



## ARTICLE

# Tax administrative environment and tax revenue collections: Evidence from Sub-Sahara Africa

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### Abstract

A perennial question in development economics is why fiscal revenues are consistently low in Africa. This study explores the role of tax administrative environment in explaining low-tax revenue collection in SSA region using unbalanced panel data (1991–2018) from 39 countries. A generalised Method of Moment (GMM) technique is used to analyse the data. The results reveal that the tax administrative environment influences tax revenue efforts differently, supporting the hypotheses that governance, economic, and political risks negatively impact tax revenue collection. The study has implications for ensuring an enabling environment if the current steps at increasing revenue through tax are to be productive. The realignment of tax efforts to the tax environment underscores the study's originality.

**Keywords:** Tax revenue, governance risk, political risk, economic risk, Sub-Saharan Africa, generalised method of moments, tax administrative environment.

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## 1. Introduction

Public finance, especially tax revenues, plays a pivotal role in nations' economic development and sustainability. Occhiali et al. (2022) posit that tax revenues are the lifeblood of public finance, enabling governments to fund essential services, infrastructure, and social programs that are crucial for the well-being of their citizens. The importance of public finance is underscored by its role in resource allocation, income distribution, and macroeconomic stabilisation (Abdul & Sarif, 2023; Jachowicz, 2013; Oyeleke, 2018). Despite the significance of tax revenues, many Sub-Saharan African countries face challenges in maximising their tax revenue collection. Limited or declining tax revenues can hinder a country's ability to finance its development agenda, leading to increased borrowing and potential debt crises. This situation is exacerbated by factors such as tax evasion, inefficient tax administration systems, and a narrow tax base.

Several explanations have been offered in the literature to account for the challenges with tax revenue in the region. Beer and Loeprick (2021) raise concerns about the potential erosion of the

domestic tax base due to tax treaties. Gupta et al. (2022) revealed that while some Sub-Saharan African countries have enhanced their tax buoyancy through reforms, others face structural impediments, emphasising the importance of understanding the underlying factors influencing tax buoyancy to formulate effective revenue-enhancing strategies. Hounghédji and Bassongui (2023) elucidate challenges that poor monetary policies and weak governance mechanisms can constrain tax revenues, especially amidst volatile commodity prices. Ghura (1998) highlights the adverse effects of economic policies and corruption on tax revenue in the region and underscores the importance of governance and policy reforms in enhancing tax collection. Investigating external factors and tax, Ofori et al. (2022) explore the impact of exchange rate volatility on tax revenue performance, emphasising how such external economic factors can significantly influence tax revenue outcomes. Jalles (2017) provides an empirical exploration of tax buoyancy in Sub-Saharan Africa, highlighting how national income changes have a role to play in the responsiveness of tax revenues. Studies on tax levels and tax structures, tax revenue trends, and non-tax revenue considerations by the OECD further elucidate the challenges of tax revenue in Africa (OECD). These studies suggest that while tax revenue and systems have gained traction, there remain inherent challenges in the levels of tax collection. The resource curse doctrine has been argued to also play a role in taxing Africa as resource-rich countries neglect other economic sectors, including taxation (Basedau, 2005; Markus, 2015; Shaxson, 2005).

While these studies provide valuable insights into tax revenue challenges in Sub-Saharan Africa, they often focus on macro-level trends and statistics. There is a need for more granular studies that delve into the micro-level intricacies of tax administration environments. Factors such as the efficiency of the tax administrative environment can significantly impact tax revenue outcomes. The discourse on public sector reform programs in the SSA region highlights the efforts to enhance the efficiency of public institutions (Kimanuka, 2009). While primarily aimed at institutional efficiency, such reforms have indirect implications for tax revenue collection. Kimanuka (2009) argued that efficient public institutions can foster an environment conducive to tax compliance and revenue optimisation. Ebeke and Ehrhart (2012) associated the SSA's tax revenue instability with a less robust tax administrative system and advocated a strong tax administration to mitigate tax revenue fluctuation. According to Occhiali et al. (2022), ICT is vital in strengthening tax administration. The study discusses the adoption of ITAS (Integrated Tax Administration System) in selected SSA, emphasising the role of technology in modernising tax administration. Fossat and Bua (2013) explore tax administration reforms in Francophone countries of Sub-Saharan Africa, with their insights shed light on the unique challenges and opportunities in these nations. Several other factors indirectly explained tax revenue administration environments and the impact on tax revenue efforts.

Alabede (2018) found economic freedom to impact tax revenue for 42 SSA countries from 2005 to 2012. Arif and Rawat (2018) utilised corruption and governance in 10 EAGLE countries covering 2001–2015 and concluded that corruption and governance have consequences for tax revenue collection in emerging economies. Extant literature considered few economics (Ali & Audi, 2018; Ayenew, 2016; Basheer et al., 2019; Kitessa & Jewaria, 2018), governance (Hassan et al., 2021; Johnson & Omodero, 2021; Nyabunze & Siavhundu, 2020; Tujo, 2021) and political (Dianda et al., 2020; Johnson & Omodero, 2021) issues affecting tax revenue. This study differs by taking a comprehensive look at these issues constituting risk factors in tax administrative environments that were hardly explored in literature, especially in the region. More importantly, the cumulative effects of the interactions of these environmental issues have not been explored, providing the gaps to be filled in this study. Hence, the question: Does the tax administration environment affect tax revenue collection in the SSA region?

This study applied the two-step system general methods of moment (GMM) to analyse the implication of tax administrative environment for tax revenue collection in the SSA region in addressing the preceding question. Data were collected for a range of economic, governance, and political risks constituting the administrative tax environment for 39 SSA countries. The

results revealed that governance risk, economic risk, and political risk variables have far-reaching consequences for tax revenue efforts in the SSA countries, with the response of tax largely influenced by tax measures as reported in the literature. The interactions of the administrative environments to explain tax revenue efforts in the region. The evidence provided in this paper shows that far more than tax evasion and avoidance, environmental risks are responsible for low tax revenue in the SSA region. These findings have theoretical and policy implications for voluntary tax compliance within the region.

The rest of the article is divided into four sections. Section 2 looks at the literature and the development of hypotheses. Section 3 explains the data collection and analysis methods, while section 4 deals with results.

## **2. Literature and Hypotheses Development**

The most commonly referenced theories about tax collection relate to deterrence and social contracts (Alabede, 2018). Deterrence theory traditionally explains the payers' motivation to pay tax by considering the cost-benefit. While the cost in the theory focuses on possible sanctions for evasion, it is safe to infer that risk factors associated with the tax environment constitute a major constraint to the propensity to pay tax. Therefore, the assertion in this study that the willingness to pay tax largely depends on the adequately managed tax administrative environment implies increased tax revenue efforts. In this study, we consider further environmental, governance, political, and economic risks not traditionally explored in the literature to explain that far more than tax evasion and avoidance, environmental risks are responsible for low tax revenue in the SSA region.

Governance risk embodies the features that prejudice the actions, processes, traditions, and institutions by which authority is exercised and decisions are taken and implemented. These could manifest in the misuse of public goods for personal gain, institutional decadence, inefficient handling of government affairs, absence of voice and accountability, and rule of law. Moore et al. (2018) stirred a contentious debate on whether taxation improves governance since governments' reliance on tax revenues versus natural resource revenues may have conflicting results. McGuirk (2013) argued that increased sums of natural resource rents lead to reduced tax enforcement and diminished demand for democratic governance in 15 Sub-Saharan countries. Whether the 'resource curse' doctrine is real or illusory, its proponents believe that single resource endowments lead to protracted autocratic regimes and increased corruption, inspiring the incumbents to reduce taxes and increase patronage (Ross, 2001, 2015). Therefore, governance environmental dynamics unequivocally influence tax revenue efforts, and corruption is a major bane of governance in Africa that has in literature been found to impact tax revenue see (Alabede, 2018; Ghura, 1998) with low tax compliance found in countries with high corruption levels (Picur & Riahi-Belkaoui, 2006). Corruption tendencies manifest themselves in various ways depending on the level of governance and adherence to the rule of law in any given country. Mehrdad (2017) attests to how resource-rich economies are victims of poor governance by power-hungry political elites looting public goods.

Ghura (1998) proxied corruption with an index that gauges the degree to which government officials engage in bribes about tax assessments, among others and found that tax ratios decline with rising corruption. The net effects of this result in low tax revenue for the state. Empirical evidence of Nyabunze and Siavhundu (2020), Alabede (2018), and Arif and Rawat (2018) found evidence to show that corruption hurts the economy by lowering tax revenue, while Mahdavi (2008) and Ketkar et al. (2005) believed improving the control of corruption will largely improve tax revenue. Although Johnson and Omodero (2021) report a direct relationship between corruption and tax revenue, the governance risk environment negatively impacts the tax revenue that could be mobilised. Arif and Rawat (2018) constructed a governance index for 10 EAGLE nations from 2001 to 2015 from the World Governance indicators using principal components analysis. They conclude that governance positively and significantly connects to tax revenue in emerging economies. In a similar

study, Hassan et al. (2021) found that government stability and law and order positively affect tax revenue collection. Since good governance positively influences tax revenue, it is logical to assume that increase in governance risk will negatively impact tax revenue. Therefore, the study's first hypothesis.

The tax economic environment no doubt poses opportunities or threats to the amount that could be raised from tax. Economic factors such as inflation, gross domestic product, investments, and employment, among others, grossly affect capital formations, thus directly and/or indirectly impacting government revenue in the form of tax. For instance, Ullah et al. (2014) showed that economic stability and high economic growth are a function of investment inflows, a sentiment shared by Hussain and Haque (2016), who found evidence that investment inflows help fast-track economic growth, especially in the developing economies. Few economic factors have been related to tax revenue in literature. Alabede (2018) regressed investment freedom, property rights, and freedom on tax revenue efforts in a panel of 42 SSA countries for 2005–2012. He documented that economic freedom is positively significant in explaining tax revenue efforts. In terms of inflation and tax, Lucotte (2012) utilised propensity score matching to analyse whether maintaining low inflation encourages better domestic tax revenue collection in 59 emerging economies from 1980 to 2009. He found that inflation-targeting adoption has had a large and significant positive effect on public revenue collection, implying that controlling inflation is an advantage to better tax revenue collection (Arif & Rawat, 2018). Trade liberalisation is another economic variable documented in tax efforts literature to influence tax revenue. Agbeyegbe et al. (2006) analysed different proxies of tax revenue about trade liberalisation proxies for 22 SSA countries from 1980 to 1996 to conclude that trade liberalisation weakly explains aggregate tax revenue with a relationship sensitive to liberalisation measures. More recent literature explores the implication of exchange rate Kitessa and Jewaria (2018), unemployment (Ali & Audi, 2018), per capita GDP (Ayenew, 2016), GDP growth Basheer et al. (2019), industry and service share of GDP (Tujo, 2021), among others, for tax revenue and found that revenue performance to be sensitive to changes in these economic factors. The general impulse from this literature suggests that tax revenue tends to thrive when these environments are much more favourable. While this study considers a number of these variables and many others, the argument is to explore what impact a less favourable environment will pose to tax revenue, hence the economic risk.

The current literature on the relationship between political risks and tax revenue is vast but vague. Mahdavi (2008) considered civil liberty and political risk in exploring variables impacting tax revenue and its composition in 43 developing countries from 1972 to 2003 and found that political risk impacts different tax measures differently. In the same vein, Castro and Camarillo (2014) analysed institutional variables of political rights and civil liberties to explain tax revenue and found significant negative impacts of the institutional variables on tax revenue. Using cluster analysis, Feger and Asafu-Adjaye (2014) analysed the effects of colonial policy history on tax revenue efforts in SSA countries. They found that colonialism impacts tax revenue and varies by the nature of colonial regimes in the different countries. Johnson and Omodero (2021) analysed political instability and tax revenue and found evidence that suggested a positive and significant relationship. Dianda et al. (2020) found political legitimacy to impact tax revenue positively. While inference from the literature pointed to better revenue efforts in a politically stable environment, Hassan et al. (2021) have evidence that external and internal conflicts favour tax revenue collection. Notwithstanding, this study aligns with most of the literature with the view that a politically risky environment will not favour tax revenue performance.

Overall, the reviewed literature indicates that many factors determine tax revenue collection in an economy. While these factors in literature have been categorised as economic, governance, and political, the gap remains in that literature explores the impact of the interaction of these composite factors on tax revenue. This is important because the empirical findings on the factors that determined

tax revenue have been largely mixed and, at most, inconclusive. Premised on this, the following hypotheses are considered:

*H1<sub>0</sub>: Governance risk environment negatively affects tax revenue performance in Sub-Saharan Africa.*

*H2<sub>0</sub>: Economic risk environments negatively influence tax revenue collection.*

*H3<sub>0</sub>: Political risk negatively influences tax revenue performance.*

*H4<sub>0</sub>: The interaction of governance, economic and Political risks negatively influence tax revenue performance.*

### 3. Methodology

#### 3.1 Data sources and data description

To test these hypotheses, this study used unbalanced panel data from 39 countries out of the 54 SSA countries. Data points from 1991 to 2018 were more readily available to analyse the relationship between tax revenue and the administrative environment of tax in Sub-Sahara Africa (SSA). The countries considered, including the study coverage period, a function of data availability considering tax revenue data. The data collection procedure adopted the purposeful non-probability sampling technique that ensures all countries in the pool with a minimum of five years of tax data availability were selected for enhanced longitudinal analysis. We began by collecting tax revenue data, which are surrogated by tax revenue as a percentage of gross domestic product (TRGDP), the absolute value of tax revenue (TAXREV) collected by each country, income tax, profit, and capital tax as a percentage of revenue (TYPKR) and other tax revenue (OTR) as a percentage of total revenue. Tax revenue data were collected from the World Bank Development Indicator (WDI), which is available from the World Bank database. Tax administrative environmental data considered were governance risk, economics risk, and political risk indicators. Data for Governance risk indicators were collected from the estimated values of control of corruption (COC), government effectiveness (GOVTEFF), political stability and absence of terrorism (PSAVT), rule of law (RUL), and voice and accountability (VOAC) of the Worldwide Governance Indicators (WGI). For economics risks, the data collected were from WDI and the Global economy databases and included current accounts as a percentage of GDP (CAGDP), GDP per capita (GDPPC), real GDP growth (RGDPG), inflation (INF), competitiveness (COMP), shadow economy as a percentage of GDP (SHADEC) and unemployment (UNEMP). In the case of political risk data, the Global Economy database was also used, and the related data are political stability (POLST), political risk (POLR), civil liberty (CIVL), political violence (POLV), short-term political risk (STPOLRISK) and medium-long-term political risk (MLPOLRISK). The guidance for the economic and political risks was based on the International Country Risks Guide (ICRG) (Howell, 2011). Details about the data construction and references are contained in Appendix 2.

#### 3.2 Model for Data analysis and summary statistics

This study relied on the expanded tax efforts mode of Ghura (1998) and Gupta (2007) to estimate the multivariate analysis utilising the two-step system generalised method moments (GMM) to explain the relationship between tax administrative environment and tax revenue performance in a panel of 39 SSA countries. The system GMM is preferred for this study because it's a lot more robust and could deal with possible endogeneity issues with the capacity to ameliorate cases of cross-sectional dependency, which may be the case in a study of this nature since it is assumed to be identically and independently distributed. Given the unbalanced panel analysis, the study applied the Arellano and Bover (1995) orthogonal deviation option recommended by Roodman (2006). For the validity of the GMM instruments, the study utilised the Hansen J statistics in a robust estimation (Mileva, 2007), while the Arellano-Bond test of serial correlation insists that the null hypothesis must be acceptable in the order of two for the absence of serial correlation and a necessary condition for the study to employ the corresponding moment condition. Moreover, the GMM is a nonnormality

approach with a robust option that caters for missing data (Roodman, 2006). Furthermore, the choice of panel data analysis helps to incorporate countries and variables that would otherwise not have been possible for insufficient data. According to Baltagi (2008) panel analysis gives room for more variability, rarer collinearity problems and controlled heterogeneity within individual data sets. As such, the relationship between the various administrative environments and tax revenue efforts in SSA is assumed to take the following general form of linear dynamic panel model.

$$\gamma_{it} = \omega_i + \rho_i \gamma_{i,t-1} + x'_{it} \rho + \epsilon_{it} \quad (1)$$

Where,  $t=\tau+1, \dots, T$  and  $\epsilon_{it}$  is assumed to be serially uncorrelated. The estimating regression models are derived in equations (1–3) and are written as:

$$\sum \text{tax}_{it} = \delta_{it} + \partial_{it} \sum \text{tax}_{it-1} + \beta_{it} \text{coc}_{it} + \gamma_{it} \text{govteff}_{it} + \vartheta_{it} \text{psavt}_{it} + \theta_{it} \text{regq}_{it} + \rho_{it} \text{rul}_{it} + \sigma_{it} \text{voac}_{it} + \mu_{it} \quad (2)$$

$$\sum \text{tax}_{it} = \delta_{it} + \partial_{it} \sum \text{tax}_{it-1} + \beta_{it} \text{cagdp}_{it} + \gamma_{it} \text{gdppc}_{it} + \vartheta_{it} \text{inf}_{it} + \theta_{it} \text{comp}_{it} + \rho_{it} \text{shadec}_{it} + \sigma_{it} \text{unemp}_{it} + \mu_{it} \quad (3)$$

$$\sum \text{tax}_{it} = \delta_{it} + \partial_{it} \sum \text{tax}_{it-1} + \beta_{it} \text{extconf}_{it} + \gamma_{it} \text{polst}_{it} + \vartheta_{it} \text{polr}_{it} + \theta_{it} \text{civl}_{it} + \rho_{it} \text{polv}_{it} + \sigma_{it} \text{stpolrisk}_{it} + \tau_{it} \text{mlpolrisk}_{it} + \mu_{it} \quad (4)$$

Where the subscripts  $it$  signify country and time, respectively.  $\sum \text{tax}$  Represents the vector of the measures of tax revenue; TRGDP, TAXREV, TYPKR and OTR, for this study in Eqn 1–4,  $\delta$  is the intercept while  $\partial$ ,  $\beta$ ,  $\gamma$ , and  $\vartheta$  are the slopes of the regression model. In equation 1 are the measures of governance risk: COC, GOVTEFF, PSAVT, REGQ, RUL and VOAC. In equation 2, the economic risk variables CAGDP, GDPPC, RGDPG, INF, COMP, SHADEC and UNEMP, while equation 3 are the measures of political risks that include EXTCONF, POLST, POLR, CIVL, POLV, STPOLRISK and MLPOLRISK with as the error term.

In equation 4, the study generated the index of each risk component to regress on the tax revenue variable. The governance, economics and political risk indexes were generated using the principal component analysis (PCA). PCA has been employed in literature to develop governance risks to explain tax revenue efforts (Arif & Rawat, 2018). Generating the various indices of governance, economic and political risks components and inputted in the regression equation 4. Estimating equation 4 will serve as robustness and gauge the administrative environment's combined effects on tax revenue within the region. This is a major contribution of the study to extant literature.

$$\sum \text{tax}_{it} = \delta_{it} + \sum \text{tax}_{it-1} + \beta_{it} \text{govrisk}_{it} + \gamma_{it} \text{econrisk}_{it} + \vartheta_{it} \text{polrisk}_{it} + \mu_{it} \quad (5)$$

Table 1 presents the data summary and the descriptions of the variables contained in the model. The arrangement of the variables follows the description in the preceding paragraph: dependent variables, the tax measure, and the independent variables, governance, economic and political risk. Variable selections were informed by literature, see (Agbeyegbe et al., 2006; Alabede, 2018; Arif & Rawat, 2018; Ghura, 1998; Lucotte, 2012) among others.

The summary statistics painted a less robust outlook. For instance, average tax revenue was generally low, and governance and economic and political environments were below average on their ranking scales. The low tax revenue could be explained by the endemic corruption of the resource curse debate, diverting attention from non-resource revenue to keep the citizens from demanding accountability (Basedau, 2005; Markus, 2015). Inflation is relatively high; unemployment, political violence and susceptibility to potential external conflicts were worrisome. Corruption, indicating

how well the political office holders and elites are perceived to use political power for the good of all, also reveals gross abuse of political offices. The potential of governments to formulate and implement policies for positive impact appeared to be relatively poor. The low tax revenue in the SSA region may be the net effect of the aforementioned negative factors in the tax environment.

**Table 1.** Summary Statistics

Variables	Mean	SD	Min	Max	Label
TRGDP	16.00538	7.510741	0.78	52.46	Total revenue to GDP
TAXREV	6.69E+11	1.70E+12	0.000967	1.51E+13	Tax revenue
TYPKR	23.53121	11.45359	0.8045	55.98264	Income tax, profit, and capital tax % of revenue
OTR	2.079859	2.660242	2.27E-05	16.74487	Other tax revenue
COC	-0.61105	0.636052	-1.81344	1.216737	Control of corruption
GOVTEFF	-0.70727	0.603413	-1.84833	1.049441	Government effectiveness
PSAVT	-0.54496	0.906378	-2.69919	1.118453	Political stability and absence of terrorism
REGQ	-0.63457	0.588091	-2.23625	1.12727	Regulatory quality
RUL	-0.65296	0.588091	-1.8523	1.07713	Rule of law
VOAC	-0.5508	0.718577	-2.00014	1.015621	Voice and accountability
CAGDP	-5.96112	11.17753	-147.997	24.69351	Current account % of GDP
GDPPC	2006.545	3059.727	102.598	22942.58	GDP per capita
RGDPG	4.182588	5.359874	-50.2481	37.99873	Real GDP growth
INF	13.64512	33.26296	-9.61615	513.9069	Inflation
COMP	3.585617	0.396044	2.58	4.54	Competition
SHADEC	38.52034	8.616181	19.23	69.08	Shadow economy
UNEMP	9.090714	8.269753	0.27	37.94	Unemployment
EXTCONF	9.454793	1.745129	3	12	External conflict
POLST	-0.51108	0.931698	-2.84	1.28	Political stability
POLR	4.285412	1.876882	1	7	Political risk
CIVL	4.146779	1.445485	1	7	Civil liberty
POLV	4.305263	1.563971	1	7	Political violence
STPOLRISK	4.531579	1.496576	1	7	Short-term political risk
MLPOLRISK	5.963158	1.257237	2	7	Medium to long-term political risk

Source: Authors' Estimation from data collected

#### 4. Data analysis and discussions

The correlation between the tax administrative environment and tax revenue results is contained in Appendix 3(a-c). A cursory look at the correlation results indicated highly correlated variables for governance and political risks. While it was favourable to generate indices for these variables, it posed a challenge for regression analysis, which played a role in deciding the model for data analysis. To test these relationships, the two-step generalised methods of the moment (GMM) with orthogonal deviation were employed for three categories of environments, as in Tables 2 to 4. The same GMM regression was implemented in Table 5 but with a composite index of the three environmental risk factors created from the principal component analysis procedure. The high correlation among independent variables informed the choice of GMM as it already assumed such correlation at order 1 (AR1) and the orthogonal deviation to cater for the unbalanced missing data panel (Arellano & Bond, 1991; Mileva, 2007; Roodman, 2006). This study estimated the three models of eqn. 1 – 3 in Table 2 – 4 to account for the given environments' distinctive effects on the continent's tax revenue efforts. Furthermore, the behaviour of various environments in a composite system was tested with the eqn. 4 model, as in Table 5.

Table 2 shows the regression results for the relationship between governance risk variables and tax revenue. The lag variable of TRGDP, TAXREV, TYPKR, and OTR indicated that the previous tax revenue percentage of GDP positively influences current tax revenue. Possibly providing incentive for revenue collection drive. The governance risk variables were seen to influence the tax variables considered sparingly. COC showed a positive weak significance to explain TAXREV but strongly negatively significant to influence OTR. GOVTEFF is only weakly related to TRGDP, while PSAVT showed no significant relationship with any of the tax variables. Meanwhile, REGQ showed strong evidence to explain both TAXREV and OTR, and RUL provides strong and negative evidence of a relationship with TRGDP, TAXREV and OTR, with VOAC only significantly positive to explain TRGDP and OTR. In terms of governance risks overall, the rule of law showed greater influence in explaining the various tax variables with consistent signs and magnitude. Although there are mixed signs of relationship depending on variables, the negative significance relationship tends to dominate, suggesting that governance risk negatively affects tax revenue drive in the SSA region. This is consistent with theory and hypothesis one of this study, which is that governance risk is detrimental to tax revenue collection.

**Table 2.** Governance GMM Results

	Model 1	Model 2	Model 3	Model 4
Variables	TRGDP	LTAXREV	TYPKR	OTR
L.TRGDP	0.665*** (0.109)			
COC	0.962 (0.607)	0.134* (0.073)	0.00183 (1.040)	-0.647** (0.284)
GOVTEFF	1.665* (0.891)	0.0486 (0.050)	0.901 (2.023)	-0.705 (0.135)
PSAVT	-0.233 (0.467)	-0.0112 (0.024)	0.442 (0.730)	-0.0179 (0.135)
REGQ	0.24 (0.876)	-0.146*** (0.043)	-0.555 (1.122)	1.462*** (0.387)
RUL	-2.735** (1.286)	-0.221** (0.095)	-0.999 (2.434)	-0.937*** (0.669***)
VOAC	1.775** (0.798)	0.0951 (0.061)	0.367 (0.756)	0.669*** (0.234)
L.LTAXREV		1.004*** (0.013)		
L.TYPKR			0.939*** (0.091)	
L.OTR				0.454*** (0.080)
Constant	6.360*** (1.978)	-0.0465 (0.337)	1.846 (2.174)	0.925*** (0.132)
Observations	430	318	281	235
Number of ID	36	32	30	29
Number of instruments	31	31	21	20
Wald Prob	0.000	0.000	0.000	0.000
AR2	0.301	0.126	0.753	0.241
Hansen prob	0.819	0.972	0.735	0.975

Source: Authors' Estimation from data collected. Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



According to the results, the governance environment provides great potential for increased tax revenue efforts. Control of corruption as the main governance factor that has been a subject of interest in literature has high coefficients in explaining tax revenue measures, given a net effect of an inverse relationship. In other words, where abuse of political powers is perceived to be high, tax revenue is expected to be low and vice versa. The finding is consistent with the work of Arif and Rawat (2018), whose study found that corruption adversely influences tax revenue in 10 EAGLE countries. An earlier study by Ghura (1998) on the effects of economic policies and corruption on tax revenue also documented that the variations in tax revenue in 39 SSA countries were attributable to corruption and economic policies. Ayenew (2016) found a negative relationship between corruption and tax revenue in Zimbabwe. Meanwhile, the same relationship was found to be positive by Johnson and Omodero (2021) in Nigeria, while Tujo (2021) did not find it significant in Ethiopia. The majority of literature considering the relationship largely aligns with the common conclusion that corruption is a bane to tax revenue as it hurts the potential for revenue collection (see Alabede, 2018; Davoodi, 2000; Fjeldstad & Moore, 2008; Huňady & Orviská, 2015; Therkildsen, 2004; Thornton, 2008) among others.

The other governance variables considered in this study, such as government effectiveness, political stability and absence of violence, rule of law, regulatory quality and voice and accountability, provide significant explanatory power in explaining tax revenue performance in the SSA. A similar study by Alabede (2018), which has considered these factors in tax efforts literature, only used them to construct a governance index with which the author gauged the effects of governance on tax revenue. More recently, Hassan et al. (2021) found that law and order in Pakistan influence tax revenue positively. Tujo (2021) did not find government effectiveness and regulatory quality to explain tax revenue in Zimbabwe. Their studies are among the few literatures that have explored the relationship between individual governance variables and tax revenue. This study contributes to the literature by analysing the effects of individual variables on tax revenue. For instance, while government effectiveness relates positively to tax measures, the rule of law exhibited a negative relationship. Providing a better insight into policies that could facilitate factors not currently supporting tax efforts to be better managed. The combined governance risks variable substantiated this negative relationship result. The key finding from the above result shows that support for good governance is consistent with better tax revenue. Put differently, governance risk constitutes a risk for tax revenue. Thus providing an answer to the first hypothesis of this study. The implication is an incentive to deepen the tax environment to avoid over-reliance on resources argued by the proponent of the resource curse doctrine (Basedau, 2005; Markus, 2015; Shaxson, 2005), which can lead to economic vulnerabilities, especially when resource prices fluctuate. Increasing taxes will create a social contract for accountability and transparency by the region's governments.

Table 3 presents the regression results for the relationship between economic risk variables and the measures of tax revenue used in this study. The results show that CAGDP is negative and strongly significant to explain TYPKR as GDPPC is negative and strongly significant to drive TRGDP, TAXREV and TYPKR although with near insignificant coefficients. Meanwhile, RGDPG indicated positive strength and significance in influencing TRGDP and TAXREV, and INF was strongly and positively significant in determining TRGDP and TAXREV while negatively explaining OTR. COMP exhibited both positive significant relationships to explain TRGDP, TYPKR and negative to explain TAXREV. Similarly, SHADEC is significantly negative in influencing TAXREV and positive in influencing TYPKR, with UNEMP showing strong significant evidence to influence TAXREV and TYPKR. Economic risk factors also showed mixed relationship signs with the various tax variables.

Albeit difficulty in deciding which sign of relationship dominates, the results provide evidence of economic risks influencing tax revenue collections, providing room to harness such influence for policy advantage. Suffice it to say that the association exhibited in the correlation analysis by the

variables was replicated in the regression result, confirming the relationships among the variables.

**Table 3.** Economic Risk GMM Regression Results

	Model 1	Model 2	Model 3	Model 4
Variables	TRGDP	LTAXREV	TYPKR	OTR
L.TRGDP	0.722*** (0.039)			
CAGDP	0.0141 (0.012)	0.00021 (0.001)	-0.132*** (0.017)	-0.00087 (0.022)
GDPPC	-0.000123** (0.000)	-1.03e-05*** (0.000)	-0.000227** (0.000)	-4.19E-05 (0.000)
RGDPG	0.0476** (0.019)	0.0249*** (0.003)	-0.0391 (0.041)	0.0247 (0.031)
INF	0.00758** (0.003)	0.00114*** (0.000)	0.00264 (0.006)	-0.00704** (0.003)
COMP	1.555*** (0.460)	-0.0797** (0.032)	3.112*** (0.784)	0.785 (0.514)
SHADEC	-0.00099 (0.022)	-0.00310*** (0.001)	0.0814*** (0.024)	0.0205 (0.026)
UNEMP	0.146*** (0.027)	0.00177 (0.001)	0.150*** (0.020)	-0.00128 (0.029)
L.LTAXREV		1.003*** (0.004)		
L.TYPKR			0.755*** (0.032)	
L.OTR				0.832*** (0.097)
Constant	-2.02 (1.450)	0.308** (0.127)	-8.965*** (3.130)	-2.897 (2.772)
Observations	206	162	151	118
Number of IDs	28	24	23	19
Number of instruments	27	18	18	18
Wald prob	0.000	0.000	0.000	0.000
AR2	0.410	0.060	0.170	0.724
Hansen prob	0.589	0.463	0.493	0.952

Source: Authors' Estimation from data collected. Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The relationships between economic variables and tax efforts are areas well-studied in the literature. This study, however, introduced further variables, such as shadow economy, competitiveness, and current account as a percentage of gross domestic product, besides the common factors that have been considered further to expand the scope of literature in the area. The advantage of the additional variables underscores their role in the domestic investment of a nation with implications for tax revenue. All the economic variables considered showed mixed signs to explain tax revenue except for GDP per capita, which was negatively related to tax measures. To start with, inflation showed a dominant positive relationship with tax revenue measures, implying that rising inflation may favour tax revenue efforts. This is inconsistent with the theory and the empirical literature of Agbeyegbe et al. (2006), who found inflation to be inversely related to tax revenue. However, Lucotte (2012) found evidence that controlling inflation is an advantage to tax revenue collection, as the author concluded

that inflation targeting adoption has had a large and significant positive effect on public revenue collection in emerging economies. Ali and Audi (2018) also found tax revenue to reduce with falling inflation in Pakistan. Both GDP per capita and real GDP growth were in the least showed very high coefficients and negative significance to explain tax revenue. Alabede (2018) documented a negative relationship between per capita income and tax revenue to support this result. Nevertheless, the expectation is a direct relationship, per the findings documented by Kitessa and Jewaria (2018), between per capita GDP and tax revenue in East Africa and Basheer et al. (2019) for GDP growth in the Middle East. The indirect relationship in this study could be associated with the level of growth and development in the region during the study period, as suggested by the summary statistics in Table 1.

As expected, competition returned net direct relation, suggesting that economic outcome diversification can potentially increase tax revenue in the region. This study found evidence to support the views that a country's competitiveness positively influences tax revenue and aligns with theory. Competition should increase the propensity to pay tax as it provides the requisite environment for investment to thrive. Obeng-Odoom (2020) challenges the conventional wisdom of the resource curse by examining African property systems as a means of economic diversification and argues that understanding property rights and institutions is crucial for grasping the dynamics of social stratification and economic outcomes in Africa. Against a priori, unemployment positively explained tax revenue.

Ali and Audi (2018) documented a positive relationship between unemployment and tax revenue. The risk of unemployment is a factor that should contribute to low tax revenue in SSA, although the issues of unemployment in the region have been argued to be structural, which may explain this relationship between tax revenue measures and unemployment. It is, however, logical to find a negative relationship between tax revenue and unemployment, which was not the case in this study. Studies investigating unemployment and tax revenue have not been common in the literature. Other variables tested include the shadow economy as a percentage of GDP and the current account as a percentage of GDP. The current account as a percentage of GDP largely influenced tax revenue measures. Adam et al. (2001) found a positive relationship with the term of trade, which could be closely linked to current account and tax revenue. The net effects of the economic risk variables suggested a positive relationship with tax measures. Hence, the inference from the foregoing addressed the second hypothesis that economic risk environments are detrimental to tax revenue collections as improved economic conditions should raise tax revenue.

Table 4 below shows the regression results of the relationship between political risk variables and tax measures. EXTCONF has high negative coefficients and is strongly significant in explaining TRGDP but with a positive coefficient in explaining TAXREV. POLST shows a negative significance to explain TAXREV, while both POLR exhibited strong negative significance to explain TRGDP and TAXREV but positively significant to explain OTR. Furthermore, the relationship of CIVL with TRGDP, TAXREV, and OTR is positive but mostly weakly significant, except for OTR, which has a strong significance. POLV is strongly significant and negatively related to TRGDP, TYPKR and OTR, just as STPOLRISK also strongly and negatively significant to explain TRGDP and TAXREV but positive to explain OTR, as MLPOLRISK showed positive significance to influence TRGDP and TAXREV. One notable feature among the results is that the coefficients of the relationships are generally strong, with the probabilities of tax measures responding quite significantly to a 79% to one percent change in the political risk variables. These results conform with the correlation results and hypothesis three.

The political environment is argued to influence the economic environment, which drives tax revenue (Gwartney & Lawson, 2003). Variables measuring the political environment in this study showed strong negative significance in explaining tax revenue. The evidence suggests that civil liberty is negatively related to tax revenue to GDP, political stability negatively influences

tax revenue, and short-, medium to long-term political risks are negatively related to tax revenue efforts. These relationships predict a risky political environment for businesses, which spells woe for tax revenue, consistent with literature findings and this study's hypothesis. Castro and Camarillo (2014) documented a negative relationship between institutional qualities proxies by civil liberty and political rights and tax revenue, while Mahdavi (2008) substantiated the results of this study as the author found civil liberty and political risks influence tax revenue depends on the measures used for the later. Similarly, Dianda et al. (2020) and Hassan et al. (2021) reported political legitimacy and government stability to influence tax revenue positively against Johnson and Omodero's (2021) evidence of a positive relationship between political instability and tax revenue in Nigeria. This study provides evidence to show that Political risk hurts tax revenue efforts, especially since the index results turned out a dominant negative relationship, consistent with hypothesis three of the study.

**Table 4.** Political Risk GMM Regression Results

	Model 1	Model 2	Model 3	Model 4
Variables	TRGDP	LTAXREV	TYPKR	OTR
L.TRGDP	0.092*** (0.033)			
EXTCONF	-0.555** (0.219)	0.120*** (0.038)	-0.225 (0.499)	-0.126 (0.235)
POLST	-0.255 (0.365)	-0.129*** (0.035)	1.28 (1.049)	0.5 (0.480)
POLR	-0.508*** (0.153)	-0.0507*** (0.012)	-0.375 (0.506)	0.429*** (0.156)
CIVL	0.461* (0.243)	0.0194 (0.017)	1.211* (0.709)	0.341** (0.173)
POLV	-0.366*** (0.092)	-0.113*** (0.012)	0.646 (0.662)	-0.694*** (0.230)
STPOLRISK	-0.358*** (0.100)	-0.0965*** (0.018)	-0.54 (0.371)	0.217* (0.128)
MLPOLRISK	0.794*** (0.172)	0.188*** (0.025)	0.771* (0.459)	-0.0422 (0.169)
L.LTAXREV		0.984*** (0.003)		
L.TYPKR			0.253*** (0.119)	
L.OTR				0.027*** (0.067)
Constant	1.856 (2.449)	-0.820* (0.424)	-11.39* (6.074)	0.398 (2.583)
Observations	73	63	53	47
Number of IDs	26	24	20	18
Number of instruments	23	23	19	17
Wald prob	0.000	0.000	0.000	0.000
AR2	0.218	0.807	0.059	0.109
Hansen Prob	0.239	0.932	0.951	0.734

Source: Authors' Estimation from data collected. Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Consistent with the literature, composite indices were created for each of the tax environmental risks, governance (GOVRISK), economic (ECORISK) and political (POLRISK) and were regressed

on the tax measures as presented in Table 5. The indices were developed in STATA using the PCA command, which generated one component for governance risk with Eigenvalue explaining 82% of the variation. The same process performed for economic and political risks yielded two components, each with a cut-off Eigenvalue of 1.6 and 1.0, explaining 55% and 82% of the variations for economic and political risks, respectively. These were then rotated to predict the indices for GOVRISK, ECORISK, and POLRISK, regressed on tax variables considered in the study. This serves as robustness while gauging the combined effects of the administrative environment through the interaction of the three components on tax revenue efforts in the region.

**Table 5.** Composite Indices GMM Regression

	Model 1	Model 2	Model 3	Model 4
Variables	TRGDP	LTAXREV	TYPKR	OTR
L.TRGDP	0.580*** (0.115)			
GOVRISK	-1.806*** (0.665)	-1.606*** (0.324)	-6.406*** (1.815)	0.761*** (0.283)
ECORISK	0.733*** (0.272)	0.414*** (0.059)	1.348 (1.016)	0.233 (0.170)
POLRISK	-1.165*** (0.365)	-0.127** (0.064)	-3.489* (1.817)	0.917*** (0.309)
GOVRISK*ECORISK*POLRISK	-0.973** (0.397)	-0.282 (0.173)	-1.642*** (0.273)	0.466*** (0.093)
L.TAXREV		0*** (0.000)		
L.TYPKR			0.482** (0.192)	
L.OTR				0.438* (0.229)
Constant	6.581*** (1.808)	26.06*** (0.163)	14.55*** (5.439)	2.019*** (0.651)
Observations	35	30	27	25
Number of id	19	17	15	14
Number of instruments	13	16	14	13
Wald prob	0.000	0.000	0.000	0.000
Hansen Prob	0.359	0.674	0.483	0.554

Source: Authors' Estimation from data collected. Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Consistent with the foregoing analysis, the lag variables of all the tax measures reveal that prior tax efforts positively influence current and future tax revenue drive. The result shows both governance and political risks as negative and significant to predict tax revenue regarding TRGDP, TAXREV, and TYPKR but only positively to explain OTR. The relationship substantiated the conclusion above regarding most of the governance and political risk variables negatively influencing tax revenue measures. Economic risk revealed a positive, strong significance to influence only TRGDP and TAXREV, confirming the relationship predicted by most economic risk variables analysed in Table 3 above. The interaction among the variables helps to validate the study result, indicating that the combined effect of governance, political, and economic risk have a dominating negative effect on tax revenue. When interacted, the dynamics of the relationships between tax revenue measures and the explanatory power of the independent variables provide further confirmation of the significance of the variables for tax and the influence of the level of development and institutional sophistication on the influence the environmental factors have on the level of tax revenue. The key findings are that governance, economics, and the political environment all influence tax revenue efforts

differently. Furthermore, the tax measures greatly influence the signs of the relationship, while regional influences also play a fundamental role in how environmental factors influence tax revenue. Thus, it has far-reaching economic implications of improving and exploiting the said environment to improve tax revenue collection in the SSA region.

The GMM satisfied all the diagnostic requirements, providing reliability of the study's results. The Wald statistics were significant at less than 1% probability levels. Likewise, the AR2 and Hansen J stats indicated the absence of serial autocorrelation and the use of good instruments, respectively, as the model also, in all cases, has the number of instruments that are less than the number of groups. This validates the results analysed for the study and the robustness checks provided by the composite analysis.

## 5. Conclusion

This study explores the relationship between tax revenue measures and tax administrative environments: governance, economic and political environments. The motivation was to provide evidence to show that the bulks of the failure of tax revenue efforts in the SSA region does not solely rest on the tables of the tax administrator nor the fingers pointing at the tax evaders but that the administrative environment of tax has a role to play in determining how much can be collected as tax revenue. These we derived impliedly from the tax deterrence theory with the assertion that risks associated with tax environment not originally captured in the theory will be an associated cost of constraint to tax revenue efforts. The generalised methods of moment regression were performed utilising tax revenue measures commonly used in the literature, realising results robust to the aggregate indices. The findings are consistent with the few environmental factors investigated in the literature, as governance, economic and political environment variables significantly influence tax revenue performance in the SSA. The explanatory power of the variables was phenomena when independent variables indices were interacted. More importantly, the interactions of the various tax administrative environments have considerably impacted the tax revenues collected in the region. Notwithstanding the mixed signs and significance of the various tax environment variables in explaining that measures in the region, the net effects support the study's hypotheses that governance, economic and political risks are detrimental to tax revenue collection, with the composite analysis robust to the inference.

Hence, the study concludes that the environment in which tax revenue is collected plays a huge role in what becomes collected as tax revenue. Notwithstanding that the tax revenue measures determine the signs of relationships, the ability of the environmental variables to significantly explain the tax variables was considered most germane as concerned stakeholders can make the best out of the factors. This study suggests that the tax environment plays a defining role in driving tax revenue in the region. The interaction of the three environmental risk factors has implications for policies that seek a healthy blend of economic, governance and political considerations in fiscal planning to promote voluntary compliance. The study recommends that attention be directed towards tax administrators and taxpayers and that collective effort be made towards creating an environment that fosters good governance with minimum economic and political risks. Laws promoting sound tax administrative environments need to be enacted with the political will to enforce them. This will, in turn, promote voluntary tax compliance and thus translate to increased tax revenue and economic growth, which is much needed, especially in the SSA region.

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### **Conflicts of interest**

The authors declare no conflict of interest.

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## Appendices

### Appendix 1

**Table:** List of SSA Countries

Angola	Guinea	Rwanda
Botswana	Ivory Coast	Senegal
Burkina Faso	Kenya	Seychelles
Burundi	Lesotho	Sierra Leone
Cameroon	Liberia	South Africa
Cape Verde	Madagascar	Sudan
Central African Republic	Malawi	Swaziland
Congo	Mali	Tanzania
Democratic Republic of the Congo	Mauritius	Togo
Equatorial Guinea	Mozambique	Trinidad and Tobago
Ethiopia	Namibia	Uganda
Gabon	Niger	Zambia
Ghana	Nigeria	Zimbabwe

#### Meta Data

TRGDP	This is the proportion of the GDP that represents revenue generated from tax, the higher, the better for government revenue	World Development Indicator
TAXREV	The culmination of all the taxes levied in an economy	World Development Indicator
TYPKR	The percentage of the total tax revenue that represents income tax, profit, and capital tax reflecting the depth of an economy's tax system.	World Development Indicator
OTR	The component of other forms of tax revenue as a proportion of the total tax revenue	World Development Indicator
COC	The index for Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests.	World Governance index
GOVTEFF	The index of Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Governance index

NB: Data descriptions and construction extracted from the various databases used

## Meta Data .... continued

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	the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	
PSAVT	The index of Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism.	World Governance index
REGQ	The index of Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Governance index
RUL	The index for Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Governance index
VOAC	The index for Voice and Accountability captures perceptions of the extent to which the citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Governance index
CAGDP	The current account is all transactions other than those in financial and capital items. The major classifications are goods and services, income and current transfers.	World Development Indicator
GDPPC	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.	World Development Indicator

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Meta Data ... continued

RGDPG	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	World Development Indicator
INF	Year-on-year percentage changes in end-of-period consumer prices.	World Development Indicator
COMP	The Global Competitiveness index is composed of 12 pillars of competitiveness: Institutions, Infrastructure, ICT adoption, Macroeconomic stability, Health, Skills, Product market, Labor market, financial system, market size, Business, dynamism, and Innovation capability.	Theglobaleconomy
SHADEC	The shadow economy as a percentage of total annual GDP. Detailed methodology of the estimations can be obtained from the following International Monetary Fund working paper by Leandro Medina and Friedrich Schneider (2018): Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?	Theglobaleconomy
UNEMP	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	World Development Indicator
EXTCOMF	Country exposure to any form of foreign aggression ranked on a scale of 0 to 12.	World Development Indicator
POLST	Rates the level of stability of the political environment with a ranking ranging between -2.5 to 2.5	Theglobaleconomy
POLR	The Political Rights ratings from the Freedom House evaluate three categories: electoral process, political pluralism and participation, and the functioning of government. The index ranges from 1 (strong rights) to 7 (weak rights)	Theglobaleconomy
CIVL	The Civil Liberties index from the Freedom House evaluates the following: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. The rating ranges from 1 (strong liberties) to 7 (no liberties).	Theglobaleconomy

POLV	<p>Political Violence includes all violent acts undertaken with a political objective; this concept is broader than ‘war’ and includes: terrorism (political, religious and ideological objectives) and political violence damage (damage to material assets as a result of political violence); for the purposes of analyzing the political violence risk, types of business interruption as a result of political violence damage are included. In order to assess the political violence risk, Credendo looks at the actual levels of internal violence in and external conflict with a country, but also at the conflict potential that arises from (lingering) internal and external tensions, frustration and dissatisfaction. Countries are classified into seven categories (from 1-low risk to 7-high risk).</p>	Theglobaleconomy
STPOLRISK	<p>The short-term political risk classification measures the likelihood of a risk caused by political and assimilated events connected to cross-border transactions with a risk horizon of up to 1 year. In order to assess this risk, Credendo uses a quantitative model, essentially focusing on the evolution of the liquidity situation of the debtor/obligor countries. The aim is to assess the capacity of a country to honor its short-term payment obligations. The model closely follows any deterioration or improvement in the situation of the debtor countries . Countries are classified into seven categories: from 1 (low risk) to 7 (high risk).</p>	Theglobaleconomy
MLPOLRISK	<p>The medium-/long-term political risk classification measures the likelihood of a risk caused by political and assimilated events connected to cross-border transactions with a risk horizon beyond 1 year. Credendo developed a quantitative model measuring especially the countries’ solvency. It combines an assessment of the economic and financial situation, an assessment of the political situation and a payment experience analysis for each country. Countries are classified into seven categories: from 1 (low risk) to 7 (high risk).</p>	Theglobaleconomy

## Appendix 3(a)

Table 6. Correlation Between Tax and Governance Risk

	TRGDP	TAXREV	TYPKR	OTR	COC	GOVTEFF	PSAVT	REGQ	RUL	VOAC
TRGDP	1.0000									
TAXREV	-0.0133	1.0000								
TYPKR	0.3282***	0.0846*	1.0000							
OTR	-0.1764***	0.0926*	-0.0683	1.0000						
COC	0.442***	-0.1923***	0.0693	-0.113*	1.0000					
GOVTEFF	0.47***	-0.1022*	0.2298***	-0.0991	0.8726**	1.0000				
PSAVT	0.2746***	-0.1264***	0.2232***	-0.0954	0.6827**	0.6518***	1.0000			
REGQ	0.4191***	0.021	0.2345***	-0.048	0.7921**	0.8728***	0.6142**	1.0000		
RUL	0.4049***	-0.0981*	0.1145***	-0.1193*	0.8938**	0.9127***	0.7553**	0.8819**	1.0000	
VOAC	0.4794***	-0.0484	0.194***	-0.02	0.7588**	0.7715***	0.6348**	0.7807**	0.8388**	1.0000

Source: Authors estimation; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix 3(b)

Table 7. Correlation Between Tax and Economic Risk

	TRGDP	TAXREV	TYPKR	OTR	CAGDP	GDPPC	RGDPG	INF	COMP	SHADEC	UNEMP
TRGDP	1										
TAXREV	-0.0133	1									
TYPKR	0.3282***	0.0846*	1								
OTR	-0.1764***	0.0926*	-0.0683	1							
CAGDP	0.1584***	0.0353	0.0429	-0.0448	1						
GDPPC	0.2671***	-0.0599	0.1606***	-0.0019	-0.0589*	1					
RGDPG	-0.0044	0.0426	-0.0223	-0.0452	-0.024	-0.004	1				
INF	0.0322	-0.0904***	0.1725***	-0.1346***	0.1112***	-0.0017	-0.0848***	1			
COMP	0.3004***	-0.0765	0.3156***	-0.098	0.1853***	0.6196***	-0.0039	0.2243***	1		
SHADEC	-0.2948***	0.2015***	-0.1715***	0.1452***	0.0767***	-0.3027***	-0.1163***	0.0697*	-0.4841***	1	
UNEMP	0.4807***	-0.2394***	0.4635***	-0.2467***	0.237***	0.3146***	-0.0512	0.2319***	0.3941***	-0.2377***	1

Source: Authors estimation; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1;

## Appendix 3(c)

**Table 8.** Correlation Between Tax and Political Risk

	TRGDP	TAXREV	TYPKR	OTR	EXTCONF	POLST	POLR	CIVL	POLV	STPOLRISK	MLPOLRISK
TRGDP	1.0000										
TAXREV	-0.0133	1.0000									
TYPKR	0.3282***	0.0846*	1.0000								
OTR	-0.1764***	-0.0109	-0.0683	1.0000							
EXTCONF	0.3304***	-0.0109	0.3117***	0.6732***	1.0000						
POLST	0.3467***	-0.1512***	0.2579***	-0.0817	0.6732***	1.0000					
POLR	-0.4613***	0.0833*	-0.1936***	0.1232**	-0.4749***	-0.5906***	1.0000				
CIVL	-0.4877***	0.0758*	-0.2258***	0.0894*	-0.471***	-0.6748***	0.8712***	1.0000			
POLV	-0.3843***	0.1333	-0.3686***	0.1434	-0.7469***	-0.8779***	0.7451***	0.7857***	1.0000		
STPOLRISK	-0.3342***	-0.0719	-0.1666*	0.2094**	-0.4869***	-0.5961***	0.452***	0.5545***	0.6559***	1.0000	
MLPOLRISK	-0.4421***	0.0272	-0.3088***	0.2011*	-0.5518***	-0.5593***	0.4644***	0.5246***	0.6812***	0.75***	1.0000

Source: Authors estimation; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1