
**The Macroeconomic and Institutional Pillars of Public Revenue Mobilization
in the Democratic Republic of the Congo: an Ardl Model Application**

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Abstract

The objective of this study is to estimate the macroeconomic and institutional determinants of public revenue mobilization in the Democratic Republic of Congo (DRC) based on the Musgrave (1969) model. To achieve our objective, we used ARDL modeling. The particularity of the present study is the consideration of tax reforms (VAT and mining reform), the quality of institutions, and the cointegration test performed.

The results show that trade openness, GDP, tax pressure, development aid, and inflation are key macroeconomic factors, while the quality of institutions and tax reforms also play an essential role in the Congolese government's ability to generate revenue. The bounds cointegration test has highlighted the existence of a long-term relationship between revenue mobilization and its macroeconomic and institutional determinants.

Keywords: Macroeconomic and institutional determinants, tax reforms, ARDL model

1. Introduction

Public revenue mobilization represents a major challenge for many developing countries, particularly in sub-Saharan Africa. The Democratic Republic of Congo (DRC) is no exception to this reality, despite its significant economic potential. Indeed, the weakness of public revenues in the DRC hampers the country's efforts at economic and social development.

With a tax pressure rate fluctuating between 10 and 15% in recent years, the DRC has one of the lowest levels in sub-Saharan Africa, far from the recommended international standards around 20-25% of GDP (IMF, 2020 and 2021; World Bank, 2015 and 2018), despite its enormous fiscal potential assessed according to its demographic weight for the taxation of the consumption of goods and services (Mabiala U. L., 2022).

In this context, it is crucial to understand the main macroeconomic and institutional determinants that shape a country's ability to generate tax revenues. Although the issue of mobilizing domestic public resources has not received the attention it deserves compared to other sources of financing, increasing own-source public revenues has now emerged for the governments of developing countries as a necessary step to reduce dependence on external public aid and to

finance more regularly and sustainably the public expenditures intended for the provision of essential services and the reduction of poverty (Souleymane D., 2012).

Despite the abundance of literature on the determinants of public revenues, empirical studies on the specific case of the DRC remain limited. It is in this context that the present study is situated, which aims to estimate the main macroeconomic and institutional factors influencing public revenue mobilization in the DRC over the period from 1980 to 2018 based on the Musgrave (1969) model.

The particularity of the present study is the consideration of tax reforms (VAT reforms and mining reforms), captured by indicator variables (Dummy), among the potential factors that can explain revenue mobilization in the DRC, and the use of Autoregressive Distributed Lag (ARDL) modeling to capture the short and long-term effects between (fiscal) revenue mobilization and its various determinants.

The rest of this paper is organized around four essential points: the literature review, the methodology, the results, and the conclusion.

2. Literature Review

The theoretical and empirical literature identifies several key factors that influence public revenue mobilization in developing countries. At the macroeconomic level, trade openness (Kaldor, 1963; Hinrichs, 1966), the level of economic development measured by GDP (Gupta, 2007; Teera, 2003), inflation (Tanzi, 1977; Drummond et al. 2012; Crivelli and Gupta, 2014) and development aid (Morrissey et al., 2014) are generally considered important determinants.

Using panel data from 125 countries, Gbewopo et al. (2009) analyzed the effects of corruption on the structure of public revenue collection. The estimation results using the Quasi-Generalized Least Squares (QGLS) method showed that the public revenue collection rate is negatively affected by corruption and inflation, while the trade openness rate, GDP per capita and the degree of monetization have a positive influence.

Fenochietto and Pessino (2013) used an econometric model with panel data from 113 countries, including 36 sub-Saharan African countries, to explain the level of tax revenues in sub-Saharan African countries using economic, demographic, institutional and governance variables. The main results for sub-Saharan Africa show that the average "tax effort" of sub-Saharan African countries is 0.57, which is lower than the global average of 0.64. The worst performing countries are the Central African Republic, Chad, Liberia and the Democratic Republic of Congo. The main determinants of low "tax effort" are: dependence on natural resources, a high share of the agricultural sector, and weak institutions and governance.

Studies by Heller (1975), Cashel-Cordo and Cragg (1990) and Khan and Hoshino (1992) have shown a negative effect of aid on tax revenues. This effect appears almost systematically, regardless of the type of aid considered: loans or grants, the degree of concessionality or conditionality, and the origin of the aid (bilateral, development banks, IMF). Cashel-Cordon and Cragg explain the negative effect of aid by a substitution effect where the authorities reduce their tax collection efforts with the arrival of external aid.

3. Methodology

The ARDL (Autoregressive Distributed Lag) approach has been used to examine the cointegration relationships between macroeconomic variables, institutional quality, tax reforms, and revenue mobilization in the Democratic Republic of Congo.

The classical estimation methods require that the series used be stationary, as the inference procedures of classical econometrics are no longer valid in the presence of series containing stochastic trends. The question is why not proceed to eliminate the trend by differentiation. The answer is that this approach is at the root of the loss of information, as it deprives the series of long-term movements. Hence the interest of working with non-stationary series by resorting to the theory of cointegration. This theory gives the conditions under which it is legitimate to work with non-stationary series (Araujo C. et al., 2008).

Given the constraints related to the application of traditional cointegration tests (Engle and Granger, Johansen approach, etc.), the ARDL cointegration technique developed by Pesaran and Shin (1999) and which has been extended by Pesaran et al. (2001) is used to examine the cointegration between revenue mobilization and its macroeconomic and institutional determinants.

Let's consider the following Musgrave (1969) model for the analysis of public revenues:

$$R = f(Y, P, t, S) \quad (1)$$

Where represents R public revenues; Y the national income or GDP; P the general price level; t the average tax rate; S the structure of the tax system.

Let's modify model (1) by incorporating variables such as tax reforms (VAT reform and mining reform), institutional quality, tax pressure and its square, and development aid, we obtain the following model:

$$TR_t = (VAT, Inst, GDP, TP, TP^2, MR, P, TOAid) \quad (2)$$

In this model, S and t from model (1) are replaced respectively by tax reforms (VAT: Value Added Tax; MR: mining reform) and tax pressure. TO represents trade openness. TR represents tax revenues (our dependent variable).

The ARDL specification of equation (2) is:

$$\Delta TR_t = \beta_0 + \sum_{i=1}^p \theta_i \Delta TR_{t-i} + \sum_{j=0}^q \vartheta_j \Delta X_{t-j} + \sum \theta_j X_{t-1} + \mu_t \quad (3)$$

Where μ_t is a white noise that is not correlated with the, nor with the past values of and not with the lagged values of. The explained variable depends not only on the present values of and its past values, but also on its own past values. X_t is the vector of present explanatory variables and X_{t-1} is the vector of lagged explanatory variables.

By virtue of the Granger representation theorem, an Error Correction Model (ECM) is inevitable in the case of cointegrated variables. Also, thanks to the PSS procedure, an ECM can help to confirm the existence or not of cointegration between variables. In our case, the ECM that will be the subject of our estimates is as follows:

$$\Delta TR_t = \beta_0 + \sum_{i=1}^p \theta_i \Delta TR_{t-i} + \sum_{j=0}^q \vartheta_j \Delta X_{t-j} + \gamma ECM_{t-1} + \mu_t \quad (4)$$

Where λ is the error correction coefficient which must be significantly negative. It indicates the speed of adjustment of the endogenous variable to return to the long-term equilibrium following a short-term shock. And ECM represents the residuals obtained from the estimation of the equation of the Cointegrated model.

Tableau 1 : Variables explicatives sélectionnées et leurs signes attendus

Variables	Code	Measure	Expected signs
Introduction of VAT	VAT	Proxy with dummy	+
Quality of Institutions	Inst	Composite Variable (PCA) Based on Six World Bank Indicators	+
Trade openness	TO	Measured by the Sum of Exports and Imports over GDP	+/-
Gross Domestic Product growth rate	GDP	Variation of Gross Domestic Product	+
Tax Pressure	TP	ratio of total tax revenues collected by the government to the Gross Domestic (Tax revenues/GDP)	+
Mining Reform	MR	Proxy avec dummy	+
Inflation	Inf	Measured by the change in the consumer index	-
Development Aid	Aid	L'ensemble des prêts et dons accordés au pays	+

Source: The authors

4. Resultats

Table 2: Results of Stationarity Tests

Variables	TR	Inst	TO	GDP	TP	Inf	Aid
Order of integration	I(1)	I(1)	I(0)	I(1)	I(0)	I(0)	I(1)

Source: The authors

The results of the stationarity tests indicate that tax revenues, institutional quality, gross domestic product, and development aid are integrated of order 1, this is to say, they become stationary after first differencing. In contrast, the three other variables appear to be stationary at the level. These results suggest that traditional cointegration tests cannot be applied, as the variables are not integrated of the same order. Consequently, only the bound testing approach to cointegration is appropriate.

Table 3: Descriptive Statistics of the Variables

	GDP	TR	Inst	TO	TP	Aid	Infl
Mean	23.1964 8	2.41100 3	-0.991488	3.076784	4.94E-05	6.13E+1 2	2.92795
Median	23.0214 2	2.28447 4	-1.545079	2.938457	1.19E-05	6.12E+1 2	2.86913
Maximum	24.3586 8	3.68085 5	0.000000	3.887056	0.004523	1.21E+1 3	2.87296
Minimum	22.2732 2	1.29499 2	-2.100317	2.066523	0.003549	3.31E+1 2	1.38840
Std. Dev.	0.59600 6	1.83474 3	0.860141	0.627210	0.001812	2.28E+1 2	1.24536 4
Skewness	0.56999 4	0.03172 5	0.261472	-0.070887	0.270324	0.82987	1.10226 2
Kurtosis	2.23623 3	2.33358 3	1.180800	1.518717	3.057646	3.13292 1	6.16293 5
Jarque-Bera	2.82436 9	0.67220 6	5.374440	3.321448	0.431118	4.50516	22.2961 3
Probability	0.24361 1	0.71455 0	0.068070	0.190001	0.806091	0.10512 8	0.00001 4
Sum	835.073 3	86.7961 2	-35.69358	110.7642	0.001729	2.39E+1 4	753.406 2
Sum Sq. Dev.	12.4328 0	117.819 9	25.89447	13.76875	0.000112	1.98E+2 6	54.2826 3
Observations	39	39	39	39	39	39	39

Source: The authors

Table 3 indicates that GDP is slightly positively skewed with a standard deviation indicating low dispersion. The distribution of tax revenues is symmetric with high dispersion. The distribution of institutional quality is slightly positively skewed with moderate dispersion. The distribution of trade openness is symmetric with moderate dispersion. The distribution of inflation exhibits a pronounced positive skewness and high dispersion. This indicates greater volatility of inflation rates. The distribution of tax burden is relatively symmetric. The distribution of development aid is positively skewed. This suggests a concentration of values around the mean, with a few extreme observations on the right side of the distribution.

Table 4: The Bounds Testing Approach to Cointegration

Fisher's Statistics: 9.856257		
Significance Threshold	Lower Bound.	Upper Bound
5%	2.86	4.01

Source: The authors

The results in Table 4 show that there is a cointegrating relationship between the variables, as the value of the Fisher statistic is far above the upper bound value at the 5% significance level.

Table 5: Estimation of Short-term and Long-term Coefficients

Variables	Short term		Long term	
	Coefficients	Probability	Coefficients	Probability
Value Added Tax	0.0969**	0.0230	0.0891*	0.0590
Quality of Institutions	1.7049***	0.0005	1.5678***	0.0042
Trade openness	1.2349**	0.0320	1.1356*	0.0507
Gross Domestic Product	0.2943*	0.0539	1.3933***	0.0001
Tax pressure	0.9002***	0.0005	0.0536	0.1919
Tax pressure ²	-0.0158	0.7882	-0.2358	0.7983
Mining reforms	0.6734***	0.0000	1.9137***	0.0000
Inflation	-0.1115***	0.0000	-0.2134**	0.0021
Foreign aid	-0.2341*	0.0798	-1.2341	0.1289
Constant	-	-	2.8940***	0.0000
Coint Eq (-1)	-0.1875	0.0000	-	-
R² =0.8775		F – stat =15.7602		
R² adjusted =0.8218		P – value =0.0000		

Source: Computed by the authors. ***p<0.01, **p<0.05, *p<0.1 are 1%, 5% and 10% levels of significance, respectively.

Table 5 shows that the error correction coefficient (adjustment speed) is negative and significant, indicating the presence of an error correction mechanism and that the adjustment is of good quality given the value of the coefficient of determination. Diagnostic tests (see the appendix) confirm that the estimates obtained are optimal.

In both the short and long term, variables such as tax forms (VAT and mining reforms), institutional quality, trade openness, GDP, and tax burden have a positive and significant influence on revenue mobilization in the DRC. The effects of tax burden are significant only in the short term. On the other hand, development aid and inflation negatively impact the government's ability to collect revenue.

Our results show that greater openness to international trade promotes revenue mobilization. Economic growth, by increasing national wealth, allows for better collection of taxes and duties.

More effective and transparent public institutions and the implementation of reforms improve revenue mobilization.

High inflation reduces the ability to mobilize revenues, weakening purchasing power and making tax collection more difficult. This contradicts the results of Musgrave (1969), who highlighted the positive effect of inflation on revenues, particularly through progressive taxes and the erosion of purchasing power induced by rising prices, which increases the nominal amount of taxable income. Excessive reliance on external aid can reduce incentives to mobilize domestic resources. Too high a tax burden can have a detrimental effect on revenue mobilization, discouraging taxpayers. But below a certain threshold, its contribution is positive, which means its effects on revenue mobilization are mixed.

5. Conclusion

This study underscores the importance of macroeconomic determinants, as well as institutional quality and tax reforms, in the DRC's ability to mobilize public revenues. To meet this challenge, the Congolese government must pursue policies aimed at stimulating economic activity, while strengthening governance and implementing ambitious tax reforms. Such a comprehensive framework, combining macroeconomic and institutional factors, would be an essential lever for increasing the country's budgetary resources.

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