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Does institutional quality matter in financial development and income inequality nexus? new evidence from Sub-Saharan Africa

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Abstract

The objective of this paper is to evaluate the effect of institutional quality on the financial development- income inequality nexus in Sub-Saharan Africa (SSA). To this end, we estimate a dynamic panel model using data from thirty-three (33) SSA countries between 1990 and 2018 through the generalized method of moments in system. To capture financial development, we use its fourth dimensions namely depth, efficiency, access and stability, and we construct a composite index using principal component analysis. We also use set of institutional quality indicators. The results show that the poor quality of institutions in SSA countries worsens the effect of financial development on income inequality overall. However, this effect is mitigated for financial efficiency. These results are consistent with the robustness tests. These results call for the implementation of programs to strengthen institutional quality in SSA countries.

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1 Introduction

The issue of income inequality has been the focus of scientifics and policy makers since the 1990s, giving rise to a vast literature on the levers that policymakers should use to reduce income disparities between rich and poor. One part of this literature focused on the role of financial development (Hassan and Meyer, 2021; Suhaimee et *al.* 2021). Theoretically, two controversial theories have been put forward to analyse the effect of financial development on income inequality, namely the widening inequality hypothesis and the narrowing inequality hypothesis. According to the narrowing inequality hypothesis (Galor and Zeira, 1993; Banerjee and Newman, 1993), financial development, through financial frictions reduction mechanisms, can reduce income inequality. Conversely, the widening inequality hypothesis (Law et *al.* 2014) postulates that the guarantees required by the financial system to cover credit demands tend to increase inequality. Empirically, results about the impact of financial development on income inequality are mixed. On one hand, many studies including Demir et *al. (*2020) and D'Onofrio et *al.* (2019) have been documented a negative effect of financial development on income inequality. On the other hand, Shi et *al.* (2022) and Chiu and Lee (2019) show that greater financial development worsens income inequality. Meanwhile, a non-linear relation has also been found between financial development and income inequality (Altunbaş and Thornton, 2019; Baiardi and Morana, 2018). While these studies highlight the lack of consensus around the issue of financial development and income inequality, the reasons for this controversy, and pathways by which financial development affects income inequality remains underexplored.

Therefore, the objective of this paper is to fill this gap by assessing the role of institutional quality on the financial development-income inequality nexus. Indeed, consistent with Chinoda and Mashamba (2021), the relation between finance and income inequality might differ across countries and is contingent upon factors such as the regulatory environment and institutional quality. This study focuses on formal institutions, defined as a set of written, explicit political, legal and economic contracts and rules whose execution should be ensured by a public entity (North, 1990). We argue that institutional quality[1] can modify the financial development and income inequality nexus. Three theoretical arguments can explain how institutional quality may change the extent to which financial development affects income inequality. First, according to the law and finance theory (La Porta et *al.* 1999), political and industrial elites, who control political institutions, may use their influence and networks to gain preferential access to finance, while reducing the availability of finance to other potential competitors. Second, democracy tend to limit the influence of narrow elite groups and redistribute political power to a larger number of people who support a well-functioning financial sector (Girma and Shortland, 2008). Third, according to Chong and Grastein (2007), good institutions help to reduce income inequality through better judicial protection and limit the illicit distribution of natural resource revenues (Arezki and Gylfason, 2011; Acemoglu et *al.*, 2005). As a result, an inadequate institutional quality can alter the effectiveness of financial development in reducing income inequality.

Following these arguments, potentials transmission channels of the impact of institutional quality on the financial development and income inequality nexus include the tax systems, social spending and human capital. Specifically, poor tax administration and exemptions that disproportionately favour well-connected and wealthy population groups can reduce the tax base (Rose-Ackerman, 1999) and increase income inequality. Moreover, a failing bureaucratic

[1] It is said to be of good quality when they promote economic development, i.e. encourage trade through reduced transaction costs and improved trust; thereby encouraging the state to respect private property (Shirley, 2013).

system tends to increase the cost of running of the government (Bourguignon and Verdier, 2000). This reduces the resources available for other uses especially social expenditures for human capital that is useful to reduce income inequality (Mauro, 1998). Since education is a lever for redistribution, the result is greater income inequality.

In Sub-Saharan Africa (SSA), stylized facts reveal that the Gini index is of about 50, which is high compared to other regions[2]. Also, looking at country-level income inequality, the 2020 World Income Inequality Development regional update shows that the share of income accruing to households belonging to the richest decile is estimated at 50% on average in 2019 with values ranging from 64% (Central African Republic) and 65% (South Africa)[3]. Furthermore, SSA is characterized by poor quality of institutions and conflict-prone regions. Indeed, according to the State Fragility Index (2019), only one country in SSA can be considered stable. Moreover, the combined policy and institutional assessment yield a score of 3.23 in 2021 (on a scale of 1 (low) to 6 (high); World Development Indicators, 2023); which is not very high. This could largely explain why SSA countries do not benefit from the redistributive impact of financial development.

The contribution of this study to the economic literature is at two levels. First, it highlights the heterogeneous nature of the effects of financial development on income inequality in specific case of SSA, which is mainly explained by the institutional quality. Only Adams and Klobodu (2016) and Law et *al.* (2014) have highlighted this relationship. However, while the first worked on a random set of countries, the latter limited their study on the effect of corruption exclusively. Thus, we improve the analysis by focusing on a set of indicators of the quality of political and economic institutions. It has been demonstrated that each of these variables is likely to differently affect economic development and therefore income inequality (Chong et Calderon, 2000). Also, each of the above-mentioned indicators can influence financial development (Pagano et Volpin, 2005). Therefore, considering each indicator has the advantage to see which variable is more relevant for the institutional environment of SSA economies and consequently to formulate appropriate economic policies.

Second, this study highlights the importance of financial development as an instrument for reducing income inequality using a multidimensional approach. Firstly, financial development is measured by its four dimensions namely financial depth, financial access, financial stability and financial efficiency. This approach allows specific policy recommendation to reduce income inequality. Secondly, we compute a composite index of financial development. Recall that a similar exercise has been done by Svirydzenka (2016). However, the author includes only three dimensions on its composite index. Our study goes beyond by taking into account financial stability in the construction of the index.

The rest of the study is organized as follows. Section 2 presents the methodology; section 3 discusses the results and section 4 concludes.

[2]Central Europe and Southeast Asia have Gini levels of 37 and 48 respectively according to the 2020 WID regional update. As a point of comparison, the top10 share in the US is estimated at 46.8% and that of France at 32.4%.
[3] This score ranges from 0 (no inequality) to 100 (total inequality).

2. Methodology of the study

2.1. Model and data

Based on Demir et *al.* (2020), this article evaluates the effect of institutions on the financial development-income inequality nexus using the following specification:

$$I_{it} = \alpha_0 + \alpha_i I_{it-1} + \beta_i FD_{it} + \gamma_i Inst_{it} + \delta_i (Inst * FD)_{it} + \theta_i X_{it} + \mu_i + \rho_t + \varepsilon_t \quad (1)$$

Where $i = 1,\ldots,33$ is the number of countries, $t = 1,\ldots,T$ is the period of the study. I_{it} is income inequality of country *i* at year *t*. FD_{it} is the financial development of country *i* in period *t*. $Inst_{it}$ is the institutional quality. $(FD * Inst)_{it}$ represents the combined effect of institutions and financial development on income inequality. X_{it} is the vector of control variables. ρ_t is the time effect; μ_i is the country fixed effect that controls for time-invariant and country-specific unobservable characteristics; and ε_{it} is the error term. In this study, we cover thirty-three (33) SSA countries. We also consider annual sample data over the period between 1990 and 2018. The choice of these years is justified on the one hand by the beginning of the effectiveness of financial liberalization in several African countries. On the other hand, the 1990s marked the period from which most African countries experienced positive economic growth and political conflict (Porteous, 2003). Moreover, we are constrained by the availability of data on the Gini index.

2.1.1. Measure of income inequality

Income inequality is measured by the Gini index before tax from the Standardized World Income Inequality Development database (SWIID). It measures the income distribution dispersion for a given population (Bergh and Nilsson, 2010). This index varies between 0 and 1 (or 0 and 100). A value of 0 characterizes a perfect income distribution in which the entire population has the same level of income; it thus represents an absence of income inequality. A value close to 1 indicates a totally unequal income distribution. Its maximum value reflects the high concentration of income towards a single category of group of individuals. The choice of this measure is justified by the fact that according to Jauch and Watzka (2016), the relationship between financial development and income inequality is modelled without an explicit role for redistribution. Therefore, redistributive policies may confound this relationship and the use of the pre-tax index would be more appropriate.

2.1.2. Measuring financial development

This paper constructs a composite index based on four dimensions of financial development from Global Financial Development Database, namely financial depth, financial stability, financial access and financial efficiency. We use domestic credit to the private sector to capture financial depth *(fd)*. Regarding financial stability *(fs),* the paper takes into account the resilience of banks to economic shocks by using the Z-score[4], consistent with the European Central Bank (2015) and the International Monetary Fund (IMF, 2019). It measures how far a bank is from insolvency and the probability of bank failures (Chiaramonte et *al.* 2016). Geographic inclusion variables including number of banks per 1,000 inhabitants and the number of bank branches per 10,000 inhabitants are used to measure financial access *(fa)*. Also, financial efficiency *(fe)* is captured through the efficiency index (IMF, 2017).

[4] It can be apprehended by the D CoVaR method of Adrian and Brunnermeier (2016). Although the latter measures each financial institution's contribution to systemic risk, the disadvantage is that it can only be used for institutions in the same space. Moreover, it does not take into account public financial institutions and foreign subsidiaries, which are very important in developing countries.

To construct the composite index of financial development, we run a principal component analysis (PCA) using the fourth dimensions of financial development mentioned above. The PCA breaks down the phenomenon into several components. Each component provides information on the various dimensions of the new variable and assigns a weight (α) to each dimension according to the most relevant information. The component that is chosen is the one that loses the least information on the phenomenon and whose coefficient is greater than 1 (appendix 3). Therefore, the composite index is obtained as follow:

$$FD_{it} = \alpha_1 fd_{it} + \alpha_2 fs_{it} + \alpha_3 fa_{it} + \alpha_4 fe_{it} \quad (2)$$

These data are mainly based on the banking sector. This choice is partly supported by the fact that according to the IMF (2019), banking systems offers a better sharing of risk over time than markets. Also, financial markets are poorly developed in developing countries. So, the impact of financing on income inequality can be better appreciated through the banking sector (Zhang and Naceur, 2019).

2.1.3. Measuring institutional quality

Institutional quality is measured using six governance indicators taken from the International Country Risk Guide (ICRG) database which captures various dimensions of the political and business climate in the States. According to the De Haan et Sturm (2017), political stability *(PS),* voice and accountability *(VA)* and regulatory quality *(RQ*) reflect political institutions. Corruption *(C),* rule of law *(RL)* and government effectiveness *(GE)* represent economic institutions. The study considers these variables because they capture the importance of the quality of institutions in countries economic processes and the role of access to finance in this regard[5] (Acemoglu and Robinson, 2013). These variables range from 0 to 6 and reflect the quality of political institutions and the quality of economic institutions. A value of 6 reflects excellent quality of institutions, while a value of 0 represents poor-quality of institutions. Following Álvarez et *al.* (2018), an overall index of institutional quality is computed by average of the 6 indicators as follows:

$$IQ_{it} = \frac{1}{n}\sum_{n=1}^{6}(Corr_{it}; VA_{it}; PS_{it}; RQ_{it}; GE_{it}; RL_{it}) \quad (3)$$

2.1.4. Control variables

Control variables include economic growth *(g)* captured by the growth rate of GDP per capita. According to Rubin and Segal (2015), this measure provides a better apprehension of the effects of economic growth on income inequality. Government spending *(exp),* measured by the proportion of government spending as a percentage of GDP, can also determine income inequality. Governments can borrow from financial institutions to implement projects that could help to create jobs (Fournier and Johansson, 2016). Openness (*Trade*), measured by the sum of exports and imports relative to GDP, can also be a determining variable because it allows the export of goods that are highly labour-intensive and has an impact on income distribution (Lim and McNelis, 2016). Income inequality can also depend on inflation *(inf).* Indeed, according to Bahmani-Oskooee and Zhang (2014), the rich can better protect themselves against inflation through better access to financial markets. Education *(edu)* is measured by the gross secondary school enrolment rate in percent. It is crucial insofar as it can stop the inter and

[5]The relevance of these variables is also raised by the work of Gani (2011) and Yerrabit and Hawkes (2015).

intra-generational transmission of income inequalities (Denk and Cournède, 2015). The proportion of the population living in urban areas *(urb)* can also affect a country's income inequality, particularly if environmental and housing disparities are not considered in urbanization policies (Sulemana et *al.* 2019). Finally, the unemployment rate[6] *(unemp)* is also relevant because young people who are employed are more able to invest in improving their living environment (Ongo and Song, 2019).

2.2. Estimation technique

Several techniques can be used to assess the effect of the quality of institution on the financial development and income inequality nexus including the generalized method of moments (GMMs) or matching methods. These methods are suitable to resolve a potential problem of endogenous and selection bias. However, matching models, especially inverse probability weights and propensity score matching present three limits. First, the literature shows that they exclude unobservable characteristics from the estimation, although the latter may influence the result (Austin, 2008). Second, these techniques may be useful when the variable of interest has 2 values[7] (0 or 1, Wooldridge, 2007). However, in this study, the institutional and financial development variables evolve in a closed interval and can take on several values. Third, these estimation techniques are mainly used for impact analyses.

Given the limits of matching models, this study uses the GMMs in system of Blundell and Bond (1998) to correct endogenous problems in the model. As the study deals with the effect of financial development on income inequality, reverse causality may be possible (Lo Prete, 2018). Moreover, some control variables clearly determine both the dependent variable and financial development. For example, education, unemployment, and trade determine both economic growth and income inequality (Sethi et *al*. 2021)[8]. The specification may also suffer from an omission of relevant variables. To this end, Baum et *al.* (2003) and Windmeijer (2005) recommend using the GMM estimator with additional conditions for its robustness systematized by Roodman (2009). GMMs in systems also solve the potential bias related to the possible correlation between "country fixed effects" and the error term. This avoids the problem of correlation between this term and the explanatory variables. Furthermore, this method makes it possible to instrumentalize several explanatory variables contrary to other methods and generates internal instruments from the endogenous explanatory variables of the model (Roodman, 2009). Thus, GMMs estimator outperforms the other estimators[9] (Ongo and Song, 2019).

3 Results

3.1 Main results

Table 1 presents the effect of institutional quality on financial development-income inequality nexus in SSA. Columns 1 to 5 present the results with the composite index of financial development, financial access, financial depth, financial stability, and financial efficiency respectively. The results call to two main conclusions. First, according to Table 1, the sign of

[6] It is measured by the number of unemployed persons aged 15 to 34 years old as a proportion of the total number of this population bracket.

[7] Introducing individuals with a value of 0 could bias the result; this is corrected by matching models (Wooldridge, 2007).

[8] In the early stages of economic development, where physical capital is the main driver of growth, inequality has a positive impact on development. In contrast, at later stages of economic development, when human capital becomes the main driver of economic growth, equality promotes investment in human capital and hence economic growth.

[9] They exploit only the moment conditions of the first-difference equation with level-delayed variables as instruments (Ongo and Song, 2019).

financial development is on average always negative and significant. Indeed, the coefficient associated to the financial development index variable is -1.454. This indicates that when the level of financial development is high, the level of inequality tends to reduce, confirming the existence of negative and linear relationship (Galor and Zeira, 1993; Banerjee and Newman, 1993). The broadening of financial base helps disadvantaged socio-economic groups to borrow and invest in income-generating activities in the mid and long term.

Table1: Effect of institutional quality on financial development-income inequality nexus in SSA

	Income inequality				
	(1)	(2)	(3)	(4)	(5)
	Financial development (FD)	FD=Financial access	FD=Financial depth	FD=Finacial stability	FD=Financial efficiency
L. Gini	0.382***	0.357***	0.301***	-0.159	0.105**
	(0.075)	(0.095)	(0.063)	(0.114)	(0.050)
Institutional quality	-1.541	-18.37	-1.905***	-6.901***	-9.196***
	(3.694)	(8.259)	(0.4460)	(1.745)	(1.608)
Financial Development	-1.454***	-3.707***	-2.266***	-8.672***	3.843***
	(0.442)	(1.058)	(0.326)	(1.997)	(0.724)
Financial Development*Institutional quality	0.889***	2.600***	1.521***	6.337***	-3.153***
	(0.307)	(0.750)	(0.214)	(1.505)	(0.601)
Economic growth	-0.130*	-0.127	-0.070	-0.397***	-0.073
	(0.0756)	(0.150)	(0.047)	(0.068)	(0.058)
Public expenditures	0.229**	0.253**	0.222***	0.096	0.124*
	(0.106)	(0.127)	(0.059)	(0.125)	(0.066)
Inflation	-0.044	-0.038	0.017	0.017	0.118**
	(0.046)	(0.034)	(0.021)	(0.032)	(0.059)
Trade openness	-0.060***	-0.077***	-0.025***	0.0007	-0.0074
	(0.019)	(0.027)	(0.008)	(0.029)	(0.011)
Urbanization	0.132***	0.141***	-0.017	0.098**	0.102***
	(0.032)	(0.037)	(0.045)	(0.042)	(0.030)
Unemployment	0.041	0.082	-0.008	0.267***	0.027
	(0.098)	(0.106)	(0.070)	(0.072)	(0.077)
Education	0.389	-0.102	0.480**	-0.315	-0.198
	(0.304)	(0.475)	(0.214)	(0.396)	(0.436)
Instruments	26	26	26	25	26
Number of countries	33	33	35	36	33
Wald	0	0	0	0	0
AR1	0.00042	0.0005	0.0007	0.0408	0.0017
AR2	0.757	0.626	0.615	0.251	0.725
Hansen	0.453	0.344	0.139	0.131	0.560

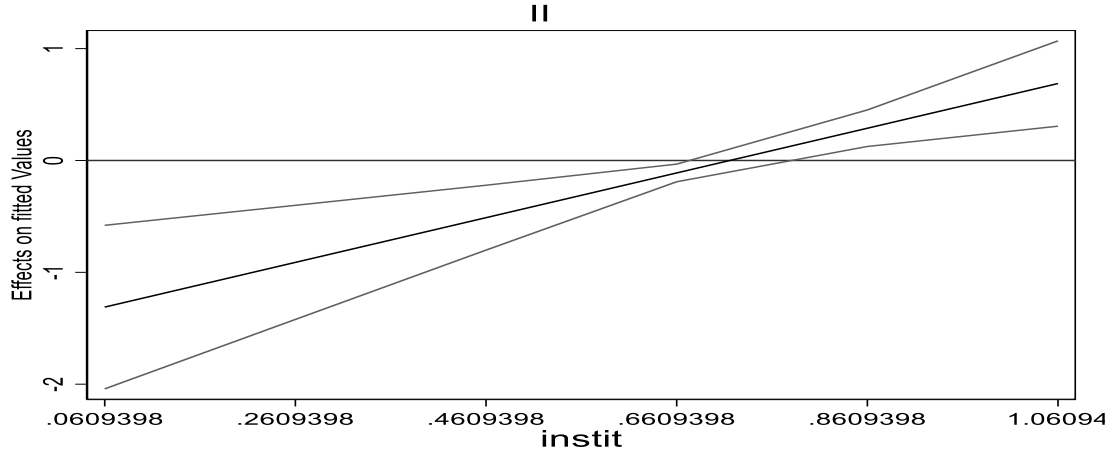
*Source: Author's estimates from Stata 15. Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

Second, the results show positive signs associated with the interaction of financial development and institutional quality. In fact, the coefficient of the interaction between financial development and institutional quality is 0.889. This reflect the fact that the impact of financial development on inequality is reversed given the low quality of institutions. This result supports that the poor quality of institutional quality in SSA countries (according to the stylized facts) attenuates the redistributive effect of financial development on inequality. Consequently, although financial development initially reduces inequality, the magnitude of this effect diminishes with the weak governance. Moreover, from Table A.2, the region's institutional

variables are very low levels[10]. Therefore, the weakness of formal institutions in the region reduces the magnitude of the effectiveness of financial development on income inequality. Consistent with Chinoda and Mashamba (2021), when institutions are weak, the benefits of financial deepening may excessively accrue to the rich who have collateral and/or higher incomes. Our results are therefore consistent with the predictions of Chong and Calderon (2000) that in countries with low institutional quality, policies to mitigate inequality fail and inequality grows. Indeed, they put forward the prediction that poor countries with high levels of income inequality will remain trapped in inequality unless a sound and credible institutional climate is established.

In addition, Figure 1 shows the evolution of the effect of financial development as a function of institutions. Below the horizontal axis, financial development has a negative effect on income inequality. Above it, the effect is positive. It shows that the institutions in SSA negatively affects the way financial development affects income inequality. Let's recall that SSA countries have poor institutional quality, with a score between 0 and 1 (see Table A.2). Within this range, financial development reduces the level of income inequality, but this redistributive effect becomes less significant. From the marginal effects, it appears that the poor institutional quality of SSA countries reduces the effectiveness of financial development in reducing income inequality, as demonstrated by Asongu et *al.* (2020). This is more consistent with the findings of Law et *al.* (2014) who argued that institutional quality improves the effect of financial development on income inequality only when it has reached a threshold greater than 1.255. However, as this quality does not exceed 1 in our sample, we can understand why an additional unit of governance is not sufficient to improve the effectiveness of financial system development in terms of reducing inequality. This result can be explained by the fact that poor institutional quality in an economy introduces (accentuates) a component of uncertainty in economic transactions. Moreover, it decreases the government's ability for efficient and effective policies (Alvarez et *al.* 2018). This uncertainty increases transaction costs and can thus alter both redistributive policies and the effect of financial development on addressing income inequality.

Figure 1: Marginal effects of the financial development effect on income inequality in SSA



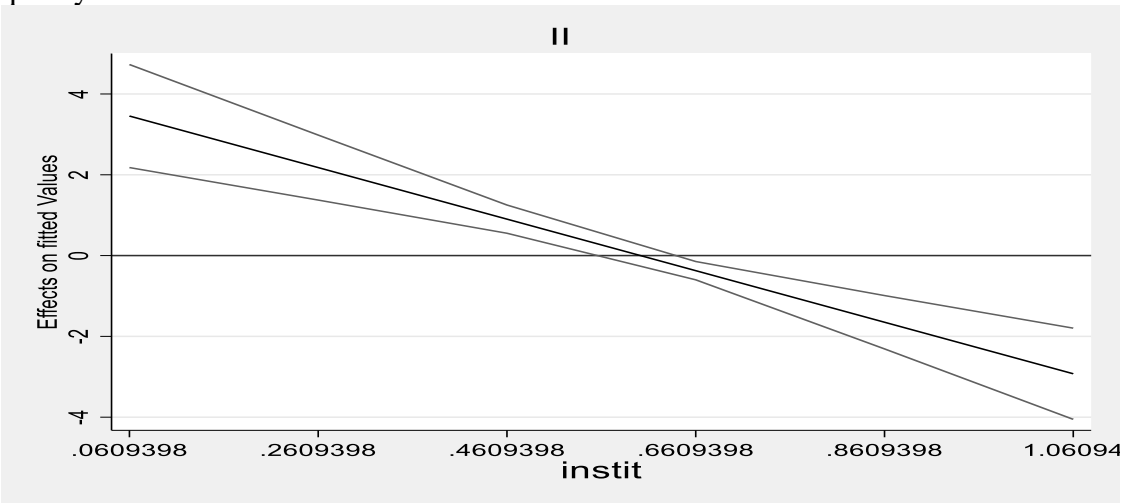
Source: Author's construction

3.2 Results by financial development dimensions used

[10] On a scale of 0 to 6, the countries in the sample have average levels below 1, indicating very low institutional quality.

Table 1 also shows that the coefficients associated with 3 financial dimensions are negative while those associated with their interactions are significant and positive. This result suggests that institutional quality in SSA reduces the effect of financial access, depth and stability on income inequality by 2.6, 1.52 and 6.33 percentage points respectively. Thus, financial deepening, financial stability and financial accessibility follow the same trend as financial development. In so doing, the analysis of their marginal effects remains the same as in Figure 1. However, the regression with the financial efficiency index is different. Financial efficiency increases income inequality by 3.843. However, the "financial efficiency*institutional quality" variable is significant and negative. The current institutional environment enhances the effect of financial efficiency. These results are consistent with Chisadza and Biyase (2023) who find that when we disaggregate the financial development index into its sub-components, there are different effects on inequality in developing countries. Figure 2 presents the marginal effects of the financial efficiency effect on income inequality in SSA. It highlights an appreciation of the effect of financial efficiency induced by the quality of institutions. This result reflects the promotion of governance in the fight against the unequal distribution of income in the countries.

Figure 2: Marginal effects of the financial efficiency on income inequality given institutional quality in SSA



Source: Author's construction.

3.3 The results by institutional variables

Table 2 presents the effect of institutional quality in the financial development-income inequality relationship as a function of the type of institutional variable. Control of corruption and government effectiveness are associated with positive coefficients of 1.065 and 2.933 points. On the other hand, the voice and responsibilities variable decreases income inequality by 6.198 points. The coefficients of the interactions "financial development* regulatory quality" and "financial development*rule of law" are positive at 0.498 and 2.945 respectively.

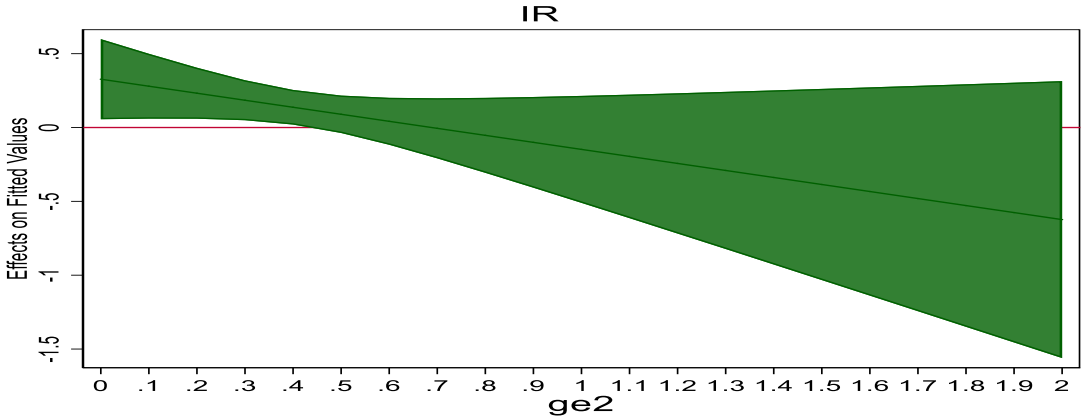
Table 2: Effect of each institutional variable on financial development-income inequality nexus in SSA

	Income inequality					
	(1)	(2)	(3)	(4)	(5)	(6)
	IQ=corruption	IQ=regulatory quality	IQ= government effectiveness	IQ =Political stability	IQ =Voice and accountability	IQ= rule of law
L. Gini	0.347***	0.475***	0.235***	0.358***	0.299***	0.291***
	(0.071)	(0.075)	(0.060)	(0.064)	(0.101)	(0.103)
Financial development	0.063	-0.351	0.327**	-0.252	-0.280	-1.358***
	(0.053)	(0.227)	(0.138)	(0.558)	(0.252)	(0.335)
Institutional quality (IQ)	1.065***	-4.425	2.933***	7.695	-6.198*	7.625
	(03290)	(5.270)	(.9848)	(9.441)	(3.585)	(7.674)
Financial development *institutional quality	-0.167	0.498*	-0.475	0.375	0.445	2.945***
	(0.139)	(0.302)	(0.300)	(0.718)	(0.375)	(0.710)
Economic growtth	0.049	0.067	-0.138	-0.088	-0.487**	-0.068
	(0.105)	(0.140)	(0.126)	(0.110)	(0.208)	(0.151)
Public expenditures	0.213**	0.235***	0.0085	0.164*	0.396***	-0.044
	(0.106)	(0.083)	(0.075)	(0.084)	(0.099)	(0.093)
Inflation	-0.139**	0.022	-0.021	-0.109**	-0.080***	-0.119***
	(0.065)	(0.035)	(0.071)	(0.048)	(0.017)	(0.045)
Trade openness	-0.060	-0.086***	0.010	-0.045	-0.033	-0.025
	(0.040)	(0.028)	(0.034)	(0.034)	(0.035)	(0.018)
Urbanization	0.092***	0.104***	0.107**	0.060*	0.031	0.041
	(0.035)	(0.035)	(0.054)	(0.035)	(0.059)	(0.032)
unemployment	0.345***	0.160**	0.215***	0.247***	0.225***	0.468***
	(0.065)	(0.079)	(0.072)	(0.058)	(0.086)	(0.084)
Education	-0.032	0.134	-0.545	0.129	0.074	-0.367
	(0.280)	(0.209)	(0.439)	(0.280)	(0.423)	(0.306)
Instruments	24	25	24	24	23	24
Number of countries	33	33	33	33	33	33
Wald	0	0	0	0	0	0
Ar1	2.96e-05	0.000147	0.000190	0.000254	0.000317	0.00281
Ar2	0.454	0.165	0.857	0.335	0.113	0.408
Hansen	0.334	0.286	0.541	0.118	0.243	0.201

*Source: Author's estimates from Stata 15. Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

Beyond these results, the analysis of marginal effects firstly shows that control of corruption, political stability, quality of regulation, and voice and accountability do not affect the effect of financial development on income inequality. Secondly, the SSA entitlement rule strongly and significantly reduces the effect on income inequality over the studied period. Thirdly, government effectiveness positively influences the effect of financial development on income inequality in SSA. Indeed, Figure 3 shows that financial development increases income inequality in SSA, but this increase evolves at a decreasing rate as the quality of public services and the credibility of governments improve. This result suggests that the quality of public policy making and implementation plays an important role in the effectiveness of financial development in reducing income inequality in SSA.

Figure 3: Marginal effects of the financial development effect by government effectiveness



Source: Author's construction

3.4 Results by a concurrent measure of income inequality

To test the robustness of the results, we use Gini index after tax because there is a debate between pre-tax and post-tax Gini use. Since income inequality depends on how taxes and transfers are redistributed between the incomes of the rich and the poor (Bergh, 2005), redistributive policies can therefore act significantly and correct the first income distribution (Jauch and Watzka, 2016). To account for this first correction, Gini after tax tend to be interesting.

Overall, the results show that the poor institutional quality worsens the effect of financial development on income inequality in SSA. This effect is the same for the dimensions of financial access, depth and stability. With respect to financial efficiency, the tests show that institutional quality increases its effect on income inequality. While these estimates confirm our main results for all measures of financial development, the results are rather mitigated for the institutional variables. Table 3 presents the results of these estimates. Columns (1) to (7) present the estimates with corruption, government effectiveness, regulatory quality, political stability, voice and accountability and rule of law respectively. Results indicate that only the coefficients of the interaction of financial development and regulatory quality, political stability, voice and accountability and rule of law respectively are significant and positive. Moreover, the analysis of marginal effects shows that the institutional variables that affect the effect of financial development on income inequality in SSA are political stability and the voice and accountability variable.

Table 3: Results with Gini index after redistribution

	Income inequality						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Institutional quality	IQ= corruption	IQ=government effectiveness	IQ=regulatory quality	IQ=political stability	IQ=voice and accountability	IQ=rule of law
L. Gini	0.489***	0.604***	0.527***	0.606***	0.503***	0.458***	0.576***
	(0.132)	(0.123)	(0.139)	(0.117)	(0.149)	(0.159)	(0.192)
Financial development	-2.052***	0.017	-0.041	-0.863*	-3.636***	-1.038**	-2.333*
	(0.677)	(0.127)	(0.115)	(0.466)	(1.363)	(0.472)	(1.280)
Institutional quality (IQ)	-2.082	13.27*	10.47*	-15.68	-20.11	-0.670	-23.00
	(6.875)	(7.886)	(5.573)	(14.49)	(17.84)	(14.66)	(17.66)
Financial development *institutional quality	1.422***	-0.022	0.247	1.146*	4.773***	1.445*	5.008*
	(0.482)	(0.234)	(0.308)	(0.622)	(1.759)	(0.792)	(2.580)
Economic growth	0.0447	0.204	0.076	0.110	-0.050	0.045	-0.303
	(0.322)	(0.246)	(0.274)	(0.249)	(0.255)	(0.285)	(0.418)
Public expenditures	0.159	0.212	0.179*	0.288*	0.002	0.482*	0.018
	(0.143)	(0.162)	(0.109)	(0.163)	(0.110)	(0.251)	(0.255)
Inflation	-0.041	0.114	0.0006	0.032	0.033	0.011	-0.062
	(0.120)	(0.135)	(0.030)	(0.091)	(0.040)	(0.102)	(0.155)
Trade openness	-0.031*	-0.128**	-0.069	-0.111**	-0.018	-0.167**	-0.056
	(0.017)	(0.061)	(0.058)	(0.053)	(0.016)	(0.074)	(0.074)
Urbanization	0.039	0.069	0.076	0.085*	0.066	0.167*	0.0009
	(0.054)	(0.055)	(0.072)	(0.049)	(0.074)	(0.096)	(0.120)
Unemployment	-0.012	0.243**	0.203*	0.172	0.138	-0.064	0.413**
	(0.174)	(0.114)	(0.107)	(0.139)	(0.133)	(0.217)	(0.185)
Education	-0.399	-0.219	-0.710*	-0.032	-0.148	-0.383	-0.634
	(0.464)	(0.209)	(0.380)	(0.438)	(0.537)	(0.639)	(0.917)
Instruments	26	24	25	24	25	25	24
Number of countries	33	33	33	33	33	33	33
Wald	0	0	0	0	0	0	0
Ar1	0.00339	0.000961	0.000693	0.00283	0.000778	0.0143	0.00337
Ar2	0.212	0.205	0.211	0.149	0.736	0.524	0.118
Hansen	0.64	0.360	0.453	0.546	0.175	0.637	0.498

*Source: Author's estimates from Stata 15. Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

4 Conclusion

The objective of this paper was to assess the effect of institutional quality in the relationship between financial development and income inequality in 33 SSA countries over the period 1990 to 2018. For this purpose, our empirical strategy is based on the generalized method of moments in system. The results of this study show that in SSA, the relationship between financial development and income inequality is affected by the level of institutional quality. Indeed, quality of institutions in SSA countries worsens the effect of financial development on income inequality over the studied period. More specifically, the institutional quality of SSA decrease the effect of financial access, depth, and stability. However, they improve the effect of financial efficiency in addressing income inequality in the region. Also, only the variables government effectiveness, voice and accountability, political stability, and regulatory quality seem relevant for SSA.

In light of these findings our results suggest two recommendations. First, the financial system must, in the quest to reduce income inequality, be part of a solid institutional framework combined with an amelioration of its performance in terms of financial service provision. More precisely, this recommendation calls on the authorities of SSA countries to improve the rule of law to better circumscribe contracts and allow for effective implementation of redistributive policies. Second the results suggest that governments should improve their capacity to formulate and implement policies and regulations on the one hand, and their capacity to implement their stated programs on the other hand. Increased stability will tend to improve the business climate and make investment attractive. While these results highlight the crucial role of institutional quality, it must be recognized that income inequality remains high in SSA countries, marked by significant cultural dominance and transmission of circumstances. Unlike the present study, future studies could explore the mediating role of culture in the relationship between financial development and income inequality.

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Angola	Ivory Coast	Madagascar	Senegal
Benin	Ethiopia	Mali	Tanzania
Botswana	Gabon	Mauritius	Chad
Burkina Faso	Gambia	Mauritania	Togo
Cameroon	Ghana	Namibia	Zambia
Cape Verde	Guinea	Niger	Zimbabwe
Congo	Equatorial Guinea	Nigeria	
DRC	Kenya	Central African Republic	
Congo	Liberia	Rwanda	

APPENDICES

Table A.1: List of Sample Countries

Table A.2: Descriptive statistics of the model

Variables	Observ	Mean	Std dev	Min	Max
Gini index after tax	956	60.42	238.51	29.80	78.96
Urbanisation	1107	35.85	15.20	5.41	87.36
Unemployment	1107	8.90	7.45	0.30	44.15
Economic growth	1052	4.44	8.90	-51.03	149.97
Inflation	1043	87.84	1094.24	-11.68	24411.03
Education	870	4.32	3.66	1.01	44.33
Government Expenditures	912	25.94	27.14	2.14	539.23
Opening	1043	73.56	45.37	11.08	531.73
Financial Stability Index	1077	17.83	8.22	1.01	100
Financial Efficiency Index	1069	24.40	8.95	0	100
Financial Depth Index	1051	26.15	14.41	0.24	86.32
Affordability Index	721	11.63	14.79	0.21	99.25
Financial Development Index	700	17.85	7.093	-20.36	48.95

GE	855	.318	.228	0	1
RQ	775	.557	.195	0	1
RL	775	.487	.189	0	1
Co	855	.367	.18	0	.833
PS	775	.703	.152	.083	.972
VA	775	.468	.214	0	.917

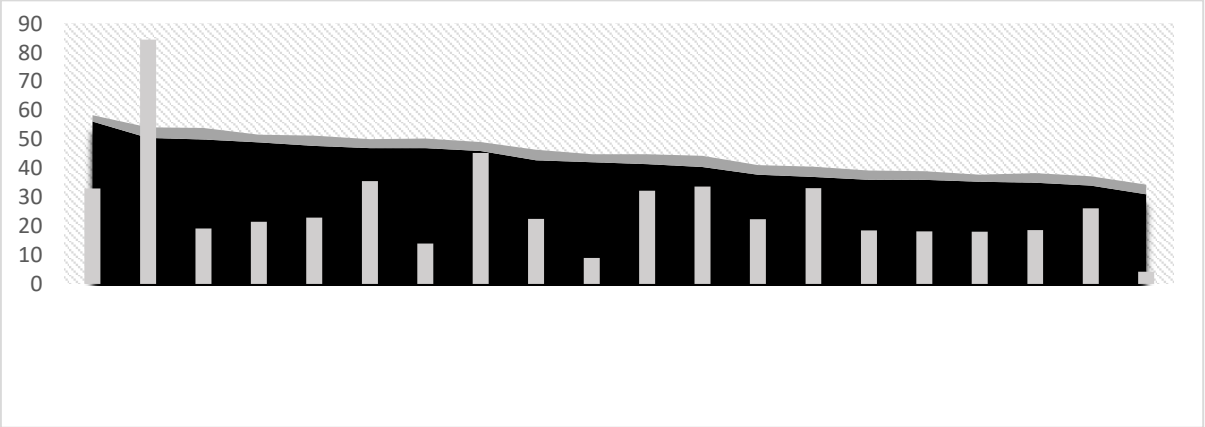
Source: author's construction

Table A.3: PCA Results on FD (with PCA/correlation, SEs and tests are approximate)
Principal components/correlation Number of comp. = 4 Trace = 4

	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
Eigenvalues						
Comp1	2.150	0.115	18.710	0.000	1.925	2.376
Comp2	0.945	0.050	18.850	0.000	0.847	1.043
Comp3	0.702	0.037	18.930	0.000	0.630	0.775
Comp4	0.203	0.011	18.760	0.000	0.181	0.224
Comp1						
Fd	0.617	0.015	40.720	0.000	0.587	0.646
Fe	-0.448	0.029	-15.290	0.000	-0.506	-0.391
Fs	0.271	0.041	6.540	0.000	0.190	0.353
Fa	0.587	0.020	29.950	0.000	0.549	0.626
Comp2						
Fd	-0.231	0.040	-5.830	0.000	-0.309	-0.154
Fe	-0.213	0.111	-1.910	0.056	-0.432	0.005
Fs	0.890	0.048	18.560	0.000	0.796	0.984
Fa	-0.331	0.048	-6.840	0.000	-0.426	-0.236
Comp3						
Fd	0.184	0.041	4.480	0.000	0.103	0.265
Fe	0.863	0.031	28.030	0.000	0.803	0.923
Fs	0.365	0.113	3.220	0.001	0.143	0.587
Fa	0.297	0.050	5.950	0.000	0.199	0.395
Comp4						
Fd	0.730	0.011	67.530	0.000	0.708	0.751
Fe	0.094	0.026	3.640	0.000	0.043	0.144
Fs	-0.039	0.023	-1.730	0.084	-0.084	0.005
Fa	-0.676	0.014	-49.990	0.000	-0.703	-0.650

LR test for independence: chi2(6) = 864.69 Prob > chi2 = 0.0000LR
test for sphericity : chi2(9) = 865 .41 Prob > chi2 = 0.0000
Source: author's estimate

Figure A.1: Combined analysis between income inequality, financial development and institutional quality in SSA



Source: authors's contruction.