

The Impact of Corruption on Tax Revenues: Evidences from Central African Countries

Selçuk BALI ¹ İbrahim ÖZMEN ²

Abstract

While corruption is a waste of public resources, it also causes a decline in tax revenues due to various socioeconomic effects. Within the scope of this study, we aim to reveal the effects of corruption on tax revenues for Central African countries by using data for the period 2002-2020. While exploring the possible corrosive effects of corruption on tax revenues, variables such as inflation, income, and industry-added value were also considered. In this study, the effects of the independent variables on tax revenues were investigated using the conditional quantile regression method. The findings can serve as a guide for policymakers to make decisions in the field of political economy. Potential reforms to the revenue system and administration are expected to yield positive results.

Keywords: Corruption, Central African countries, Conditional quantile regression

Introduction

In all countries where political elections can be held in a free and democratic environment, corruption and poverty, which are two important phenomena that the parties claiming to prevent or eliminate, directly or indirectly affect a large part of society in developed, developing or poor countries. It is also noteworthy that corruption plays an important role in the political agenda. It is a common notion that corruption occurs when public power is "inappropriately" used for certain interests. However, poverty may arise when public resources, which are considered the driving force in capitalist economies, are not distributed fairly and equitably.

Although it varies from country to country, 80-90% of public revenue consists of tax revenue. While the ineffective and efficient use of public resources can be considered one of the underlying factors of poverty, corruption in the declaration and collection of taxes can lead to further deepening of poverty.

There are various definitions of corruption, and it should be noted that the acceptance of any phenomenon as corruption varies from society to society, whether small or large. In other words, there are differences in the contexts of social norms. While Tanzi (1998) states that corruption is related to the monopoly and discretion of the state, Stapenhurst (2000) defines it as the abuse of public power for one's own or the group's interests. Sen (2004) defined corruption as the violation of applicable rules for personal profit, and Huntington (2006) defined it as the behavior of public officials outside the generally accepted rules to achieve

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their personal goals. Finally, according to Berkman (2009), the unlawful use of authority by individuals to obtain financial or personal benefits is corruption.

Various indices have been used to measure the perception of corruption. These are the Global Corruption Barometer (GCB), Bribery Index (BPI), International Country Risk Guide (ICRG), Corruption Perceptions Index (CPI) and Corruption Control (CC) Index. Not all of these indices are based on concrete data and some are scaled as a result of personal perceptions, thoughts, foresights and judgments.

It is difficult to reach a definition that everyone agrees on, and it is controversial which attitude or behavior will be considered corrupt. However, the existence of some corrupt species has been accepted.

For example, extortion occurs when a public official uses his authority to put pressure on the person requesting the service in order to obtain personal benefits. The criminal element is pressure (Kahraman, 2019). Nepotism is defined as prioritizing members of one's own social group in job placement, contracting, and use of resources (Bramoullé and Goyal, 2016). Although it is accepted as a legal activity in some countries, lobbying, which conflicts with ethical values because of its consequences, can be defined as the competition of individuals or groups to influence public policies for their own interests (Begovic, 2005). Vote trading is basically one type of political corruption; it can be expressed as the support of each other in the bills and proposals that the political parties present to the parliament and protect their own interests (Gür, 2014). Rent seeking is the use of public resources by public officials and politicians by taking into account their personal interests and prioritizing interest and pressure groups in the distribution of public resources (Ata, 2009). Bribery is an extra fee applied by public officials who are obliged to fulfill a certain duty to people who request services to obtain annuity (del Monte and Papagni, 2001). Embezzlement is the unlawful individual use of resources given to public officials to perform their duties (Nye, 1967).

The effect of corruption on tax revenues can be evaluated in the context of financial corruption. Fiscal corruption can be associated with three main indicators: tax evasion, tax legislation, and informal economy in tax. According to Bağdigen and Dökmen (2006), the effects of corruption on tax revenues can be listed as follows: i) informality increases, causing a narrowing of the tax base and a decline in tax revenues; ii) reducing investments, negatively affecting economic growth and shrinking the tax base; iii) unwillingness of taxpayers to meet the illegal demands of some malicious public employees, the shift of their commercial activities to the informal, economy or causing it to cease operations and tax revenues may decrease.

Starting with the objective effects of corruption and the possible theoretical context of poverty, this study investigates the effects of corruption on total tax revenues in selected Central African countries. In this study, we preferred the conditional quantile regression estimator, which has been widely used in panel data methods. Our findings show that increases in control of corruption at low quantile levels increase tax revenue. We strengthened

the accuracy of our findings by using non-parametric methods.

The remainder of this paper is organized as follows. In the second part, following the introduction, the literature contains summary information about some studies focusing on corruption and tax revenues. In the third part, information about the data, sample, and method, in the fourth part, the findings and the accuracy of the findings were checked, and the results are presented and the conclusion section.

2. Literature Review

Many studies have examined the effects of corruption on various economic factors. Much of this work has focused on growth. Other factors considered are foreign direct investments, inflation, exports, imports, government expenditures, government revenues, and tax revenues.

In studies dealing with the corruption-growth relationship, it has been found that the relationship is generally negative (seen for detail Mo (2001), del Monte and Papagni (2001), Neanidis et. al. (2017)), and in some (seen for detail Swalehen and Stansel (2007), Podobnik et. al. (2008)) concluded that corruption positively affects growth. The general effect of corruption is to harms FDI flows (Zander, 2021). The literacy rate, GDP growth, and economic integration have a negative effect on corruption, whereas inflation has positive effect on corruption (Uroos et. al., 2022).

Table 1. Literature Table

Author(s)	Country(s) / Years	Variables	Result
Ajaz and Ahmad (2010)	Developing countries (25) 1990-2005	Cor, Gov, Tr	Cor has a negative impact on Tr.
Potanlar et. al. (2010)	Developing countries (27) 2002-2006	Cor, Tr	Cor has a negative impact on Tr.
Monteiro et. al. (2011)	EU countries (27) 1998- 2009	Ctr, Unp, Cor, debt, Trade	Cor has a negative impact on Ctr.
Dökmen (2012)	OECD countries (25) 1984-2007	Cor, Tr	Cor has a negative impact on [5] r.
Binaj (2015)	50 countries 1995-2011	Cor, tax burden, Gdp, Tae	The vicious circle between tax evasion and political corruption is often seen in developing and sometimes developed countries.
Huňady and Orviská (2015)	OECD and Latin America countries (46) 1998-2013	Cor, Tr	Cor has a negative impact on Tr.
Litina and Palivos (2015)	45 countries 1994-1999/2005-2007 and 16 countries 1972-2012	Pcor, Te	Cor has a positive impact on Te.
Timmons and Garfias (2015)	Brazilian municipalities 2001-2008	Cor, Audit, Pop, Ptr	Cor has a negative impact on Ptr.
Özmen 2016	BRIC-T 1996-2013	Ctr, Cor, pGDP per capita, Trade, Ef	Cor has a negative impact on Tr.
Arif andRawat (2018)	10 EAGLE countries 2001-2015	Cor, Gov, Tr	Corruption has a positive and significant impact on the tax revenue collection of the

			13 erging economies.	
Tunç (2018)	EU Member Transition		There is a bidirectional causality	
	Economies Cor, Tr		relationship between tax	
	2003-2015		revenues and corruption.	
Dramane	WAEMU Countries	Con Con To	Cor has a negative impact on Tr.	
(2022)	1996-2017	Cor, Gov, Tr		

Notes; Corruption: Cor, Govern: Gov, Tax revenue: Tr, Corporate tax revenues: Ctr, Property tax revenue: Ptr, Unemployment: Unp, Trade: Tr, Tax administration efficiency: Tae, Political corruption: Pcor, Tax evasion: Te, Population, Pop, Inflation: Cpi, Economic freedoms: Ef, Gross domestic product: GDP, GDP per capita: pGDP

3. Sample, Data and Methodology

As mentioned in the introduction, we investigated the effects of corruption on tax revenues in selected Central African Countries. Although there are many countries in this geographical definition accepted by the United Nations (Wikipedia, 2023), we chose seven countries from which we could access the dataset to create a balanced panel among them. Table 2 lists these countries.

Table 2. Countries List

Angola	Gabon ³
Burindi	Republic of the Congo (or Congo Rep. (in WDI))
Cameron	Rwanda
Chad	

To investigate the effect of corruption on tax revenues, we start with the panel model suggested by Arif and Rawat (2018). Based on the following functional definition, we set up the model given in Equation 2:

$$Tr = f(GDP, CC, Ind, CPI)$$
 (1)

$$lnTr_{it} = a_0 + \beta_1 lnGDP_{it} + \beta_2 CC_{it} + \beta_2 lnInd_{it} + \beta_2 lnCPI_{it} + \varepsilon_{it}$$
(2)

Where Tr represents total tax revenues, GDP indicates gross domestic per capita income, CC represents control of corruption, Ind, Industrial value-added, CPI is the consumer price index, and ε is the error term.

We used logarithms for all variables, except control of corruption. In is the natural logarithm of the series. The data consisted of 140 observations from seven countries between 2002-2021. Detailed information on the data is provided in Table 3.

Table 3. Data Information

Variable	Definition	Unit	Data source
Tr	Total Tax Revenue	18 Revenue (% of GDP)	IMF, 2023
GDP	Gross Domestic Product	GDP per capita (constant 2015 US\$)	
Ind	Industry 8 lue added	Industry (including construction), value added (% of	WDI, 2023
	14	GDP)	WD1, 2023
CPI	Consumer price index	Consumer price index $(2010 = 100)$	
CC	Control of Corruption	Control of Corruption	WGI, 2023

³ We obtained the 2021 CPI value for Gabon from "https://www.economy.com/gabon/consumer-price-index-cpi"

Control of corruption index estimated by the World Governance Indicator (WGI) (2023). The index value interval was -2.5 to 2.5. The value indicates improvement as it moves towards the positive, that is, corruption is taken under control, and the corruption increases as it moves towards the other side, that is, the negative.

To estimate Equation 2, we employ the Conditional Quantile regression (CQR) estimator developed by Koenker and Bassett (1978). With this estimator, we used the Bofinger bandwidth method proposed by Koenker (2005). One of the main advantages of quantile regressions is that the effects in different quantiles can be interpreted differently at various points in the conditional distribution of the dependent variable. In a bivariate model, such as α and b, quantile regression parameterizes the quantiles of the distribution of α conditional on the independent variables b as βb , where β is a vector of the estimated parameters. The CQR estimator optimization estimate is as follows:

$$min_{\beta} \sum_{i=1}^{n} \delta_{\tau} (\alpha_{i} - b_{i}'\beta) \tag{3}$$

where α_i is the vector of the dependent variable, b_i is a matrix of independent regressors, β is the estimated vector of parameters and δ_{τ} is the absolute value function that yields the τ^{th} sample quantile as its solution.

For the linear model of ∂^{th} quantile $(0 < \partial < 1)$ as is;

$$\min_{\beta} \frac{1}{n} \left\{ \sum_{i:\alpha_{i} > b_{i}'\beta} \partial \left| \alpha_{i} - b_{i}'\beta \right| + \sum_{i:\alpha_{i} < b_{i}'\beta} (1 - \partial) \left| \alpha_{i} - b_{i}'\beta \right| \right\}$$

$$(4)$$

Accordingly, as one keeps increasing α_i from zero to one, we can be traced the entire conditional distribution of the α_i , conditional on the set of regressors (Koenker, 2001; Foster, 2008). The main contribution of CQR to our research is that the entire conditional distribution of the dependent variable can be characterized using different values of τ .

The coefficient signs of the total tax revenues of the variables are as follows:

H₁: In a fair taxation system, an increase in income increases the total tax revenue (+),

H₂: Increasing industrial production increases total tax revenue (+),

H₃: Consumer price index increases/decreases total tax revenues (+/-),

H₄: Control of Corruption increases total tax revenues (+).

4. Empirical Findings and Robustness Check

Table 4 presents some pioneering statistics for our variables. The GDP means are higher than the others. The standard divisions of Ind and CPI are higher than the rest. Skewness shows that each variable is positively skewed.

Table 4. Descriptive Statistics

	Mean	Max.	Min.	Std. Dev.	Skewness	Kurtosis	J-B
Tr	24.39	48.43	10.37	8.77	0.76	2.85	13.64a
GDP	2083.57	7357.56	261.09	2132.21	1.47	3.90	55.82a
Ind	32.85	66.17	9.23	18.79	0.37	1.53	15.75a
CPI	116.52	583.67	15.34	67.74	4.00	24.11	2976.50a
CC	-0.97	0.77	-1.58	0.56	1.78	5.33	106.39a

Notes: a indicate 5% statistically significant.

Moreover, the kurtosis value revealed that Tr is mesokurtic (normal distribution), GDP, CPI, and CC are leptokurtic (T-distributions), and Ind is platykurtic (uniform distributions). Accordingly, it is difficult to say that the variables have a normal distribution. Therefore, nonparametric methods may be more effective for our estimation.

Table 5 presents the findings for the CQR and OLS estimators. We also employ the nonparametric kernel (Gaussian) regression (NKR) estimator to check the accuracy of our CQR findings. NKB has 100 bootstrap replications and an *imaic* option is employed. This instrument, along with the improved AIC proposed by Hurvich et. al. (1998). The NKR approach minimizes the trade-off between bias and variance.

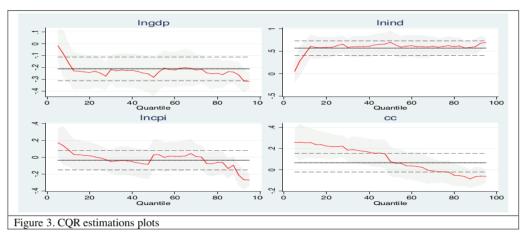
Table 5. CQR estimator and OLS, NKR results

	OLS NIVE		CQR				
	OLS	NKR	Q10	Q25	Q50	Q75	
lngdp	21ª	22ª	16°	24ª	28ª	24ª	
lnInd	.56a	.58a	.44ª	.62a	.69a	.61ª	
Incpi	03	02	.08	008	.02	07	
CC	.06	.06°	.25a	.21ª	.07	01	
Constant	3.00a		2.31a	2.87a	2.82a	3.43a	
PseudoR ²	0.3192	0.6469	0.1632	0.2260	0.1833	0.2784	

Notes: Q indicate quantile. a, b, cindicates p < 0.10; p < 0.05; p < 0.01 respectively. R^2 results for NKR and OLS have been reported.

The CQR findings show that for lngdp are -0.16 and -0.28 and negative and significant in all quantiles, implying that per capita income (lngdp) leads to a decrease in total tax revenue. InInd coefficients are 0.44 and 0.69. These are positive and significant in all quantiles, implying that lnInd leads to an increase in the total tax revenue. Our main findings relate to the control of corruption (CC) coefficients. CQR findings show that CC are 0.25 and 0.21. These are positive and significant in the 10th and 25th quantiles, respectively. We used the OLS and NKR methods to check the robustness of the CQR findings. NKR findings confirmed CQR findings.

Graphical representation can be useful, as the results for the quantiles can be presented in a graph. The figures show that CQR provides clearer information.



All coefficients for lngdp are negative and below -0.2, and this effect persists on average across all quantiles. For lnInd, the trend is similar, but the coefficients are positive and larger. We did not find a meaningful coefficient for lncpi. Finally, the CC findings interval was 0.20 to -0.20. These findings indicate the existence of a threshold value for the sample.

Conclusion and Policy Implications

In this study, we investigated the effects of corruption on total tax revenues in seven Central African countries span to 2002-2021. We add several variables to strengthen the research model and monitor the robustness of the findings. In addition, we robustly validated our findings by using different estimators.

We categorized our findings into four headings. While the first relates to the control of corruption findings, the others belong to all the three variables.

- i) According to the conditional quantile regression findings, a decrease in corruption in low quantiles increases total tax revenue, but this positive effect disappears in high quantiles. This finding was confirmed using a nonparametric kernel regression estimator.
- ii) Contrary to expectations, increases in per capita income reduce total taxes. This phenomenon can be explained in two ways. If there is no tax tariff with increasing rates in a tax system, the increase in this income may not affect the total tax revenue, but a second scenario is also possible, which is the high level of loss or evasion in the question. Thus, the higher the earnings, the easier it is to get out of the tax. This is more likely in systems with high levels of corruption.
- iii) As industrial value-added increases, total tax revenues increase, and these findings are valid for all quantiles.
- iv) Inflation has no statistically significant effect on the total tax revenue.

All three findings were confirmed using a nonparametric kernel regression estimator. While hypotheses H₂ and H₄ are valid for the selected Central African country, hypothesis H₁ is invalid. Finally, H₃ could not be confirmed or falsified.

Further research should focus on the effects of corruption on indirect and direct tax revenues rather than on total tax revenues. In addition, the samples of the studies can be investigated using comparative sampling, as well as different country groups, different income and development levels, and whether the effects vary according to the development levels of the countries.

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