Financial Development, Government Efficiency and Income Inequality in WAEMU Countries

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Abstract: Income inequalities have been increasing throughout the world for decades, and the WAEMU countries are no exception. Inequalities are improving from one country to another, and are increasing within these countries. Reducing income inequality is in line with the Sustainable Development Goals (SDGs). This study analyses the effects of government efficiency on the relationship between financial development and income inequality in the eight WAEMU countries over the period 1996-2023. The use of the generalised quantiles method on panel data shows that financial development through government efficiency can contribute to a reduction in inequality within WAEMU countries, while guaranteeing inclusive and sustainable growth. The study suggests that improving institutional quality, economic development and inflation control can reduce income inequality within WAEMU countries.

1. INTRODUCTION

Although the WAEMU countries have experienced fairly remarkable average growth over the last few decades in the West African zone, it must be emphasised that this growth is not inclusive. Indeed, the WAEMU zone contains very poor countries with very low social welfare and a population decimated by poverty and inequality (OXFAM, 2019). In some countries in the zone, the concentration of wealth has led to the emergence of a small but growing group of incredibly wealthy people, while a majority struggle to meet their most basic needs, such as quality education, healthcare and decent jobs. In Guinea-Bissau, for example, the richest 10% earn 60% of the national income. This figure rises to 52% in Côte d'Ivoire and 40% or more in all the other countries (see chart 1 below). In all countries except Mali, the richest 1% earn more than 10% of national income, and even 17% in Benin, Côte d'Ivoire and Guinea-Bissau. Figure 1 below shows the distribution of income inequality in the WAEMU countries.

The distribution of income inequality in WAEMU countries can also be seen in Figure 1 below. However, in the long term, income inequalities harm society as a whole (OXFAM, 2019). They attract economic and social tensions, even in countries where there is economic and political stability. High levels of inequality also have the effect of slowing down the growth of the national economy. The level of income inequality in the region is on an upward trend, with an average of 42%. These data show that the average level of income inequality in the WAEMU zone remains high and worrying.

These observations raise a number of questions, notably about the cause of the rise in income inequality in WAEMU countries.

The question of the link between financial development and income inequality remains at the heart of the debate among economists. For Kpodar (2006), financial development is a process that generates the accumulation of financial assets, the expansion of financial instruments, improved efficiency and competitiveness in the financial sector, as well as broader access to financial services for the population. As for Sahay et al (2015), financial development is a process by which a financial system gains in depth, accessibility, efficiency and diversity. Thus, financial system development could be defined as the development of the size, effectiveness, and efficiency of that system.

The ambiguous impacts of financial development on income inequality in the literature show that income inequality can be affected by other variables. Recent studies that have attempted to provide answers to these questions are those by Adeleye et al (2017) on sub-Saharan Africa. The major limitation of these studies is that they do not mention an interaction between financial development and institutional quality as one of the explanatory factors of income inequality. Also, these studies do not specify the effects of the explanatory variables on the distribution of income inequalities.

Yet studies outside West Africa have shown that an interaction between the quality of institutions and financial development can have a positive impact on reducing income inequality (Van Velthoren et al, (2019); Khan et al, (2020), Weychert, (2020), Huynh and Tran, (2023) and Perugini and Tekin, (2022)).

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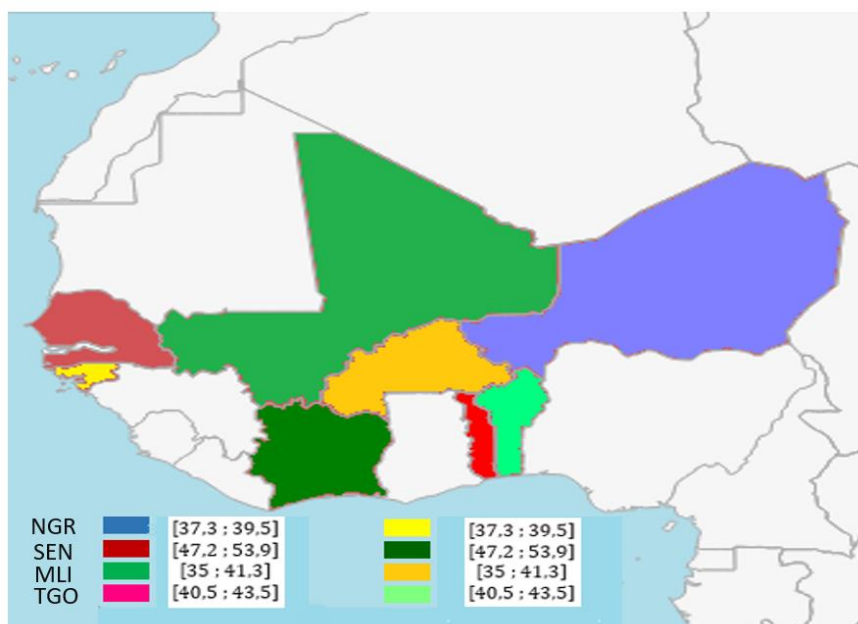
Fig. (1). Distribution of income inequalities in the WAEMU zone: Gini index from 1996 to 2023.

Note: BEN, BFA, CIV, GNB, NGR, MLI, SEN, TGO represent the abbreviations of the names of the countries Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Niger, Mali, Senegal and Togo respectively.
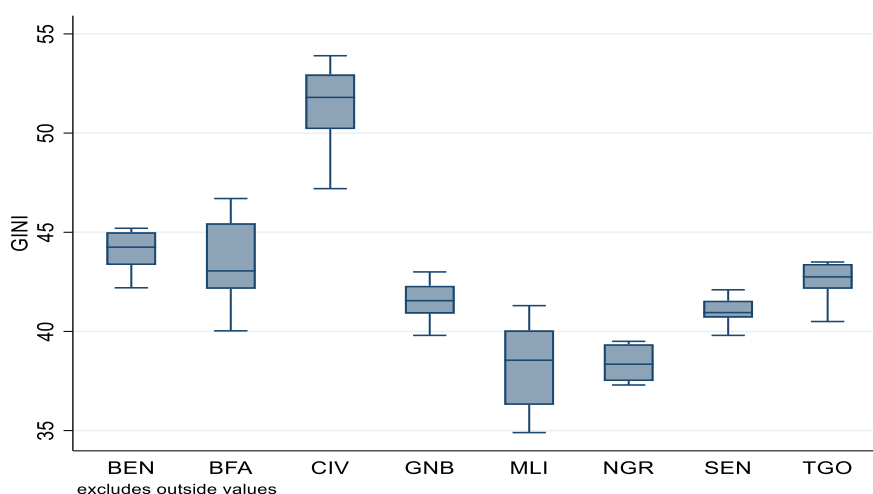
Graph 1. Distribution of income inequalities in the WAEMU zone: Gini index from 1996 to 2023.
Source: Authors, based on data from SWIID, 2024.

Indeed, Van Velthoven et al (2019) have shown that income inequalities caused by finance (financial development, financial liberalisation and banking crises) are more related to income redistribution than to inequalities caused by other factors. Thus, for these authors, institutional quality may play an important role in the relationship between financial development and income inequality. Better institutional quality stimulates development via the rule of law and government efficiency (Khan *et al*, 2020). Financial development reduces income inequality by giving poor people better access to financial services to improve their incomes (Beck et al, (2007); Weychert, (2020). For Chong and Gradstein (2007), while financial development increases income inequality, improving institutional quality can help to reduce this negative impact, since better institutional quality leads to better living conditions. Huynh and Tran (2023) also show that the development of financial institutions (FI), access to financial institutions (FIA), the efficiency of financial institutions (FIE) and access to financial markets (FMA) reduce income inequality. But overall financial development (OFD), financial market development (FM), the depth of financial institutions (FID) and the depth of financial markets (FMD) increase it.

They conclude that better institutional quality not only reduces income inequality, but also mitigates the effects of financial development on income inequality. In a context marked by repeated coups d'état within the union, the aim of this article is to analyse the effect of an interaction between government effectiveness and financial development on in-

come inequality in WAEMU countries. This study is structured as follows: introduction (section 1), data (section 2), methodology (section 3), then the results and their interpretation (section 4). And finally, the conclusion (section 5).

2. DATA

The aim of this article is to analyse how complementarity between government efficiency and the multidimensional financial development index can reduce income inequality in WAEMU countries. Annual data involving the 08 WAEMU countries from 1996 to 2023 were used in the analysis. The variables in this study are presented in Table **1** below. The GE and FD variables represent our variables of interest. Indeed, Government Effectiveness (GE) has been researched for a long time in the literature and has been defined through several indicators (Brewer et al, (2007), Acemeglu *et al.*, (2010) and Acemeglu and Robinson (2012)). The following indicators are used: (1) Quality of public services. (2) The quality of the civil service. (3) The degree of independence from political pressures. (4) Quality of policy making and high performance of public services. (5) Positive perceptions of the credibility of government loyalty to such policies. (6) Increased economic growth. (7) Increased foreign direct investment. (8) The quality of social infrastructure. (9) Increased public investment. (10) The quality of public procurement systems and the reduction of corruption.

Financial development (FD) is a multidimensional index of financial inclusion developed by Sahay et al (2015b). This index takes into account the three components of financial development, which are depth, accessibility and efficiency. It ranges from zero (0) to one (1). When it tends towards zero it indicates an underdeveloped financial system and when it tends towards one it indicates a developed financial system. Table **1** below summarises the variables used.

Table 1. Study variables.

Variables	Definitions	Sources
GINI	Income inequality	Données mondiale sur les inégalités de revenus (SWIID, 2024)
FDV	Financial Development Index	Financial Development index Database du Fond Monétaire International (FMI, 2024)
EFG	Government efficiency	Worldwide Governance Indicator (WGI, 2024)
GEFD	Interaction between government efficiency and financial development	Worldwide Governance Indicator (WGI, 2024) & Global Financial Development Database du Fond Monétaire International (FMI, 2024)
GDP	GDP per capita (2015 constant USD)	World Development Indicator (WDI, 2024)
INFL	Consumer price index	World Development Indicator (WDI, 2024)
FDA	Proxy for the level of activity financed by the financial system	World Development Indicator (WDI, 2024)

Source: Authors.

3. METHODOLOGY

3.1. Specific model

Panel data models are defined as the estimation of regression models using panel data. Therefore, all the assumptions and diagnostic tests in question for regression models are also valid for this model (Graham *et al.*, (2018)). Although the structure of the panel data model includes individuals (i) and time (t), these dimensions must be expressed with indices. The panel data model with dependent variable Y and independent variable X can be expressed as follows:

$$Y_{it} = \alpha_{it} + \beta_{it}X_{it} + \mu_{it} \quad (1)$$

With Y_{it} et X_{it} ; $i = 1, \dots, N$ et $t = 1, \dots . T$

Here, μ_{it} is the error term, β_{it} is the constant parameter and is the slope parameter. The number of parameters is k = 2 in equation (1). To define and compare the distribution of a variable, the quantile function is used, while the relationship of a variable with its independent variables is estimated by quantile regression. The quantile regression model in the framework of Koenker and Bassett (1978) can be written as follows:

$$y_{it} = x'_{it}\beta_0 + \varepsilon\theta_{it} \; with \; Quant_\theta(y_{it}x_{it}) = x'_{it}\beta_0$$

Where i denotes the country, t the time dimension, yit denotes income inequality, x_{it} is a vector of regressors, β is the vector of parameters to be estimated, ε is the vector of residuals. $Quant\theta yitxit$ denotes $\theta ème$ conditional quantile of y_{it} of a given x_{it}. The $\theta ème$ regression quantile, $0 < \theta < 1$ solves the following problem:

$$min/\beta \frac{1}{n}\left\{ \sum_{i,t:y_{it}>x_{it}\beta} \theta|y_{it} - x'_{it}\beta| + \sum_{i,t:y_{it}>x_{it}\beta}(1-\theta)|y_{it} - x'_{it}\beta| \right\} = min/\beta \frac{1}{n}\sum_{i=1}^{n}\rho_\theta \varepsilon_{\theta it}$$

$\rho_\theta(\cdot)$ known as the "control function", is defined as.:

$$\rho_\theta(\varepsilon_{\theta it}) = \begin{cases} \theta\varepsilon_{it} & si \; \theta_{it} \geq 0 \\ (1-\theta)\varepsilon_{it} & si \; \theta_{it} \leq 0 \end{cases}$$

Finally equation (1) is solved using linear programming methods. According to Buchinsky (1998), as we increase θ continuously from 0 to 1, we trace the entire conditional distribution of yit, conditional on xit. Because of the advantages (as noted above) of the quantile regression estimation technique over linear, fixed-effects and random-effects models, in the study we examined the 1st to 9th quantiles as follows:

$$Q_\theta LGINI_{it} = \alpha_\theta + \beta_{\theta,1}LEFG_{it} + \beta_{\theta,2}FDV_{it} + \beta_{\theta,3}GEFD_{it}$$

$$+\beta_{\theta,4}LGDP_{it} + \beta_{\theta,5}FDA_{it} + \beta_{\theta,6}INFL_{it} + \varepsilon_{\theta,it} \quad (2)$$

with $\theta \epsilon \{1, \dots ., 9\}$

Where LGINI is the logarithm of the Gini, which measures income inequality, and LEFG is the logarithm of government effectiveness. The GENQREG model by Backer (2016) and Powell (2022) was used to estimate the quantile regression method.

3.3. Empirical Results

The results of the tests are presented here, followed by the estimation results of our generalised quantile regression model.

3.3.1. Test Results

The results of the cross-section dependence and individual homogeneity tests are presented in Tables **2** and **3**. These results show that the null hypothesis of independence is rejected at the 5% threshold, since the probability values are less than 5%. The series are therefore cross-sectionally dependent. Consequently, a shock occurring in one WAEMU country can be transmitted to the other countries in the zone. The results of the Pesaran and Yamagata (2008) test show that the null hypothesis of homogeneity of individual coefficients is accepted for all equations. These results therefore support the homogeneity of WAEMU countries.

Table 2. Cross-sectional dependence and homogeneous slope tests.

Pesaran *et al.* cross-sectional dependency test (2008).		
	Statistics	**P-value**
LM (Breusch et Pagan, 1980)	46.07	0.0171
LMADJ* (Pesaran *et al.* 2008)	4.407	0.0000
LMCD* (Pesaran, 2004)	-1.953	0.0508

Source: Authors, based on our estimates.

Table 3. Homogeneous slope tests.

Homogeneity test Pesaran and Yamagata (2008).		
Statistics P-value		
Delta tilde	13.238	0.000
Delta tilde Ajusté	15.663	0.000

Source: Authors, based on our estimates.

Once the study has revealed the presence of inter-individual dependence, it is necessary to determine the order of integration of the series. To do this, the second-generation unit root tests of Pesaran (2007), Pesaran (2003) and Bai and

Ng (2004) were used. The results are presented in Table **4**. From this table, we can see that the variables FDV, LGDP and INFL are stationary in level according to the three CIPS, PANIC and CADF tests. The LGINI and LEFG variables are not stationary in level according to the three tests, but stationary in first difference.

3.3.3. Estimation Results

The results of the generalised quantile regression analysis (GENQREG) on the panel data are summarised in Table **5** below.

Our results show that government effectiveness (GFE) and financial development (FDV) reduce income inequality in WAEMU countries for all quantiles. Indeed, government efficiency and financial development reduce income inequality for the different quantiles. For income ceilings of 10, 25, 50, 75 and 90 per cent, financial development (FDV) reduces income inequality whether government efficiency (EFG) is low or high. On the other hand, an interaction between financial development and government effectiveness (GEFD) increases income inequality for low income ceilings, for example 10 and 25 per cent, and then decreases it for high income ceilings of 50, 75 and 90 per cent. In other words, financial development reduces income inequality when the level of government efficiency is high. Our results show that countries with a developed financial system accompanied by a more efficient government are more likely to reduce income inequality. Indeed, a well-established state bureaucracy and a historically strong state tradition can improve access to financial services through financial inclusion, access to healthcare and education, thereby reducing the income gap between the poor and the rich. Our results are consistent with those of Huynh and Tran, (2023), Perugini and Tekin, (2022), Khan *et al*, (2020) and Sidek, (2021) who argue that better institutional quality provides an efficient ecosystem to promote better income redistribution through public spending. Indeed, subsidies for the poorest people to access health centres and quality training reduce the gaps between the richest and the poorest. Similarly, building local schools and health centres in towns and villages can reduce income inequalities. Also, a more competent bureaucracy and the provision of good quality public services can reduce income inequalities between individuals.

Table 4. Results of unit root tests.

| Methods	LGINI	LEFG	FDV	LGDP	INFL
CADF	-1.485 (0.069)	-0.948 (0.172)	-2.489*** (0.006)	-2.670*** (0.004)	-7.714*** (0,000)
CIPS	-2.269 (0.069)	-2.085 (0.172)	-2.614*** (0.006)	-2.676*** (0.004)	-4.406*** (0.000)
PANIC	-1.531 (0.126)	0.439 (0.660)	-2.216** (0.027)	2.1903** (0.028)	-2.543** (0.016)

Source: Authors, based on our estimates.
Note: *** and ** denote significance at the 1% and 5% thresholds respectively. CADF, CIPS and PANIC represent the test statistics of Pesaran (2003), Pesaran (2007) and Bai and Ng (2004) respectively.

Table 5. Estimation results.

Variables/ Parameters	Quantiles (GENQREG)					
	OLS	0.10	0.25	0.50	0.75	0.90
LEFG	-0.0025195	-0.0001422	-0.0007529**	-0.0012414**	-0.00145***	-0.0047512***
FDV	-0.061238**	-0.0463201***	-0.0316743***	-0.0433733***	-0.0719595***	-0.1194871***
GEFD	-0.0004874	0.0018174***	0.0005363***	-0.0009375***	-0.0009395***	-0.0007898***
LGDP	-0.0014928*	-0.0027044***	-0.0023974***	-0.0006481	-0.0007748***	0.000498
FDA	0.0045406**	-0.0003909***	0.0020933***	0.0033789***	0.0048023***	0.0058128***
INFL	0.000311**	-0.0002393***	-0.0000653	0.0001815***	0.0003932***	0.0004226***
Constant	0.0327538*	0.0542117***	0.0472283***	0.0155125	0.0214297***	-0.0002422

Source: Authors, based on our estimates

Note: *, ** and *** indicate significance at the 1%, 5% and 10% thresholds respectively.
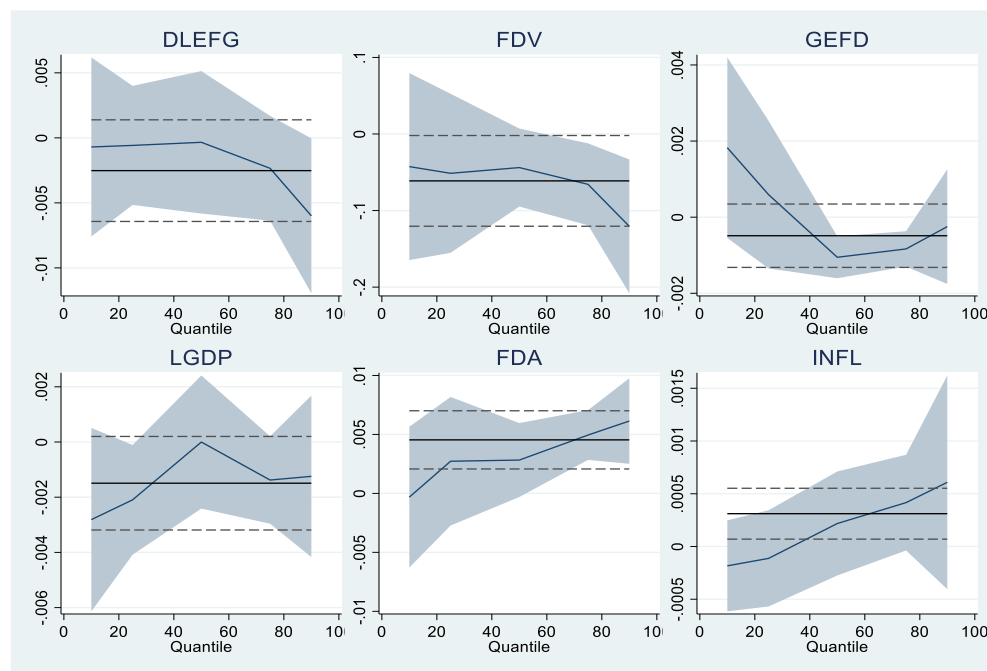
Fig. (2). Coefficients estimated from MCO and GENQREG regression.
Source: Authors, based on our estimates.

Our results also show that the financing of household activities (FDA) by the financial system reduces inequality at the low income level (10 per cent) and increases inequality at the high income level (*e.g.* 25, 50, 75 and 90 per cent). This result shows that poor households with access to credit often have fewer opportunities to invest in productive projects that could improve their economic situation in the long term (such as purchasing assets or financing small businesses). Similarly, households may spend the finance on leisure consumption, so the finance obtained does not generate substantial returns, thus reinforcing income inequalities. GDP per capita, on the other hand, reduces income inequality for all quantiles.

Sustained economic growth generally creates jobs and raises household incomes, especially in sectors where demand for labour is strong, increasing household income and therefore reducing income inequality. Our results also show that the level of inflation influences income inequality at different levels. When income differentials are low, i.e. 10 and 25 per cent, and the level of inflation is low, this reduces income inequalities, whereas higher inflation increases income inequalities. The increase in household purchasing power in an inflationary situation leads to an increase in household consumption expenditure, which reduces investment and increases the income gap between rich and poor.

More specifically, the results of the coefficients of estimates for the various quantiles mentioned in Table **5** above are shown graphically in Fig. (**2**) above:

Fig. (**2**) above illustrates the heterogeneous trade-off between financial development, government efficiency and income inequality across WAEMU countries.

The horizontal lines between the two dotted lines represent the OLS estimates and are constant as expected, while the confidence intervals are the areas bordered by the two dotted lines.

Fig. (**2**) shows that the coefficients on financial development (FDV) and government effectiveness (DLEFG) have a decreasing slope and are lower than the ordinary least squares (OLS) estimate for income gaps greater than or equal to 80 per cent. And higher than the OLS coefficient for quantiles below 80 per cent. The efficiency term coupled with financial development (GEFD) shows a different picture. Its slope is negative, indicating a fall in income inequality. Its coefficient is higher than that of the OLS for the lower quantiles, for example from 10 to 50 per cent. However, it is lower than the OLS coefficient for higher quantiles (60 to 90 per cent) of income levels. As for the other variables, Figure 2 shows a positive slope in the relationship between GDP per capita (LGDP), activity financing (FDA), inflation (INFL) and income inequality. In fact, the LGDP, FDA and INFL coefficients are lower than the OLS coefficients for lower quintiles, for example 30, 75 and 60 per cent of the income gap respectively. On the other hand, the OLS coefficient is lower than the LGDP, FDA and INFL coefficients for quantiles greater than 30, 75 and 60 per cent of the income gap respectively.

CONCLUSION

Over the last few decades, the WAEMU countries have experienced fairly remarkable average economic growth, but it has not been inclusive. In some countries in the zone, the concentration of wealth has led to the emergence of a small but growing group of incredibly wealthy people, while the majority struggle to meet their most basic needs. This study analyses the role of government efficiency in the relationship between financial development and income inequality in WAEMU countries over the period 1996-2023. The use of the generalised quantiles method (GENQREG) on a panel of 08 countries shows that government efficiency is a crucial factor in the relationship between financial development and income inequality. An effective government maximises the benefits of financial development for the population as a whole, while minimising the risks of increased inequality. This requires adequate regulation of financial markets, equitable redistribution of resources, the fight against corruption, support for financial inclusion, and protection for vulnerable households against economic crises. In the absence of effective government, financial development risks amplifying income inequalities, concentrating gains in the hands of the richest and exposing the poorest to financial risks. The evidence also points out that in addition to the government's various development programmes, efforts should also focus on improving institutional quality, economic development and maintaining low inflation as part of its attempt to tackle income inequality.

AUTHORS' CONTRIBUTIONS

All authors have read and approved the final version.

DECLARATION OF CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY DECLARATION

Data from this study are available on request.

ANNEXES

Table 1. Descriptive statistics.

	GINI	EFG	FDV	GEFD	GDP	FDA	INFL
Average	42.58496	24.23998	0.1022882	2.543854	1.25e+10	1.600291	2.94035
Maximum	53.9	58.42507	0.2010994	11.34292	7.20e+10	5.67191	50.73405
Minimum	34.9	1.904762	0.0220312	0.0710882	5.97e+08	0.2875534	-3.502586
Standard deviation.	4.14962	13.78539	0.0310583	1.676974	1.26e+10	0.8179792	5.391139
Skewness	1.014887	0.3788495	0.1242056	1.077685	2.308391	1.274451	6.075352
Kurtosis	3.864275	2.356427	4.189147	6.120904	9.080197	6.591082	52.44469
Observations	224	224	224	224	224	224	224

Source: Authors, based on our estimates.

In addition, the Doornik and Hansen (2008) normality test is applied to all variables. As shown in Table 2, not all of the variables used are normally distributed. Consequently, it is appropriate to use the generalised quantile panel regression method. In this way, generalised quantile panel regression reduces the effect of deviations that may arise due to variation in the data in the periods considered as a result of skewness and kurtosis. In other words, this method will produce more efficient empirical analyses of the results compared to the standard panel data analysis method, as it will reduce the effect of discrepancies (Nzama *et al*, 2022).

Table 2. Results of the normality test Doorni-k¬Hansen, (2008)

Variables	Joint test (Chi2)
LGINI	25.625*** (0.0000)
LEFG	54.248*** (0.0000)
FDV	13.237*** (0.0013)
GEFD	32.364*** (0.0000)
LGDP	13.191*** (0.0014)
FDA	43.282*** (0.0000)
INFL	2092.777*** (0.0000)

Source: Authors based on our estimates.

Note: (***) represents significance at the 1% confidence level.

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