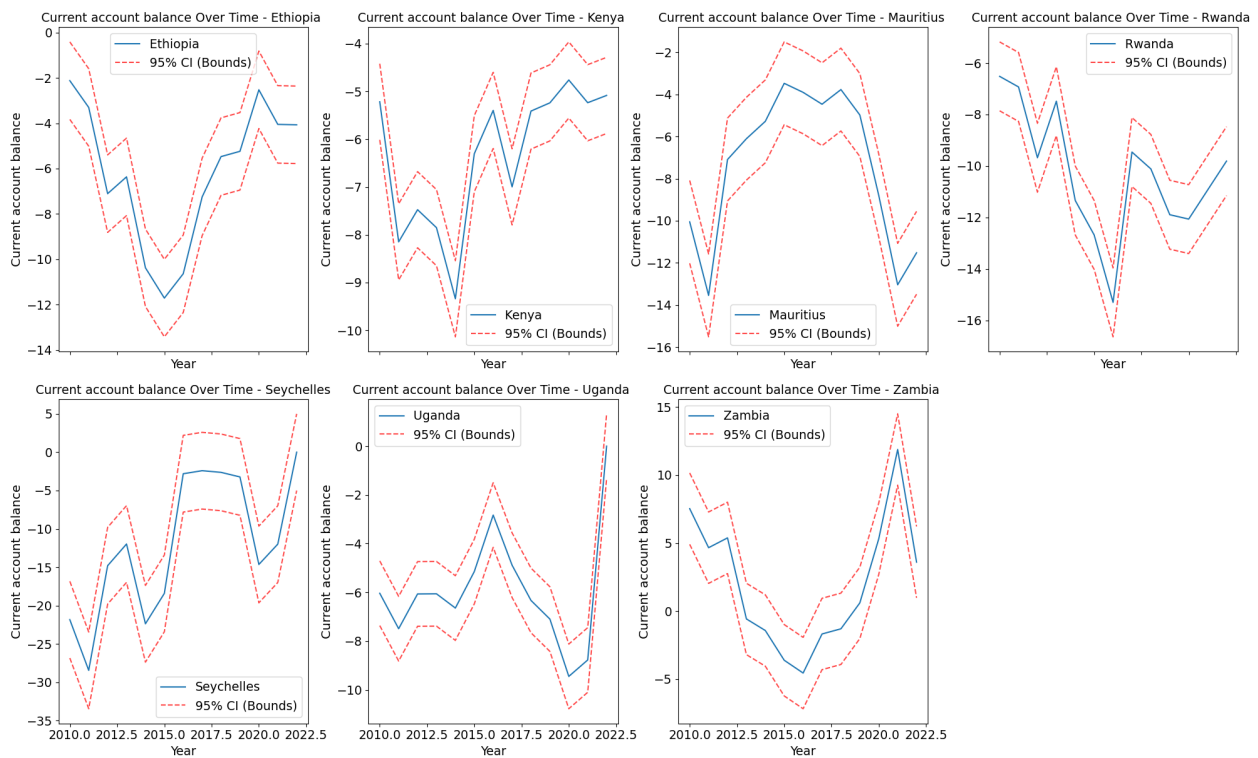


Figure 6. Demonstrating the estimated influence of current account balance in different countries over a period of time. The red lines are 95% confidence bounds.

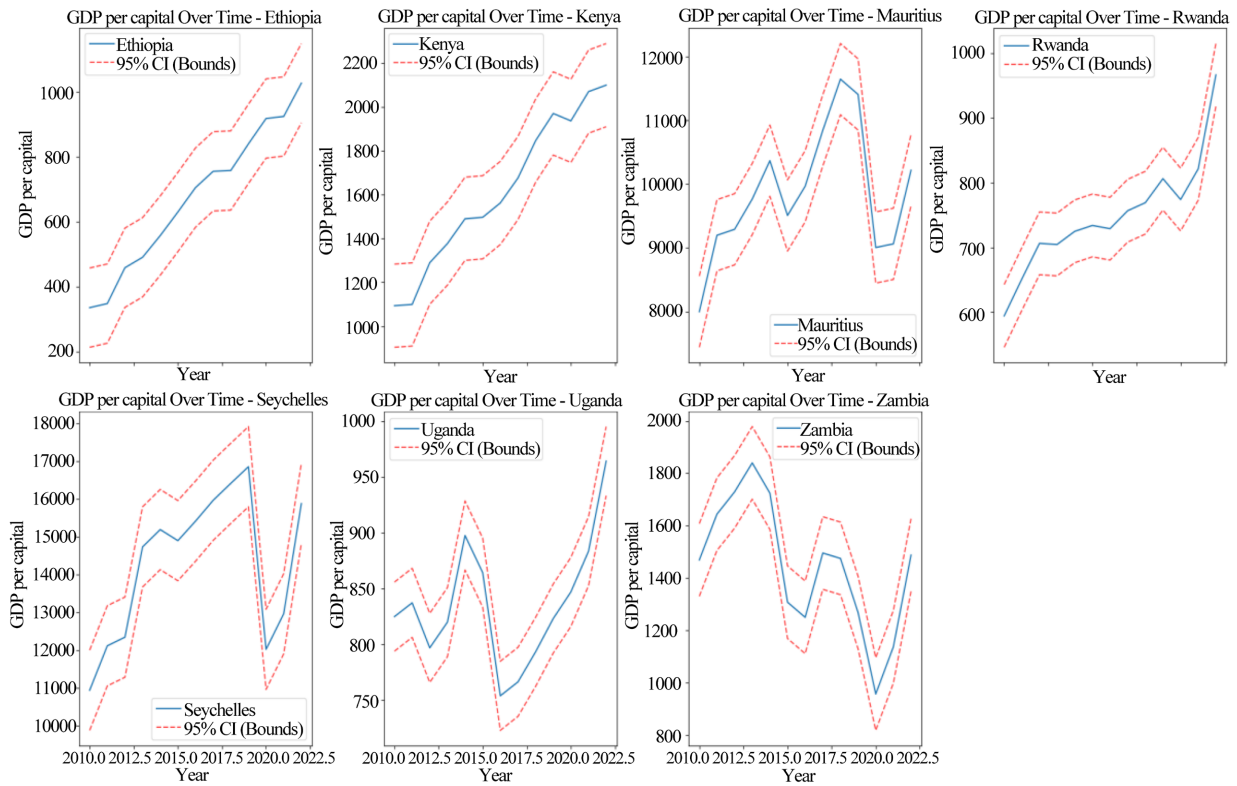


Figure 7. Demonstrating the estimated influence of GDP per capita in different countries over a period of time. The red lines are 95% confidence bounds.

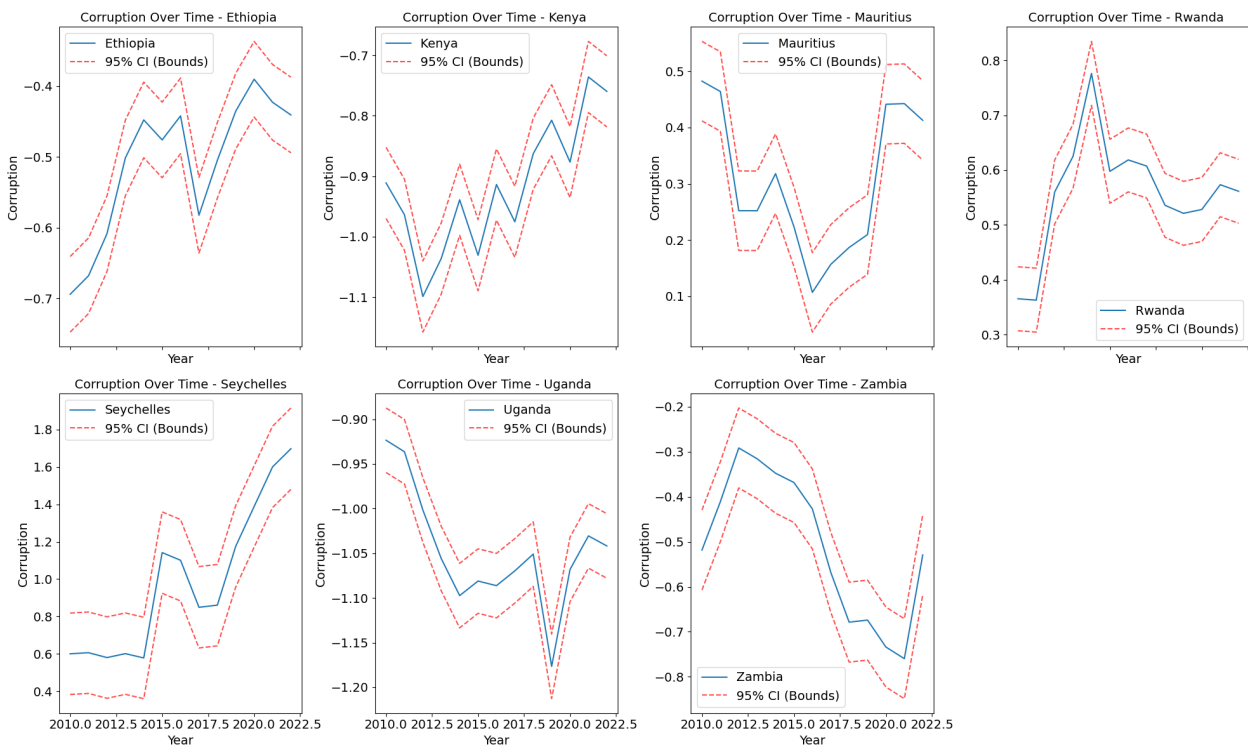


Figure 8. Demonstrating the estimated influence of corruption in different countries over a period of time. The red lines are 95% confidence bounds.

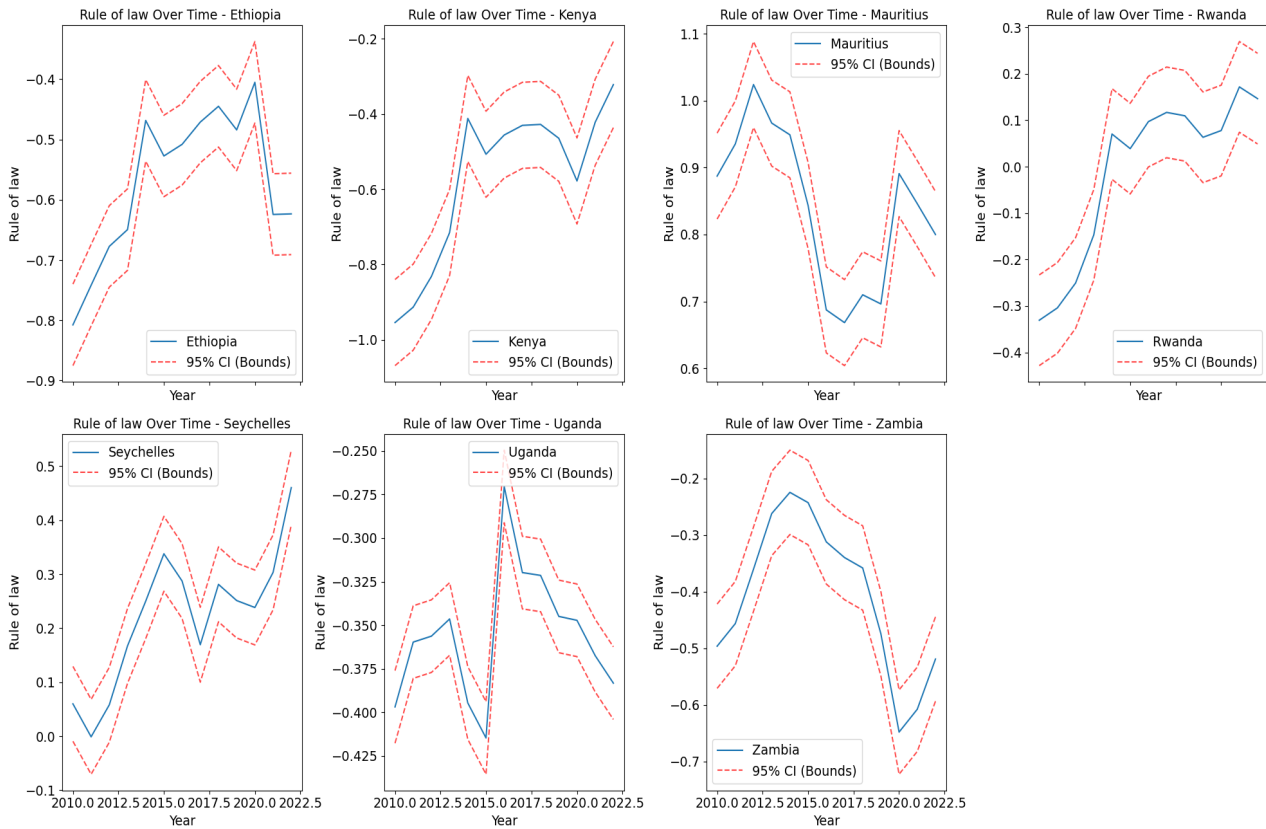


Figure 9. Demonstrating the estimated influence of the rule of law in different countries over a period of time. The red lines are 95% confidence bounds.

The results for Annual GDP Growth in middle-income countries are significant and positive in the random effect model. GDP per Capita is also negative and significant, similar to low-income countries. Similarly, inflation is negative and significant, indicating that higher inflation leads to worse ratings whereas corruption is positive but not consistently significant.

4.3. Discussion of Results in Table 4

Table 4, measures creditworthiness based on income classification for the seven East African countries considered. Using the ordered probit model it can be seen that for the high-income countries, GDP and the rule of law were the only variables that were significant in estimating sovereign creditworthiness, indicating that economic strength and quality of governance are key determinants of creditworthiness while using the random effect model external stock, corruption, and rule of law were the factors that were significant for estimating credit rating with corruption indicating an increase in corruption in a high-income country leads to decrease in the sovereign credit rating. For low-income countries using the ordered probit model, GDP and external stock (see **Figure 3** and **Figure 4**) were found to be the only variables that contributed significantly to the estimation of sovereign credit rating, highlighting the importance of economic size and external

debt burden in assessing credit risk, however, with the random effect model for the low-income countries none of the factors were significant. In addition, middle-income countries had the highest number of significant factors using the ordered probit model. We found that annual GDP growth, inflation, and current account balance were significant predictors in the estimation of sovereign credit rating, this is consistent with [25] and [24], studies have revealed that both GDP growth, inflation and current account balance have a negative impact on the rating and are found to be significant (see **Figure 3**, **Figure 5**, and **Figure 6**). However, [10] concluded that there is no correlation between current account balance and credit rating. Similarly, [23], focused only on S&P ratings and found that the current account balance is insignificant and has no impact on ratings. In their study, they reported that there is no relationship between GDP growth and sovereign credit ratings. [16] found that inflation has a positive impact on credit ratings. Their study revealed a significant positive relationship, indicating that higher inflation is associated with higher ratings. With the random effect model, we found GDP per capita, external stock and inflation significant in estimating the credit rating in middle-income countries.

This points to a more nuanced assessment of creditworthiness, where economic growth, price stability, and external balances are critical. Across all income classifications, GDP or its growth emerges as a critical factor in understanding the fundamental role of economic size and health in determining creditworthiness. The key factors vary according to countries' income levels, reflecting different economic structures, vulnerabilities, and priorities. For example, while high-income countries' credit ratings are influenced by governance (rule of law), low-income countries are more affected by external debt levels. Although, there's a positive relationship between corruption and credit rating in East Africa.

4.4. Arguments about East African Countries

In the context of East African countries, which are generally classified as low or middle-income, the following observations were made. Given the GDP per capita and its negative impact on sovereign ratings, it suggests that East African countries might struggle with lower GDP per capita, adversely affecting their sovereign ratings (see **Figure 7**).

More so, the inflation and external stock factors are particularly significant in low and middle-income countries, indicating that high inflation and external debt can be detrimental to the economic outlook and thus to the ratings (see **Figure 5**). East African countries with high inflation rates might face downgraded ratings.

As seen in the models, higher corruption significantly worsens sovereign ratings (see **Figure 8**). This is a crucial factor for East African nations where governance issues might play a central role in their credit ratings. However, the insignificance of the Rule of Law in low-income countries suggests that while governance is crucial, it may not be as strongly linked to sovereign ratings as economic metrics like GDP per capita or inflation (see **Figure 9**).

Table 3. Results of multi-year ordered probit model with Sovereign Rating as independent variable.

Rating	Coef.	Std. Err.	z	P > z	[95% Conf. Interval]	
gdp_growthannual	-0.0655	0.4326	-1.5141	0.13	-0.1503	0.0193
Gdp	0.0008	0.0024	3.08875	0.002*	0.00028	0.0126
Externalstock	6.55E-12	1.83E-11	0.35712	0.721	-2.94E-11	4.25E-11
Current	0.026	0.0392	0.66352	0.507	0.0508	0.1028
Inflation	0.0238	0.0256	0.92686	0.354	0.0265	0.0741
Unemployment	0.0859	0.0432	1.9863	0.047**	0.0012	0.1701
Corruption	2.7696	0.9906	2.800	0.005**	0.8281	4.7112
political_stability	-9.7836	9.6911	-1.00895	0.313	-28.7778	9.2107
Rule	0.0675	1.4096	-0.04764	0.962	-2.8304	2.6953
Year	-0.2794	0.0525	-5.320	<0.001***	-0.3823	-0.1764
income_id	2.7839	2.500	1.11232	0.266	-2.1168	7.6844

*Indicates the variables that are significant at a 5% significant level.

Table 4. Result of ordered probit model and random effect model based on the income classification of the countries.

Income level	Ratings	Coef	Std. Err.	z	P > z	[95% Conf	Interval]
High	gdp_growthannual	-0.0103 (0.0825std)	0.0825	-0.1244	0.901	-0.1719	0.1514
	GDP	0.0009	0.0003	2.5602	0.011**	0.0002	0.00145
	Externalstock	2.45E-10	1.95E-10	1.2563	0.209	-1.37E-10	6.28E-10
	Current	0.1404	0.0994	1.4118	0.158	-0.0544	0.3352
	Inflation	0.158	0.1289	1.2265	0.220	-0.0947	0.4107
	Unemployment	0.2883	0.247	1.1675	0.243	-0.1958	0.7724
	Corruption	-1.6352	1.1981	-1.36	0.172	-3.9834	0.7129
	political_stability	39.4406	25.4987	1.5546	0.122	-10.5361	89.4172
	Rule	12.1995	3.4191	3.5678	<0.001***	5.4981	18.9009
Random effect model							
High	gdp_annualgrowth	-0.012065	0.804899	-0.13	0.899	-0.1680224	0.1474923
	gdp per capita	0.0008183	0.000508	1.61	0.107	-0.0001774	0.001814
	External stock	2.45E-10	8.95E-11	2.74	0.006***	6.97E-11	4.21E-10
	Current	0.140419	0.0882991	1.59	0.112	-0.0326441	0.313482
	Inflation	0.158017	0.1551381	1.02	0.308	-0.1460481	0.4620821
	Unemployment	0.2883186	0.2955444	0.98	0.329	-0.2909378	0.867575
	Corruption	-1.635231	0.4539368	-3.60	<0.001***	-2.524931	-0.7455316
	Political-stability	39.44056	34.72377	1.14	0.256	-28.61677	107.4979
	Rule	12.19946	5.201703	2.35	0.019**	2.004312	22.39461

Continued

	gdp_annualgrowth	0.0056	0.0955	0.0589	0.953	-0.1815	0.1928
	gdp per capita	-0.0042	0.002	-2.097	0.036**	-0.0083	-0.0003
	Externalstock	8.98E-11	3.79E-11	2.3656	0.018**	1.55E-11	1.64E-10
	CurrentAccBal	0.0631	0.1128	0.5592	0.576	-0.158	0.2841
Low	Inflation	0.0581	0.0365	1.5893	0.112	-0.0134	0.1297
	Unemployment	0.0156	0.0745	0.2096	0.834	-0.1304	0.1617
	Corruption	0.01	0.6789	0.01003	0.988	-1.3205	1.3406
	political_stability	-15.2312	16.3176	-0.933	0.351	-47.213	16.7506
	RULE	-2.0638	2.2006	-0.938	0.348	-6.3768	2.2492
Random effect model							
	gdp-annualgrowth	0.0056388	0.0465401	0.12	0.904	-0.085578	0.0968556
	gdp per capita	-0.004283	0.0029715	-1.44	0.149	0.010107	0.001541
	externalstock	8.98E-11	7.15e-11	1.26	0.209	-5.03e-11	2.30e-10
	Current	0.063054	0.0941642	0.67	0.503	-0.1215044	0.2476124
Low	Inflation	0.0580887	0.0313061	1.86	0.064	-0.0032702	0.1194476
	Unemployment	0.0156316	0.0517561	0.30	0.763	-0.0858086	0.1170717
	Corruption	0.100423	0.3959407	0.03	0.980	-0.7659872	0.7860719
	political_stability	-15.23122	8.602469	-1.77	0.077	-32.09175	1.629309
	Rule	-2.063755	1.878387	-1.10	0.272	-5.745326	1.617815
	gdp_annualgrowth	0.4677	0.2006	2.32635	0.020**	0.0745	0.8609
	GDP per capita	-0.0045	0.0024	-1.91104	0.056	-0.0092	0.0001
	Externalstock	-4.14E-11	3.88E-11	-1.06694	0.286	-1.17E-10	3.46E-11
	Current	-0.461	0.232	-1.9863	0.047**	-0.9156	-0.0063
Middle	Inflation	-0.5061	0.1908	-2.65207	0.008***	-0.88	-0.1322
	Unemployment	0.0274	0.124	0.22112	0.825	-0.2157	0.2705
	Corruption	6.5127	3.6536	1.78046	0.075	-0.6482	13.6737
	political_stability	1.2182	35.5227	0.03385	0.973	-68.4049	70.8414
	Rule	-6.0617	6.0736	-0.99998	0.318	-17.9658	5.8424
Random effect model							
	gdp-annualgrowth	0.4677474	0.3062133	1.53	0.127	-0.1324197	1.067915
	gdp per capita	-0.0045458	0.0018752	-2.42	0.015**	-0.0082211	-0.0008705
	externalstock	-4.14e-11	6.78e-12	-6.11	<0.001***	-5.47e-11	-2.81e-11
	Current	-0.4609583	0.2656455	-1.74	0.083	-0.981614	0.0596975
Middle	Inflation	-0.5060527	0.1903853	-2.66	0.008***	-0.879201	-0.1329045
	Unemployment	0.0274123	0.24972	1.10	0.272	-0.0215319	0.0763565
	Corruption	6.512745	4.839442	1.35	0.178	-2.972387	15.99788
	political_stability	1.218236	14.27378	0.09	0.932	-26.75786	29.19433
	Rule	-6.061661	4.399652	-1.38	0.168	-14.68482	2.561499

*Indicates the variables that are significant at a 5% significant level.

In summary, for East African countries, maintaining macroeconomic stability (low inflation, improved GDP per capita) and addressing corruption can significantly impact their sovereign ratings, which in turn influences their economic standing and access to international capital markets.

5. Conclusion, Recommendations, and Limitations

The growing interconnectedness of global markets and cross-border investments has elevated the importance of credit ratings. This study seeks to deepen our understanding of the macroeconomic factors that influence sovereign credit ratings, with a particular focus on East African countries. The findings show that all the analyzed indicators significantly contribute to the credit ratings assigned by rating agencies. Notably, variables such as GDP, unemployment, corruption, and the passage of time were found to be statistically significant in the estimation of the multi-year ordered probit model. The results indicate that as time progresses, sovereign credit ratings tend to decline, suggesting a trend of worsening creditworthiness, likely driven by increasing debt levels and political instability. Surprisingly, corruption was found to have a positive impact on credit ratings in East Africa. This unexpected result implies that in this regional context, higher levels of corruption may be linked to other factors that indirectly improve credit ratings, or the effects of corruption may be outweighed by stronger positive influences, such as economic growth.

A comparison of the rating models used by various credit rating agencies reveals that several key determinants are consistently applied across the board. Governance variables and inflation, in particular, are recognized as significant by all agencies. Countries that score higher on governance indicators tend to receive more favorable ratings from every agency. The seven East African countries analyzed in this study are classified as developing nations. To stimulate economic growth, these governments must build strong institutional frameworks and adopt strategies to enhance their competitiveness. Moreover, addressing a range of critical issues is essential. Given the high-value rating agencies place on governance indicators, East African nations should prioritize improving their economic institutions. Key areas of focus include strengthening corruption control, enhancing government effectiveness, upholding the rule of law, coordinating monetary policies, and improving infrastructure to align with the standards of Africa's best-performing regions.

While this study offers valuable contributions and important insights, it is not without limitations, as is common in any research effort. These limitations refer to potential shortcomings that lie beyond the researchers' control. In our case, the lack of prior research focused on the selected East African countries presents a challenge. Apart from the illustrative variables sourced from the World Bank Indicator (WDI), there are significant delays in obtaining credit rating data from these countries. Additionally, the quality of data in these emerging nations raises concerns, potentially impacting the study's overall reliability.

In conclusion, this paper examines the factors influencing sovereign credit ratings in selected East African countries based on their income levels. However, it does not encompass all countries in the region. Future research should expand on this by exploring additional macroeconomic factors that impact sovereign credit ratings.

Limitations and Future Research

Though the study covers only seven out of 21 East African countries, it potentially limits the generalizability of the findings to the broader region. However, future research should acknowledge the challenge of limited prior research on the selected countries, which could further improve the scope of the discussion and comparative analysis. Secondly, the model considers a limited set of macroeconomic and qualitative variables. Other potentially relevant factors, such as social indicators, global economic conditions, or natural resources, were not fully considered. Hence, advocating for its consideration and estimation in future research to eliminate biases.

Declaration

Dataset is readily available online.

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Authors' Contributions

The conceptualisation, curating data and analysis of the work on the factors influencing Sovereign Credit Ratings in East Africa were done by M. N., I. M., M. S. & C. M. All the authors were actively involved in performing the Ordered Probit Model analysis and discussions on findings as well as the conclusion of the paper. All authors were major contributors to the manuscript's writing. All authors read and approved the final manuscript. Besides, **M. S.** supervises the entire work.

Ethical Approval

The work was ethically approved and accepted by the Taiyuan University of Technology Institutional Review Board (TYUTIRB/SEM/2024/305). Authorities and participants were informed about the study's goal and other details. None of the authors was forced to participate in the study.

Conflicts of Interest

The authors declare no competing interests in the publication of this research work.

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