

The role of institutional transaction costs in the transmission of financial development's effects on inclusive growth in Africa

Pascal KULU MULINDWA, (PhD student)

*Dschang school of Economics and Management
University of Dschang (Cameron)
ULPGL-GOMA (DR Congo)*

Paul NINGAYE, (Full Professor)

*Faculty of Economics and Management
University of Dschang (Cameron)*

Alain KIKANDI KUMA, (Associate Professor)

*Faculty of Economics and Management
Université Libre des Pays des Grands Lacs Goma (D.R. Congo)*

Correspondence address :	Faculty of Economics and Management University of Dschang, Cameroon Université Libre des Pays des Grands Lacs Goma, D.R. Congo (Free University of the Great Lakes Countries, Goma, DR Congo) Telephone : +243 893040012
Disclosure Statement :	The authors declare that they have not received any financial support that could have influenced the objectivity of this study. They take full responsibility for any potential plagiarism, the use of artificial intelligence in the writing process, as well as for the results presented in this article.
Conflict of Interest :	The authors report no conflicts of interest.
Cite this article :	KULU MULINDWA, P., NINGAYE, P., & KIKANDI KUMA, A. (2026). The role of institutional transaction costs in the transmission of financial development's effects on inclusive growth in Africa. <i>International Journal of Accounting, Finance, Auditing, Management and Economics</i> , 7(4), 461–500. https://doi.org/10.5281/zenodo.19485627
License	This is an open access article under the CC BY-NC-ND license

Received: 28/02/2025

Accepted: 09/04/2026

International Journal of Accounting, Finance, Auditing, Management and Economics - IJAFAME

ISSN: 2658-8455

Volume 7, Issue 04 (2026)

The role of institutional transaction costs in the transmission of financial development's effects on inclusive growth in Africa

Abstract

While existing literature has extensively documented the direct effects of financial development on inclusive growth, the mediating and moderating roles of institutional transaction costs remain largely unexplored within the African context. This study examines the role of institutional transaction costs in transmitting the effects of financial development to inclusive growth in Africa. Using a panel data model covering 53 African countries over the period 2003–2021, the results, obtained through various econometric techniques and robustness tests to address potential endogeneity, reveal that financial development positively and significantly influences inclusive growth, with a GMM coefficient of 0.2727. However, this relationship remains fragile in the African context. The analysis of indirect effects demonstrates that institutional transaction costs serve not only as a transmission channel (mediator), as the Sobel test yields a positive and significant mediation coefficient of 0.009, representing 14% of the total effect, supported by the bootstrap result showing a robust bias-corrected confidence interval (BC) with positive values ranging from 0.0003 to 0.1253, but also as an amplifier (moderator) of the impact of financial development on inclusive growth. Although the Driscoll-Kraay estimation for moderation shows a positive and significant coefficient of 0.6213, it lacks the robustness required to produce a uniform effect across all African countries. Consequently, African governments should implement policies aimed at reducing institutional transaction costs to ensure more effective and inclusive growth.

Keywords: Inclusive growth, Institutional transaction costs, financial intermediation, Panel data, Africa, Mediation analysis, Governance.

Classification JEL : D23, O16, G20, O43

Paper type: Empirical Research

1. Introduction

Inclusive growth, as a model of economic growth that ensures everyone participates in the process of wealth creation and the distribution of the fruits of that wealth, represents a major challenge for Africa, a continent where GDP growth has not always led to an equitable improvement in people's living conditions. This concept, which goes beyond mere economic growth, emphasizes a more equitable distribution of opportunities and the benefits of economic development (Demirgüç-Kunt & Levine, 2009). Indeed, despite sometimes impressive growth rates, many African countries still struggle to translate their macroeconomic successes into tangible social progress for all their citizens, as Ali and Son (2007). Yet financial development is emerging as a potential lever for promoting this inclusive growth. It occupies a central place in contemporary economic debates, particularly for its role in stimulating economic growth (Levine, 2005; Medjahed & Hachim, 2023; El Balghity & El Alaoui, 2022; Laajoul & Oulhaj, 2021).

Whilst the theory of financial intermediation (Gurley & Shaw, 1960) posits that financial mechanisms reduce market frictions, the effectiveness of these mechanisms cannot be understood in isolation from the institutional framework. In line with the seminal work of Coase (1937), we recognise, on the one hand, that economic exchanges do not take place in an institutional vacuum, but are inseparable from transaction costs (information search, negotiation, contract enforcement). It is precisely here that the New Institutional Economics introduced by North (1990,1991) and Williamson (1985) becomes indispensable: institutions are not mere background variables; they constitute the 'playing field' that defines the profitability and feasibility of financial exchanges. Furthermore, transaction costs encompass the expenses associated with market trading, the cost of price discovery, as well as the costs of drafting and executing contracts. Ideally, they are understood as the outcomes of legal institutions and reflect the costs associated with the use of these institutions; they thus represent the materialisation of legal institutions (Kovac & Spruk, 2016, 2019).

Although the direct link between finance and inclusion is well documented, the internal mechanisms that facilitate or hinder this transmission in Africa remain largely unexplored. More specifically, the role of institutional transaction costs, as a filter determining the effectiveness of financial systems, is often overlooked in empirical models. Yet high costs (corruption, legal uncertainty, administrative burdens) act as a regressive tax on the most vulnerable, neutralising the potential benefits of financial liberalisation (Houssou, 2021).

To fill this gap, this paper examines how institutional transaction costs influence the transmission of financial development's effects on inclusive growth in Africa by testing a dual hypothesis: that of a transmission channel (mediation), verifying whether financial development operates via a reduction in transaction costs, and that of a threshold or amplification effect (moderation), analysing whether the level of transaction costs amplifies or attenuates the effectiveness of financial policies. Drawing on a panel of 53 African countries (2003–2021) and advanced econometric techniques (GMM, Lewbel 2sls, Driscoll-Kraay), this research aims not only to enrich the theoretical debate on inclusive finance, but also to provide concrete recommendations for designing institutions capable of transforming financial capital into tangible social progress.

The major contribution of this study lies in moving beyond the conventional approach focused solely on financial depth (credit) to offer a multidimensional analysis incorporating depth, accessibility, efficiency and stability. The key originality is to demonstrate empirically that institutional transaction costs do not merely act as a direct constraint, but operate according to a dual dynamic: on the one hand as a transmission channel (mediator), where finance reduces information frictions, and on the other hand as a conditioning factor (moderator), where institutional robustness is necessary to transform financial expansion into social progress. By

demonstrating that the efficiency of the financial system depends on the reduction of administrative barriers, this study provides an innovative policy framework for improving the transactional environment and ensuring shared prosperity.

This article takes into account the following sections. After section 1 which introduces the study, section 2 presents a survey of the existing literature (both theoretical and empirical). Section 3 discusses the data and methodology used in this study. Section 4 presents and discusses the results. Section 5 concludes the study.

2. Literature Review

Financial development and its impact on inclusive growth are central themes in contemporary economic debates. Financial development, characterized by the expansion and sophistication of financial markets and institutions, is often regarded as a key driver of growth (Levine, 2005). However, the question of whether this growth is truly inclusive, that is, whether it benefits society as a whole, including the most vulnerable groups, remains a subject of intense discussion and research (Demirgüç-Kunt and Levine, 2009).

In the financial sector, some authors have sought to draw on several theories to examine this relationship. Beyond the theory of financial intermediation (Gurley and Shaw, 1960; Levine, 2005; Demirgüç-Kunt and Levine, 2009), the theory of financial liberalisation (McKinnon, 1973 and Shaw, 1973) and the theory of financial inclusion (Demirgüç-Kunt and Levine, 2009), the theory of endogenous growth (Romer, 1986; Lucas, 1988) offers a complementary perspective on the link between financial development and inclusive growth. The latter emphasizes the importance of human capital, technological innovation and increasing returns in the growth process.

2.1. Analysis of the determinants and direct impact of financial development

An analysis of the contemporary empirical literature broadly confirms the role of financial development as a direct driver of inclusive growth. From a global perspective, the work of Pham et al. (2024) in Asia and Iddrisu et al. (2024) in Africa demonstrates that the expansion of financial services promotes more widely shared prosperity. These findings are corroborated by Oyinlola and Adedeji (2019), who, using the GMM system method, highlight that the dynamism of the financial sector stimulates inclusive growth. More specifically, in sub-Saharan Africa, financial inclusion is identified as a positive driver (Sarpong and Nketiah-Amponsah, 2022; Cui et al., 2022), although its effectiveness remains qualified by the pre-existing industrial structure of national economies.

Beyond the financial sphere, inclusive growth is driven by a range of structural, technological and human determinants. On the one hand, urbanization (Ngounou et al., 2024; Bitoto et al., 2024), access to electricity (Bitoto et al., 2024) and the spread of information and communication technologies (Ofori and Asongu, 2021; Ofori et al., 2022) appear to be major catalysts for modernization. Furthermore, investment in human capital, through improvements in health systems (Tella and Alimi, 2016) and education (Oyinlola et al., 2020), strengthens the social resilience essential for sustainable growth. The impact of natural resources, however, remains open to question: whilst Bitoto et al. (2024) view them as a potential hindrance, Raheem et al. (2018) suggest a stimulating effect, illustrating the inherent complexity of managing extractive rents.

Conversely, inclusivity faces persistent macroeconomic and demographic pressures. Inflation, rapid population growth (Tella and Alimi, 2016; Pham et al., 2024) and income inequality (Nketia et al., 2022) are identified as major structural obstacles. Furthermore, the effectiveness of foreign direct investment (FDI) does not appear to be automatic; it remains strictly contingent upon the quality of local infrastructure (Kang and Martinez-Vazquez, 2022). In short, whilst financial development is a pillar of inclusive growth, its success depends on a multidimensional

ecosystem in which price stability, the quality of infrastructure and the strength of political institutions play an indispensable supporting role.

2.2. Institutional transmission channels: an analysis of indirect effects

An analysis of the empirical literature reveals that the influence of financial development on inclusive growth is not a linear process, but is largely dependent on the quality of the institutional environment. A consensus is emerging around the idea that institutions act as an efficiency filter or a transmission mechanism. On the one hand, the work of Ferrini (2012) and Kovac and Spruk (2016) highlights a mediating role: institutions stimulate economic activity by systematically reducing transaction costs, uncertainty and contractual risks. From this perspective, the financial system can only reach marginalized segments of the population if the institutional framework allows for the smooth dissemination of information and the secure execution of contracts.

On the other hand, a significant strand of the literature, led by Law et al. (2013), Gyamfi et al. (2022) and Li et al. (2024), highlights a moderating or conditional effect. These authors demonstrate the existence of a critical ‘institutional threshold’: below a certain level of governance, financial expansion may prove ineffective, or even detrimental to inclusion. Conversely, a robust institutional framework amplifies the positive effects of finance by effectively regulating market actors. This duality between mediation and moderation, also observed in the African context by Nonvide et al. (2025) for the WAEMU and Yinusa et al. (2020) for Nigeria, justifies the relevance of our study. In line with this approach, we seek to quantify how Institutional Transaction Costs (ITC) serve both as a transmission channel and as a lever for amplifying financial inclusion for sustainable growth in Africa.

The tables (1&2) below provide an overview of the key empirical studies relevant to this research:

Table 1: Summary table of empirical studies: direct effect between financial development and inclusive growth

Categories	Authors	Region / Period	Methodology	Key findings
Financial Sector	Pham et al. (2024)	Asian countries (1995-2020)	OLS / Panel	Financial development directly drives inclusive growth.
	Iddrisu et al. (2024)	Africa (2004-2020)	Panel Econometrics	Confirmation of the driving role of financial development in inclusion.
	Oyinlola & Adedeji (2019)	Global sample (1990-2014)	System GMM	Financial dynamism stimulates inclusion in two stages.
	Sarpong & Nketiah (2022) (2004_2018)	Sub-Saharan Africa (2004-2018)	System GMM	Financial inclusion is a major positive determinant of inclusive growth
Infrastructures & Technologie	Ngounou et al. (2024)	46 African countries (1995-2020)	Driscoll & Kraay	Urbanization is a driver of inclusive growth
	Ofori & Asongu (2021)	Sub-Saharan Africa (1980-2019)	OLS / GMM	ICT and research-oriented FDI boost inclusion
	Bitoto et al. (2024)	Africa (1996-2020)	Panel Econometrics	Access to electricity and manufacturing value added are essential.
Human Capital	Tella & Alimi (2016)	14 African countries (1995-2012)	Fixed Effects	Investments in health improve inclusive growth.
	Oyinlola et al. (2020)	Sub-Saharan Africa (1996-2017)	GMM / Fixed Effects	Education is a fundamental positive determinant of inclusivity.
Freins & Obstacles	Nketia et al. (2022)	Africa (2004-2018)	Panel Econometrics	Income inequality and poor institutional quality hinder growth
	Ukwandu (2018)	Nigeria (1999-2015)	Case study	Energy poverty drastically reduces inclusive growth

Source: Author's own construction

Table 2: Summary table of empirical studies: Transaction costs and institutions as transmission channels

Authors	Region	Methods	Nature of the indirect effect (Channel/Threshold)	Key findings
Nonvide et al. (2025)	WAEMU (2015-2022)	MCG / 2SLS	Mediation	Institutional quality transforms an initial negative relationship between digital finance and growth into a positive driver
Li et al. (2024)	109 Developing countries (1996 et 2020)	Panel model	Moderation	Institutional quality positively influences the transmission of financial development to inclusive growth.
Gyamfi et al. (2022)	48 African countries (1990-2016)	Dynamic panel	Moderation	Institutions play a crucial moderating role: if they are weak, financial development can hinder inclusion
Emara & Said (2021)	MENA countries (1990-2018)	Panel analysis	Conditionality	Financial development stimulates growth only in the presence of strong institutions.
Yinusa et al. (2020)	Nigeria (1984-2017)	Panel econometrics	Interaction	Highlights a co-dependent relationship between finance, institutions and inclusion to stabilize growth.
Kovac & Spruk (2016)	Cross-Countries (1990-2011)	OLS / IV	Mediation (Channel)	Transaction costs are the main channel through which institutions affect growth. Without a reduction in transaction costs, finance is futile.
Law et al. (2013)	Global sample (1980-2008)	Threshold analysis	Threshold effect	There is a minimum 'institutional threshold' for financial development to begin positively impacting growth
Ferrini (2012)	Theoretical	Conceptual analysis	Mediation (Channel)	Institutions stimulate growth by lowering transaction costs, risks and uncertainty
Law & Azman-Saini (2012)	64 countries (1980-2008)	GMM system	Threshold effect	Financial development only has a positive effect on growth if institutional quality is sufficiently high
Minea & Villieu (2010)	Theoretical	Endogenous growth	Threshold effect	Finance reduces private transaction costs but requires an institutional threshold to offset the loss of public revenue.
Demetriades & Law (2006)	Global sample (1978-2000)	Cross-country	Interaction	Financial development has a significantly stronger impact when it takes place within a sound institutional framework.

Source: Author's own construction

A review of these tables shows that several authors, in their work, question whether institutions play a role in the relationship between finance and inclusive growth. This article demonstrates how they do matter by quantifying the impact of reducing transaction frictions. This shift from a static view of governance to a dynamic one centered on institutional transaction costs constitutes the main contribution of this work in Africa, particularly by underpinning their mediating role.

In light of the above, we propose, firstly,

H1: *financial development has a positive effect on inclusive growth in Africa and, secondly,*

H2: *Institutional transaction costs play a mediating/moderating role in the transmission of the effects of financial development on inclusive growth in Africa.*

3. Methodology and Data

3.1. Theoretical and Empirical Model

An analysis of the relationship between financial development and inclusive growth in Africa requires moving beyond standard neoclassical growth models (such as Solow, 1956). Indeed, whereas traditional approaches focus on the accumulation of capital and labor, our study posits that the inclusiveness of growth depends on the efficiency of transmission mechanisms, and more specifically on the reduction of transaction frictions. We adopt an analytical framework based on New Institutional Economics (North, 1990; Williamson, 1985). Within this framework, the financial sector does not merely allocate resources; it acts as a potential reducer of Institutional Transaction Costs (ITC).

Following the logic of Baron and Kenny (1986), supplemented by causal mediation approaches, we model inclusive growth (QCI) as the product of an interaction between the capabilities of the banking sector and the reduction of institutional transaction costs, positing that the financial sector's efficiency in terms of growth depends on the reduction of transaction frictions (North, 1990). We have the following equation:

$$QCI = f(DF, CTI, X) \quad (1)$$

Where QCI represents inclusive growth, DF represents financial development, CTI represents institutional transaction costs, and X represents the control variables.

Panel data offer several advantages. They provide more information than cross-sectional data, notably by taking into account unobservable characteristics specific to individuals and/or the periods under study over time; They facilitate the control of individual heterogeneity; the analysis of adjustment dynamics; and the identification and measurement of effects that are not detectable in cross-sectional data or time series (Hsiao, 1986 and Wooldridge, 2001).

$$QCI_{it} = f(DF_{it}, CTI_{it}, X_{it}) \quad (2)$$

The logical specification of our model follows a causal mediation structure, in which the effect of financial development is broken down into two pathways. On the one hand, a direct effect: the financial sector's intrinsic capacity to generate economic opportunities. And on the other hand, an indirect (mediated) effect: the impact that arises through improvements in the contractual framework, the reduction of information asymmetries and the lowering of barriers to entry (CTIs). We have the following development:

$$QCI_{it} = \beta_0 + \beta_1 DF_{it} + \beta_2 CTI_{it} + \beta_3 X_{it} + \mu_{it} \quad (3)$$

Since inclusive growth is represented by an index that incorporates several variables, it will be denoted IQCI (inclusive growth index). Furthermore, in a panel data analysis, the error terms can be decomposed into individual effects, time effects and white noise errors (Baltagi, 2008); the equation is written as:

$$IQCI_{i,t} = \beta_0 + \beta_1 (DF)_{i,t} + \beta_2 (CTI)_{i,t} + \beta_3 (X)_{i,t} + \mu_i + \vartheta_t + \varepsilon_{i,t}, \quad (4)$$

To examine the effect of financial development on inclusive growth in Africa, we draw on the model used in the work of Ngounou et al. (2024), who tested the inverted Kuznets U-curve hypothesis regarding the relationship between urbanization and inclusive growth in Africa using panel data. Using Equation (4), we will analyze the link between financial development and inclusive growth in Africa by incorporating control variables. Thus, our empirical model is specified as follows:

$$IQCI_{i,t} = \beta_0 + \beta_1(IDF)_{i,t} + \beta_2(CTI)_{i,t} + \beta_3(Urb)_{i,t} + \beta_4(TNR)_{i,t} + \beta_5(Manuf)_{i,t} + \beta_6(Mortality)_{i,t} + \beta_7(Elec)_{i,t} + \mu_i + \vartheta_t + \varepsilon_{i,t}, \quad (5)$$

where $(IQCI)_{i,t}$ represents the inclusive growth index for country i in year t ; $(IDF)_{i,t}$ represents the financial development index for country i in year t ; $(CTI)_{i,t}$ represents the institutional transaction costs for country i in year t ; $(Urb)_{i,t}$ represents the urbanization rate of country i for year t ; $(TNR)_{i,t}$ represents the natural resource rent of country i for year t ; $(Manuf)_{i,t}$ represents the value added of country i 's industrial sector for year t ; $(Mortality)_{i,t}$ is the infant mortality rate for country i in year t ; $(Elec)_{i,t}$ is the electricity consumption of country i for year t ; μ_i is the country-specific effect; ϑ_t is the time-specific effect; $\varepsilon_{i,t}$ refers to the error term; where the index i refer to the country and t denotes the year.

Having analyzed the direct effect of financial development on inclusive growth, the next step is to incorporate the role of institutional transaction costs and institutions. The model to be estimated is given by the equation (6):

$$IQCI_{i,t} = \beta_0 + \beta_1(IDF)_{i,t} + \beta_2(CTI)_{i,t} + \beta_3(IDF * CTI)_{i,t} + \beta_4(Urb)_{i,t} + \beta_5(TNR)_{i,t} + \beta_6(Manuf)_{i,t} + \beta_7(Mortality)_{i,t} + \beta_8(Elec)_{i,t} + \beta_9(Institution)_{i,t} + \mu_i + \vartheta_t + \varepsilon_{i,t}, \quad (6)$$

where *Institution* is the matrix of governance variables (corruption control, political stability, government effectiveness, the rule of law, regulatory quality, and voice and accountability).

To verify the dynamic nature of our model (5), we use the following specification:

$$IQCI_{i,t} = \beta_0 + \beta_1(IQCI)_{i,t-1} + \beta_2(DF)_{i,t} + \beta_3(CTI)_{i,t} + \beta_4(Urb)_{i,t} + \beta_5(TNR)_{i,t} + \beta_6(Manuf)_{i,t} + \beta_7(Mortality)_{i,t} + \beta_8(Elec)_{i,t} + \mu_i + \vartheta_t + \varepsilon_{i,t}, \quad (7)$$

Where $(IQCI)_{i,t-1}$ represents inclusive growth lagged by one period.

• Description of Variables

i. Dependent Variable

Our dependent variable is the Inclusive Growth Index (IGI). The measurement of inclusive growth is controversial in the literature because it is multidimensional and dependent on multiple dimensions (McKinley, 2010; Mlachila et al., 2014; Cha'ngom et al., 2020; Ngounou et al. 2024; Njoya et al. 2023).

Consequently, several economists at the International Monetary Fund (IMF) propose six inclusive growth indicators based on two dimensions commonly used in the literature.

Firstly, economic fundamentals, namely the sustainability of GDP growth per capita; stability measured by the inverse of the coefficient of variation of growth levels or economic fluctuations (Ramey and Ramey, 1995). Diversified sources reflected in the diversification index and external orientation reflected in the share of net external demand. Secondly, social production or the social dimension of growth, namely access to healthcare (longevity and good health), measured by healthcare expenditure, and decent education, measured by completion of primary education. The above variables are used to construct a composite index of inclusive growth quality using principal component analysis (PCA).

The results in Table 3 show that based on the Kaiser-Meyer-Olkin (KMO) values, Cronbach's alpha, and Bartlett's tests, common factors exist among the inclusive growth indicators, so PCA

is appropriate. Thus, 3 eigenvalues are greater than 1 and explain 73.8% of the inclusive growth index. It is these components that are used as indicators of the quality of inclusive growth in our estimations.

Table 4 shows an oblique rotation of principal component (PC) saturations to determine the number of elements included in each PC (Fabrigar et al., 1999; Ngounou et al. 2024). By rotating the PC weighting coefficients, it is possible to detect trends in how the components integrate with inclusive growth variables (i.e., GDP per capita growth rate, diversification index, net external demand, health care expenditure, primary education completion rates, and inverse coefficient of variation ($1/cv$)). Principal component 1 (PC1) is explained more by the GDP per capita growth rate and the primary education completion rate. Indeed, these two variables, namely GDP per capita growth rate and primary education completion rate, have a positive correlation with PC 1. Principal component 2 (PC2) is explained solely by external orientations. To this end, external orientations and PC 2 have a positive relationship. Principal component 3 (PC 3) is explained more by GDP growth per capita and primary education completion rates. While GDP growth per capita is positively correlated with PC 3, primary education completion rates and PC 3 have a negative relationship.

Figure 1 represents the evolution of the eigenvalues resulting from the construction of the inclusive growth index via Principal Component Analysis (PCA). This graph also confirms that only three components satisfy the criteria since their eigenvalues are greater than one.

ii. Variable of Interest

Our variable of interest here is the financial development index constructed from four dimensions drawn from the literature, namely captured financial depth: domestic credit to the private sector referring to financial resources provided by the private sector, such as loans, purchases of non-equity securities, trade credits and other accounts receivable, which establish a claim for repayment. For some countries, these claims include loans to public enterprises; financial stability captured by the banking Z-score, which reflects the probability of default of a country's banking system. It compares the buffer of a country's banking system (capitalization and returns) with the volatility of these returns; financial efficiency, captured by banks' net interest income, which is the book value of the bank's net interest income as a share of its average interest-earning assets (total interest-earning assets); and financial accessibility, captured by the number of commercial bank branches representing each country, is calculated as follows: $100,000 \times \text{reported number of commercial bank branches} / \text{adult population in the reporting country}$, Čihák et al. (2012).

iii. Control Variables

Subsequently, we include several control variables, namely

- Transaction Costs (TC): Here, transaction costs represent the share of overall transactions specifically, financial activities.
- Urbanization: Refers to the urban population, the population living in urban areas, measured as a percentage of the total population as defined by the Office for National Statistics. This variable has been used repeatedly in the literature, particularly as a proxy for urbanization (Gupta, et al., 2022; Mignamissi & Djeufack, 2022; Ngounou et al. 2024).
- Natural Resources: The measure of natural resources in this analysis is based on the ratio of total natural resource rent to GDP, drawing on research by Raheem et al. (2018), Abdulahi et al. (2019), and Mohamed (2020). These studies highlight the crucial role of natural resource revenues in financing infrastructure development and human capital cultivation, both of which contribute significantly to economic growth.
- Industrial Sector Value Added (IVA): Industries falling under ISIC divisions 15 to 37 are classified as manufacturing industry. Value added, which represents a sector's final output

after accounting for all inputs and subtracting intermediate inputs, is recognized in the literature as a possible factor influencing economic growth.

- Infant Mortality Rate (IMR): The infant mortality rate, which is determined by the number of children who die per 1,000 live births, has a significant impact on industrial and agricultural productivity. This is due to the depletion of the country's labor force and barriers to rapid development (Singh et al. 2014; Idowu, 2013).
- Access to Electricity: Calculated as the percentage of the population with access to electricity. This measure is derived from various sources such as national surveys, industry reports, and global databases, and it provides data on electrification rates in the region.
- Control of Corruption (CC): Capture's perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state of elites and private interests.
- Political Stability (PS): Measured by the perception index of the likelihood of political instability and/or politically motivated violence, including terrorism.
- Government Effectiveness (GE): Approximated by the quality of public services, the performance of the civil service and its level of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to those policies. Values range from -2.5 (low) to +2.5 (high).
- Rule of Law (RL): Represents citizens' confidence in and adherence to the rules of society, including the quality of contract enforcement, police, and courts, as well as the perception of crime and violence. Values range from -2.5 (low) to +2.5 (high).
- Voice and Accountability (VA): Represents the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free press. Values range from -2.5 (low) to +2.5 (high).

3.2. Estimation Techniques and Data

This study determines the role of Institutional Transaction Costs (ITC) in the transmission of financial development's effects on inclusive growth in Africa. To do this, we use a panel of 53 African countries over the period 2003 to 2021. This study period was chosen based on data availability. The excluded countries are mainly transition countries that lack data on inclusive growth.

To ensure our conclusions truly reflect the African reality, we chose not to limit ourselves to a few isolated cases. By analyzing 53 countries and nearly 1,000 observations, we sought to embrace the full diversity of the continent, from its varied legal systems to its different monetary zones. This comprehensive approach allows us to demonstrate a fundamental point: transaction costs are not merely a local accident, but a structural challenge that Africa must overcome to make its financial system truly inclusive. The data used to construct the Inclusive Growth Index come from the World Bank Development Indicators (WDI, 2023) database, with the exception of the Diversity Index, whose data come from the United Nations Conference on Trade and Development (UNCTAD, 2023).

The data for the variable of interest, financial development (domestic credit, bank Z-score, banks' net interest margin, and bank branches), come from the Global Financial Development (GFD, 2023) database. The control variables (urbanization, natural resource rent, industrial sector value added, infant mortality rates, and electricity) come from the World Bank Development Indicators (WDI, 2023) database. The transaction cost variable comes from the International Monetary Fund (IMF, 2023) database, while the governance variables (Control of Corruption, Political Stability, Government Effectiveness, Rule of Law, Regulatory Quality, and Voice and Accountability) come from the Worldwide Governance Indicators (WGI, 2023). Institutional transaction costs (ITC) were captured by the Cost of Financial Intermediation (CFI) index drawn from the IMF database (2023). Theoretically capable of quantifying

contractual frictions and information asymmetries, which, according to North (1990), are the source of transaction costs, the CFI incorporates not only interest margins but also commission fees, collateral management costs and provisions for risks. In this sense, it meets Williamson's (1985) definition of 'system operating costs': it is not merely the price of money, but the overall cost required to secure and finalise a transaction in an uncertain environment. Compared to other perception indices (such as the WGI), the IMF's CFI has the advantage of being derived from national systems, thereby ensuring a degree of variability across African countries. It illustrates how institutional inefficiency can become a financial barrier, thereby hindering the spread of inclusive growth. Furthermore, CFIs enable a shift from a theoretical institution to an accounting demonstration. Indeed, given that, according to the NEI, institutions are 'the rules of the game', CFIs constitute the 'entry fee' to the financial market. Consequently, the key benefit lies in its ability to identify why financial development does not directly translate into inclusive growth, particularly in Africa. A high IFI indicates that the gains to be derived from the efficiency of the banking sector may be offset by the shortcomings of the contractual framework (information asymmetry, slow judicial processes, enforcement risks, etc.). Thus, this index has all the attributes required to represent institutional transaction costs.

Unit root tests for the panel data (LLC, IPS and Fisher) were carried out to examine the long-run relationship between the model's key variables. Following these tests, it appears that the Inclusive Growth variable is stationary at level $I(0)$, whilst the CTI and DF variables are $I(1)$. This renders the Pedroni or Westerlund-type cointegration test inappropriate (Engle and Granger, 1987; Pedroni, 2004).

We favor a structural equation modeling (SEM) approach. This approach allows us to test the robustness of the institutional channel using Sobel tests, Monte Carlo simulations and the Bootstrap resampling procedures (Preacher & Hayes, 2008), thereby providing empirical validation that more closely reflects the structural realities of the African continent.

For the basic estimation, we employ several estimation techniques from the literature, namely Ordinary Least Squares (OLS), Driscoll-Kraay, and Generalized Least Squares (GLS), to address the problem of cross-sectional dependence that may persist given that we are working with small groups. For robustness, the use of Lewbel 2SLS (2012) and System GMM (GMM-S) developed by Arellano and Bond (1991) will allow us to control for the problem of existing heteroskedasticity and potential endogeneity assumptions in our model.

Theoretically, endogeneity can result from reverse causality, measurement error, or omitted variable bias. Reverse causality can occur between financial development and inclusive growth, either by promoting or hindering inclusive growth. Measurement error could also contribute to endogeneity, as the measures used to link financial development and inclusive growth may contain inaccuracies. Omitted variable bias is another source of endogeneity, as it is impossible for the model to account for all determinants of inclusive growth. Moreover, unobserved country-specific characteristics can simultaneously influence both variables. Failure to resolve the endogeneity problem in estimation leads to biased estimates. To mitigate reverse causality, the model includes the lagged dependent variable (Wooldridge, 2009).

• **Main Data Characteristics**

The descriptive statistics and the correlation matrices between the variables are reported respectively in Tables 5 and 6. The description of these data shows some homogeneity regarding the first three moments (mean and standard deviation). The difference in the number of observations is due to missing data. However, given that we are far from an over-dispersion, the results obtained should remain relatively stable. This relative stability could be due to the homogeneity of other variables such as urbanization, natural resource rent, industrial sector value added, infant mortality rate, electricity, Control of Corruption, Political Stability,

Government Effectiveness, Rule of Law, Regulatory Quality, and Voice and Accountability (Table 5).

Table 5: Descriptive statistics on the relationship between financial development and inclusive growth

Variable	Obs	Mean	Std. Dev.	Min	Max
Inclusive Growth Index	1007	-.212	.47	-2.5	3.54
Financial Development Index	1007	0	.971	-2.1	4.22
Transaction costs	528	.286	.055	.156	.458
Urbanization	1007	43.239	18.2	8.908	90.423
Total Natural Resource	984	11.876	11.653	.002	66.06
Manufacturing	975	10.516	5.803	.233	35.215
Mortality rate	1007	52.627	23.538	9.2	130.3
Electricity	999	45.652	29.41	.8	100
Corruption control	999	-.646	.632	-1.937	1.6
Political Stability	999	-.591	.911	-3.313	1.201
Government efficiency	999	-.774	.635	-2.44	1.15
Role of laws	999	-.703	.64	-2.591	1.024
Quality of regulation	999	-.71	.616	-2.548	1.197
Path and responsibility	999	-.615	.724	-2.197	.975

Source: Author's own construction

4. Results and discussion

4.1. Preliminary results

Figure 2 highlights the relationship between financial development and inclusive growth in Africa. The points in blue with country codes indicate the correspondence between financial development (on the x-axis) and inclusive growth (on the y-axis). The red line represents the general trend for all the points. The interpretation of the figure reveals an upward trend, indicating a positive relationship between financial development and inclusive growth. This means that countries with a high level of financial development experience an accelerating rate of economic development and, consequently, an increase in inclusive growth.

These results concerning the correlation between financial development and inclusive growth present three limitations. Firstly, a positive correlation does not necessarily imply a causal relationship due to the absence of confounding factors or reverse causality. Furthermore, an unmeasured third variable may influence the two variables being analyzed, thus creating an illusion of a direct link. Finally, the correlation results are sensitive to extreme points represented by South Africa (ZAF), Seychelles (SYC), and Djibouti (DJI), which can skew the interpretation of the relationship's intensity and direction. These limitations underscore the importance of in-depth analysis to better understand the relationship between financial development and inclusive growth. One might therefore expect a heterogeneous relationship, as not all countries are at the same level.

Tables 7-a and 7-b presents the results of estimating the relationship between financial development and inclusive growth using the Ordinary Least Squares (OLS) method and the Driscoll-Kraay method. The initial results in the table obtained using the OLS method (from Column 1 to Column 5), show that financial development has a positive and significant effect on inclusive growth. This first point is highlighted to illustrate the general trend of the results. Panel data most often presents a set of anomalies related to cross-sectional dependence issues, which are detected through the Pesaran test. Controlling for this dependence initially led us to use the Driscoll and Kraay (1998) estimation technique.

The results in Columns 7 to 12, obtained by progressively adding control variables to the model, reveal a positive dynamic. Indeed, financial development appears to be a driver of inclusive growth in Africa. This means that access to financial services and the improvement of financial

exerts a positive and significant effect on inclusive growth, with a confidence level of 1% . This means that anyone-unit increase in the financial development indicator leads to a notable rise of 0.09 units in inclusive growth.

Table 7-b: Effect of financial development on inclusive growth: Estimation using Ordinary Least Squares (OLS) and the Driscoll-Kraay method.

Variable	Inclusive Growth Index					
	Discoll-Kraay					
	7	8	9	10	11	12
Financial Development Index	0.1542* (0.0754)	0.1363** (0.0495)	0.2306*** (0.0481)	0.1668*** (0.0162)	0.0801*** (0.0262)	0.0793*** (0.025)
Urbanization		0.0234*** (0.006)	0.0136** (0.0052)	0.3517*** (0.0291)	0.0087*** (0.0011)	0.0079*** (0.0011)
Total Natural Resource			0.0104** (0.0038)	0.0050** (0.0022)	0.0044* (0.0024)	0.0051** (0.0024)
Manufacturing				0.0034 (0.0022)	-0.012 (0.0163)	0.0168 (0.0163)
Mortality rate					- 0.0040*** (0.0009)	-0.0029** (0.001)
Electricity						0.0893*** (0.0122)
Constant	-1.4818*** (0.0927)	- 2.8332*** (0.3408)	- 2.6656*** 0.2751	- 1.5829*** -0.0846	- 0.4018*** -0.0457	- 0.3724*** (0.0448)
Observations	230	230	248	875	860	858
R-squared	0.2333	0.1242	0.2966	0.2989	0.3223	0.348
Number of groups	50	50	20	50	50	49
Fisher [P-value]	4.178***	11.53***	15.62***	57.93***	67.67***	81.19***

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's own construction

Four arguments serve to justify the positive effect of financial development on inclusive growth. Firstly, financial development improves access to credit, enabling households and Small and Medium-sized Enterprises (SMEs) to obtain resources for investment in income-generating entrepreneurial projects, which fosters wealth and job creation. Secondly, when financial infrastructures are robust, this promotes financial inclusion, allowing vulnerable and marginalized populations to access banking services, thereby reducing economic inequalities. Furthermore, financial development stimulates national and international investment by attracting local and foreign capital that boosts corporate productivity. Finally, financial development allows for the optimal mobilization of resources for the construction of basic infrastructure, which helps improve connectivity and market access.

Theoretically, this result is justified by the fact that financial development facilitates capital accumulation by improving access to financing for investments in education and technology. Also, a developed financial infrastructure creates network effects by linking several economic actors. Furthermore, efficient financial markets allow for the optimal allocation of resources, maximizing investment returns and thus fostering economic growth. Finally, a developed financial system contributes to economic stability, which provides risk management mechanisms that promote an environment conducive to investment. Empirically, this result is

supported by several prior studies, such as those by Pham et al. (2024) and Oyinlola and Adedeji (2019), who find that financial development induces inclusive growth.

Regarding the results for the control variables in Column 6 of Table 8, it emerges that urbanization has a positive and significant effect on inclusive growth at the 1% level. This means that a one-unit increase in urbanization is accompanied by a 0.27-unit increase in inclusive growth. This result is justified by the fact that urbanization promotes access to economic resources and opportunities. It also facilitates access to markets, health services, education, and infrastructure, which contributes to improving living conditions. Furthermore, urbanization stimulates economies of scale, innovation, and job creation. Empirically, this finding is supported by the results of Ngounou et al. (2024), who analyze the effects of urbanization on inclusive economic growth. Natural resource rent positively and significantly affects inclusive growth in Africa at the 1% level. This means that a one-unit increase in the rent is accompanied by a 0.006-unit increase in inclusive growth.

Table 8: Effect of financial development on inclusive growth: Generalized least squares (GLS) estimation.

Variable	Generalized least squares (GLS) estimation					
	Inclusive Growth Index					
	1	2	3	4	5	6
Financial Development Index	0.1833*** (0.0141)	0.1522** (0.0672)	0.1596*** (0.0156)	0.1668*** (0.0138)	0.1015*** (0.0168)	0.0971*** (0.0166)
Urbanization		0.0169*** (0.0045)	0.3073*** (0.0289)	0.3517*** (0.0304)	0.3001*** (0.0307)	0.2778*** (0.0310)
Total Natural Resource			0.0024 (0.0094)	0.0050*** (0.0012)	0.0062*** (0.0012)	0.0068*** (0.0012)
Manufacturing				0.0034 (0.0024)	0.0043* (0.0023)	0.0047** (0.0023)
Mortality rate					0.0049*** (0.0008)	-0.0042*** (0.0008)
Electricity						0.0759*** (0.0169)
Constant	0.2125*** (0.0137)	-2.6274*** (0.2685)	-1.3434*** (0.1084)	1.5829*** (0.1151)	1.1645*** (0.1294)	-1.0927*** (0.1292)
Observations	1,007	249	984	875	875	872
Number of id	53	53	53	50	50	50
Fisher [P-value]	56.34***	142.7***	188.5***	145.9***	123.4***	126.5***

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's own construction

This result can be explained by the fact that natural resource rents increase government revenues, allowing for reinvestment in essential infrastructure such as education, health and transport. In addition, the exploitation of these resources generates direct and indirect jobs, thereby reducing unemployment and raising the living standards of local populations. The revenues generated stimulate the development of local industries by promoting economic diversification. This result is supported by the work of Raheem et al. (2018), who find that natural resource rents have a positive effect on inclusive growth in sub-Saharan Africa.

Manufacturing value added has a positive and significant 10% effect on inclusive growth. This result shows that, all other things being equal, a one-unit increase in manufacturing value added is accompanied by a 0.0047-unit increase in inclusive growth. This result can be explained by

the fact that good performance in the manufacturing sector contributes to inclusive economic growth. Pham et al. (2024) found in their research that manufacturing value added is a positive determinant of inclusive growth. With regard to the mortality rate, it appears that this has a negative and significant 1% effect on inclusive growth. This means that a one-unit increase in the mortality rate, all other things being equal, is accompanied by a 0.0042-unit decrease in inclusive growth. This result suggests that higher mortality rates hinder economic development. It thus highlights how the deterioration of health reduces the well-being of populations, productivity and inclusive growth. Finally, it appears that access to electricity significantly improves inclusive growth in Africa by 1%. This implies that a one-unit increase in access to electricity is accompanied by an increase in inclusive growth of 0.0759 units. This result is supported by the work of Ukwandu (2018), who finds that inclusive growth is constrained by access to electricity.

We observe a difference in the coefficient values when moving from the Simple OLS model (0.1757) to the Full OLS model (0.0564). The decrease in the coefficient (from 0.17 to 0.05) is entirely normal due to the omitted variable bias. In this model, financial development captured part of the effect of other variables that were not included in the model (the control variables). This shows that part of the impact of financial development was channeled through other mechanisms. By introducing the control variables, the coefficient of 0.0564 obtained is more accurate, as it represents the net effect of financial development on inclusive growth.

Similarly, moving from the full OLS model (0.0564) to the GLS model (0.0971), we observe that the model gains in robustness. Given that OLS assumes that the error term is homoscedastic (constant variance), yet within the panel of African countries, economic structures are highly heterogeneous (which implies heteroscedasticity and autocorrelation), GLS corrects this bias by assigning different weights to observations based on the value of their variance. The shift from 0.05 to 0.09 shows that OLS underestimated the actual impact of financial development due to statistical errors linked to heterogeneity across countries. GLS, therefore, reveals a robust effect.

- ***Homogenization of the panel according to regional breakdown.***

The results in Table 9, obtained by breaking down the database geographically, show that financial development has a positive and significant effect on inclusive growth in Africa. Specifically, in the group of North and West African countries, financial development has a 10% positive effect on inclusive growth. This result confirms the positive effect of financial development found in the baseline analysis. The results for the control variables are mostly similar to those found in the baseline. For the group of East and Central African countries, financial development has a positive and significant effect of 5% on economic growth. Finally, this result appears controversial for the group of Southern African countries in that the effect of financial development on inclusive growth, although positive, is statistically insignificant for column 20 of Tables 9-a & 9-b.

These results can be explained by several contextual and structural factors. First, the level of financial infrastructure development and the adoption of innovations, such as mobile banking in East Africa, have enabled greater inclusion of marginalized populations, particularly in rural areas, thereby stimulating economic activity. The East African region exhibits a positive and significant coefficient (Col. 12: 0.1298), which is the most robust compared to other zones. East Africa currently stands as the African leader in the rise of financial technology. Countries in this region (such as Kenya, Rwanda, and Uganda) have bypassed the lack of physical banking infrastructure through the widespread adoption of mobile money. As noted by Suri and Jack (2016), the expansion of digital financial services in East Africa has contributed to poverty reduction by facilitating consumption smoothing and increasing access to micro-credit.

Next, West Africa also shows a positive and significant coefficient (Col. 8: 0.0075), although its magnitude is more modest. This zone is characterized by a hybrid model combining banking system regulation with digital expansion. Here, financial inclusion is driven by regional institutional reforms, particularly within the WAEMU (UEMOA) zone. Zins and Weill (2016) explain that financial inclusion in West Africa is strongly correlated with education and income levels; this may explain why, once these factors are controlled for, the "pure" effect of financial development (FD) appears more tempered than in the East.

North Africa, on the other hand, possesses a high coefficient (Col. 4: 0.1311), reflecting the efficiency of its formal financial system. Countries in this region, such as Morocco and Egypt, feature mature and solid banking systems with extensive branch networks. Consequently, inclusion is driven by traditional banking and the development of credit for SMEs. Ben Naceur and Omran (2011) demonstrate that bank performance and financial reforms are direct determinants of growth through the financing of the manufacturing sector, a finding that corroborates our results. They emphasize that institutional maturity and banking reforms in the MENA region foster more efficient financial intermediation.

Furthermore, Central Africa also displays a positive and significant coefficient (Col. 16: 0.0272). This result is explained by the dominance of rent-seeking economies. The abundance of natural resources imposes an outward-oriented financial structure. Thus, while financial development supports overall macroeconomic growth, capital flows are largely concentrated in a single sector: extraction. Marginalized populations are often overlooked due to a lack of credit channel diversification toward the informal and rural sectors, which house the majority of the region's population. Previous studies have shown that resource-rich countries often possess financial systems that are less developed for the general public; banks in these zones are highly liquid but do not lend to the poor (Beck et al., 2009; Bhattacharyya and Hodler, 2010; Asongu, 2014). Additionally, the risk of corruption remains high due to the resource curse (Bhattacharyya and Hodler, 2014). Consequently, while the impact is significant, it remains constrained by the region's economic structure.

Finally, Southern Africa is the only region where the effect of financial development on inclusive growth loses its significance when all control variables are included (Col. 20: 0.0136). In conclusion, regional heterogeneity is not merely a statistical variation; it is the reflection of plural and distinct financial development trajectories across the continent.

Table 9-a: Homogeneity by regional area estimated using ordinary least squares (OLS) and the Driscoll-Kraay method

	Inclusive Growth Index											
	North Africa				West Africa				East Africa			
	OLS		Discroll-Kraay		OLS		Discroll-Kraay		OLS		Discroll-Kraay	
	1	2	3	4	5	6	7	8	9	10	11	12
FD Index	0.1276*	0.3951*	0.0773**	0.1311*	0.0527**	0.0173*	0.1937***	0.0075*	0.4006***	0.1812***	0.0107**	0.1298**
	(0.0663)	(0.2126)	(0.0344)	(0.1612)	(0.0230)	(0.0313)	(0.0353)	(0.0313)	(0.0330)	(0.0664)	(0.0921)	(0.0549)
Urbanization		0.0109		0.0193		0.0102***		0.0117***		0.0282***		0.0226***
		(0.0188)		(0.0192)		(0.0024)		(0.0021)		(0.0030)		(0.0027)
TNR		0.0309*		0.3981*		0.0167***		0.1070***		0.0094		0.0210
		(0.0158)		(0.1916)		(0.0026)		(0.0166)		(0.0059)		(0.0157)
Manufacturing		0.2047		0.0590		0.0160***		0.0295***		0.0287		-0.0002
		(0.8062)		(0.0736)		(0.0045)		(0.0069)		(0.0453)		(0.0077)
Mortality rate		0.0742**		-0.0659**		-0.0014		-0.0038**		-0.0089***		0.0071
		(0.0326)		(0.0247)		(0.0011)		(0.0013)		(0.0031)		(0.0053)
Electricity		0.0018		-0.1013		0.0038***		0.0027**		-0.0042*		0.0060**
		(0.0159)		(0.4755)		(0.0014)		(0.0011)		(0.0025)		(0.0025)
Constant	0.1074**	-0.5347	0.0140	-2.6445	-0.1598***	-1.1889***	-0.3369***	-1.2117***	-0.1358***	-0.6182***	-0.8469***	-1.3590***
	(0.0527)	(2.4658)	(0.0609)	(2.6542)	(0.0440)	(0.1433)	(0.0246)	(0.1375)	(0.0278)	(0.1911)	(0.1057)	(0.3489)
Observations	105	166	114	172	180	262	285	252	247	187	131	172
R-squared	0.3470	0.3919	0.1890	0.3590	0.6320	0.4769	0.1449	0.4882	0.3762	0.6398	0.3403	0.7320
Fisher	3.698	6.338	5.034	5.005	5.262	38.75	30.13	27.55	147.7	53.28	0.0134	55.82

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's own construction

Table 9-b: Homogeneity by regional area estimated using ordinary least squares (OLS) and the Driscoll-Kraay method

	Inclusive Growth Index							
	Central Africa				South Africa			
	OLS		Driscoll-Kraay		OLS		Driscoll-Kraay	
	13	14	15	16	17	18	19	20
FD Index	0.1791** (0.0791)	0.7802* (0.4591)	0.1022* (0.0511)	0.0272** (0.0627)	0.0316* (0.0171)	0.0885** (0.0354)	0.1192*** (0.0209)	0.0136 (0.0271)
Urbanization		-0.0196 (0.0364)		0.0215*** (0.0032)		0.0030 (0.0037)		0.0091** (0.0042)
TNR		0.0633*** (0.0179)		0.0089*** (0.0012)		0.0104*** (0.0039)		0.0123*** (0.0032)
Manufacturing		0.8626*** (0.3131)		-0.0230*** (0.0044)		0.0237 (0.1011)		0.0170*** (0.0056)
Mortality rate		-0.0047 (0.0150)		0.0060** (0.0028)		0.0048* (0.0025)		0.0032 (0.0020)
Electricity		-0.0142 (0.0209)		-0.0026 (0.0025)		0.0863 (0.0600)		0.0019 (0.0023)
Constant	-0.1956*** (0.0487)	-3.0247* (1.6663)	-0.1719 (0.1288)	-1.5047*** (0.1993)	-0.1883*** (0.0225)	-1.0234*** (0.3109)	-0.3711*** (0.0498)	-1.1581*** (0.1525)
Observations	171	145	112	155	190	160	145	171
R-squared	0.4294	0.4666	0.3482	0.6021	0.4177	0.2146	0.3028	0.2843
Fisher	5.122	5.541	4.008	134.5	3.395	6.968	32.61	17.68

Standard errors in parentheses **** p<0.01, ** p<0.05, * p<0.1

Source: Author's own construction

4.2. Robustness checks

4.2.1. Endogeneity issues

Two estimation techniques, Lewbel's DMC method and the generalized method of moments (GMM), are used to address endogeneity in the analysis of the effects of financial development on inclusive growth. The Lewbel DMC method provides robust estimates using internal instruments, thereby validating the hypothesis of a positive and significant effect of financial development on inclusive growth. At the same time, the GMM method reveals memory effects, indicating that past levels of inclusive growth have a positive influence on current levels. The robustness results for this estimator are valid and therefore reliable. Indeed, as our model specification is dynamic, it exhibits first-order autocorrelation, as expected. The p-values for AR(1) are below 5% or 10% in several columns (6 to 11). This is normal given the construction of the first-difference estimator. We also note that the p-values for the AR(2) test are all above the 10% threshold (ranging from 0.113 to 0.454). This confirms the absence of second-order autocorrelation in the errors and thus confirms that the model is correctly specified. Furthermore, given that the p-value of the Hansen test is well above 0.10 (ranging from 0.154 to 0.533), this confirms that the instruments used are not correlated with the error terms and are statistically suitable for addressing the endogeneity issue of financial development in the lagged variable of inclusive growth.

The results presented in Table 10 show that the effect of financial development remains constant and significant despite changes in estimation techniques, highlighting its important role as a determinant of inclusive growth. The coefficients remain positive and significant. Furthermore, the results in columns 6 and 11 show that, beyond the contribution of financial development to inclusive growth, variables such as urbanization, natural resource rents and access to electricity remain positive and significant for inclusive growth, in line with the baseline results.

Table 10: Effect of financial development on inclusive growth: Estimation using Lewbel's 2SLS method and the generalised method of moments.

Variable	Inclusive Growth Index										
	Lewbel 2SLS					GMM					
	1	2	3	4	5	6	7	8	9	10	11
L. Inclusive Growth Index						0.3659*** (0.0201)	0.2137*** (0.0145)	0.1535*** (0.0136)	0.1633** (0.1556)	0.0460** (0.0198)	0.0437** (0.0446)
FD Index	0.0851** (0.0343)	0.0587* (0.0348)	0.0716*** (0.0241)	0.0506* (0.0264)	0.0654** (0.0306)	0.0805*** (0.0247)	0.0468** (0.0196)	0.1720*** (0.0407)	0.3011** (0.2271)	0.1266* (0.0616)	0.2707** (0.1163)
Urbanization	0.0113*** (0.0017)	0.0122*** (0.0017)	0.0114*** (0.0010)	0.0087*** (0.0009)	0.0092*** (0.0010)		0.0660*** (0.0018)	0.1033*** (0.0071)	0.1237 (0.1210)	0.2458*** (0.0438)	0.2030* (0.1395)
Total Natural Resource		-0.0346** (0.0141)	0.0023* (0.0014)	0.0047*** (0.0013)	0.0050*** (0.0014)			0.0565*** (0.0010)	0.1730*** (0.0426)	0.1139*** (0.0103)	0.2135** (0.0871)
Manufacturing			0.0054** (0.0024)	0.0055** (0.0024)	0.0043* (0.0023)				0.2511* (1.2650)	0.0024 (0.0575)	0.0959*** (0.0182)
Mortality rate				-0.0051*** (0.0009)	-0.0050*** (0.0010)					-0.0614*** (0.0193)	-0.0282 (0.0415)
Electricity					0.0068 (0.0207)						0.6443*** (0.8476)
Constant	-0.5468*** (0.1004)	-0.5797*** (0.0977)	-0.7814*** (0.0542)	-0.4355*** (0.0671)	-0.4660*** (0.0919)	-0.9808*** (0.0547)	-4.9345*** (0.1253)	-1.1588*** (0.5065)	-1.2332** (0.4511)	-1.5882*** (0.5663)	-2.2975** (0.2801)
Observations	287	287	871	871	837	181	181	181	171	176	172
R-squared	0.1155	0.1725	0.2927	0.3325	0.3721						
Number of id						22	22	22	21	22	21
Instruments						17	20	20	13	18	18
Ar (1)						0.0164	0.0276	0.0350	0.112	0.0868	0.0842
Ar (2)						0.454	0.239	0.138	0.1609	0.113	0.309
Hansen (p)						0.354	0.417	0.483	0.154	0.530	0.533
Fisher	31.54	25.75	80.23	84.95	78.98	688.01	438.2	518.7	707.3	902.0	293.4

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source : Author's own construction

4.2.2. Taking governance variables into account

The results in Table 11-a & 11-b highlight the positive and significant effect of financial development on inclusive growth in Africa, regardless of the specification of the equations and estimation techniques. This analysis underscores the importance of incorporating governance variables, as effective financial development must be accompanied by strong governance structures to ensure the equitable distribution of resources. Thus, robust financial systems, coupled with good governance, can reduce economic inequalities and promote development that benefits all segments of society, thereby encouraging policymakers to adopt economic policies that strengthen both access to finance and institutional transparency (Beck and Levine, 2004).

With regard to governance variables, it appears that control over governance characteristics such as corruption control, political stability, government effectiveness, rules and laws, and regulatory quality significantly stimulate inclusive growth in Africa. Voice and accountability are statistically insignificant for inclusive growth in Africa.

Table 11-a: Effect of financial development on inclusive growth: Role of governance. Estimation using ordinary least squares (OLS) and the Driscoll-Kraay method.

	Inclusive Growth Index					
	Ordinary Least Squares (OLS)					
	1	2	3	4	5	6
FD Index	0.0416** (0.0186)	0.0473** (0.0183)	0.0340* (0.0185)	0.0458** (0.0185)	0.0411** (0.0186)	0.0536*** (0.0191)
Urbanization	0.1942*** (0.0372)	0.1415*** (0.0370)	0.2365*** (0.0379)	0.2053*** (0.0377)	0.2014*** (0.0374)	0.1687*** (0.0372)
Total Natural Resource	0.0081*** (0.0013)	0.0068*** (0.0012)	0.0089*** (0.0013)	0.0077*** (0.0013)	0.0080*** (0.0013)	0.0059*** (0.0013)
Manufacturing	0.0005 (0.0023)	-0.0007 (0.0023)	0.0008 (0.0023)	-0.0000 (0.0023)	-0.0006 (0.0023)	-0.0009 (0.0024)
Mortality rate	-0.1460*** (0.0287)	0.1337*** (0.0285)	-0.1605*** (0.0286)	0.1656*** (0.0296)	-0.1453*** (0.0287)	0.1328*** (0.0290)
Electricity	0.0073*** (0.0008)	0.0077*** (0.0008)	0.0062*** (0.0008)	0.0071*** (0.0008)	0.0074*** (0.0008)	0.0080*** (0.0008)
Corruption control	0.1208*** (0.0258)					
Political stability		0.0832*** (0.0160)				
Government efficiency			0.1996*** (0.0317)			
Role of laws				0.1275*** (0.0286)		
Quality of regulation					0.1288*** (0.0284)	
Path and responsibility						(0.0219)
Constant	-1.8408*** (0.1842)	-1.6189*** (0.1840)	-1.9469*** (0.1838)	-1.9285*** (0.1875)	-1.8471*** (0.1843)	-1.7534*** (0.1853)
Observations	869	868	868	868	868	868
R-squared	0.3925	0.3975	0.4060	0.3926	0.3931	0.3789
Number of groups						
Fisher	79.47	81.05	83.96	79.42	79.57	74.94

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's own construction

Plausible explanations for these results are based on the fact that mastery of governance characteristics such as control of corruption, political stability, government effectiveness, rule

of law and quality of regulation stimulates inclusive growth in Africa by enhancing transparency and fairness in the management of economic resources. First, increased control of corruption allows for the optimal allocation of public resources to priority sectors such as health, education and infrastructure, which are essential for reducing inequalities (Mauro, 1995).

Political stability, by reducing uncertainty, attracts investment and fosters an environment conducive to job creation, while encouraging the equitable distribution of economic benefits (Aisen and Veiga, 2013). Furthermore, effective government and strong rule of law ensure protection of property rights and better provision of public services, facilitating the integration of marginalized populations into the formal economy (Kaufmann et al., 1999). Finally, the quality of regulation promotes competitiveness and access to credit, thereby stimulating entrepreneurship and the economic participation of disadvantaged groups (Beck et al., 2007). The results relating to urbanization, natural resource rents and access to electricity remain positive and significant for inclusive growth, as found in the baseline analysis.

Table 11-b: Effect of financial development on inclusive growth: Role of governance. Estimation using ordinary least squares (OLS) and the Driscoll-Kraay method.

	Inclusive Growth Index					
	Driscoll-Kraay					
	7	8	9	10	11	12
FD Index	0.0423* (0.0222)	0.0469* (0.0226)	0.0377* (0.0215)	0.0480** (0.0225)	0.0440* (0.0232)	0.0501* (0.0256)
Urbanization	0.1730*** (0.0312)	0.1175*** (0.0293)	0.2187*** (0.0319)	0.1892*** (0.0324)	0.1833*** (0.0344)	0.1361*** (0.0331)
Total Natural Resource	0.0082*** (0.0020)	0.0068*** (0.0019)	0.0090*** (0.0022)	0.0079*** (0.0020)	0.0084*** (0.0019)	0.0069*** (0.0022)
Manufacturing	-0.0273 (0.0208)	-0.0461** (0.0195)	-0.0236 (0.0217)	-0.0319 (0.0199)	-0.0359 (0.0210)	-0.0384* (0.0205)
Mortality rate	-0.1991*** (0.0266)	-0.1799*** (0.0279)	0.2056*** (0.0269)	-0.2194*** (0.0274)	0.1972*** (0.0275)	-0.1927*** (0.0288)
Electricity	0.0078*** (0.0007)	0.0081*** (0.0006)	0.0066*** (0.0007)	0.0075*** (0.0007)	0.0078*** (0.0008)	0.0087*** (0.0007)
Corruption control	0.1407*** (0.0247)					
Political stability		0.1067*** (0.0100)				
Government efficiency			0.2080*** (0.0339)			
Role of laws				0.1469*** (0.0212)		
Quality of regulation					0.1531*** (0.0212)	
Path and responsibility						0.0568 (0.0257)
Constant	-1.9131*** (0.1196)	-1.6143*** (0.1270)	-2.0044*** (0.1281)	-2.0103*** (0.1306)	-1.9128*** (0.1276)	-1.8064*** (0.1190)
Observations	854	854	854	854	854	854
R-squared	0.4048 49	0.4174 49	0.4172 49	0.4036 49	0.4051 49	0.3871 49
Number of groups						
Fisher	265.4	319.6	248.0	275.6	284.0	240.3

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's own construction

4.3. Role of institutional transaction costs in the effects of financial development on inclusive growth in Africa

This subsection addresses the explanatory analysis of the indirect effects of financial development on inclusive growth by examining the moderating and mediating roles of institutional transaction costs (ITCs). The objective is to determine whether ITCs serve as a moderator or a mediator in the transmission of financial development's effects on inclusive growth in Africa.

Regarding the moderation approach, the results of which are recorded in Table 12, we first performed variable centering before proceeding with the interaction analysis to mitigate the risks of multicollinearity, as recommended by Aiken and West (1991). The third row of said table shows the existence of a positive and significant effect (0.6216) of the interaction between financial development and institutional transaction costs on inclusive growth in Africa. However, examining only the table coefficients in an interaction analysis can be limiting. Although positively oriented, a lack of statistical robustness across the entire dataset can be observed (Brambor et al., 2006). It should also be noted that standard errors (in our case, the standard error of financial development and that of the interaction term) can inflate in interaction models, thereby rendering the effect non-significant on the graph even when the interaction term appears significant in the table (Berry et al., 2012). Consequently, we also conducted a graphical analysis of marginal effects as recommended. Indeed, the rectangular shape of the shaded area in Figure 3 (marginal effects) shows that even if an interaction exists, there is doubt regarding whether the effect is positive for all countries, given that the trend line is perfectly horizontal.

Thus, the first row of the table shows a positive effect of financial development on inclusive growth. This positive effect suggests that improving access to finance (via banks, microcredit, financial markets, etc.) allows a larger portion of the population, including the most marginalized, to participate in economic activity. This translates into increased productive investment, diversified job creation, and better access to basic services such as education and health. In an African context where inequalities are pronounced, a dynamic financial sector serves as a lever for poverty reduction and, consequently, a catalyst for inclusive growth. The analysis of the marginal effects in Figure 3 reinforces the results indicating that financial development is a powerful determinant of inclusive growth in Africa (with a coefficient of 0.3). This sufficiently proves that the African financial system acts on inclusive growth independently of the bureaucratic or contractual barriers of the formal institutional framework. However, given that the confidence interval encompasses zero (-0.4 to 1), this result remains fragile. These findings corroborate those of Asongu (2013), who finds that financial development in Africa is too fragile because it primarily benefits the formal sector, leaving the informal sector marginalized. Similarly, Ibrahim and Alagidede (2018) find that finance is only effective if it exceeds a certain level of institutional development. Without this, the effect remains statistically uncertain. This situation suggests that, autonomously, financial development alone does not systematically guarantee inclusive growth in Africa. It must be coupled with other structural policies, such as access to electricity or education, among others, to reach the threshold of statistical significance.

Table 12: Effect of financial development inclusive growth: Moderating role of transaction costs.

	Inclusive Growth Index							
	OLS				Driscoll-Kraay			
	1	2	3	4	5	6	7	8
FD Index	0.3274*** (0.0923)	0.0233** (0.0406)	0.1748*** (0.0601)	0.1064* (0.0559)	0.1651** (0.1208)	0.0334** (0.0462)	0.0564* (0.0300)	0.0824* (0.0420)
ITCs	0.0898** (0.5219)	0.0228* (0.6180)	0.4210** (0.1784)	0.2110** (0.1961)	0.0999** (3.5567)	0.0422* (0.5273)	0.1757*** (0.5727)	0.0019*** (0.5930)
DF index* ITCs		0.0667** (0.0324)	0.0506** (0.0396)	0.0574* (0.0334)		0.0534** (0.0435)	0.8473*** (0.1228)	0.6216** (0.1189)
Urbanization			0.0056* (0.0031)	0.0032 (0.0027)			0.0047 (0.0049)	0.0026 (0.0042)
TNR			0.0009 (0.0054)	0.0108** (0.0050)			-0.0020 (0.0106)	0.0105 (0.0091)
Manufacturing			0.0368*** (0.0123)	0.0339*** (0.0103)			0.0154 (0.0091)	0.0132 (0.0117)
Mortality rate				-0.0072*** (0.0026)				-0.0089*** (0.0030)
Electricity				0.0635*** (0.0173)				0.0659*** (0.0187)
Constant	-0.6167 (0.6630)	0.3054 (0.2174)	-1.5899*** (0.3495)	-0.3044 (0.3493)	0.9279 (0.7544)	0.3054 (0.2453)	-0.0405 (0.2457)	-0.2632 (0.2534)
Observations	107	120	96	95	33	120	112	111
R-squared	0.1141	0.2405	0.4484	0.6227	0.2288	0.2405	0.3967	0.6108
Fisher	6.695	12.24	12.06	17.74	4.290	37.16	15.64	211.1

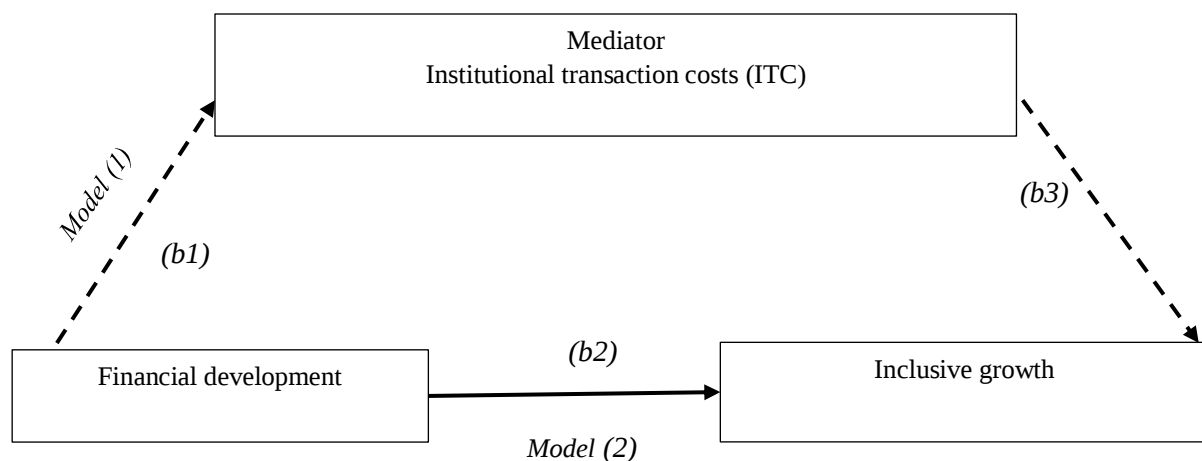
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source : Author's own construction

With regard to mediation, the analysis of transmission channels using mediation techniques is discussed in the work of Iacobucci et al. (2007); MacKinnon (2012); and Zhao et al. (2010). We apply the classical mediation analysis developed by Baron and Kenny (1986), validated by distribution tests (Sobel, Delta) and resampling tests (Bootstrap), to explore the direct and indirect effects of financial development on inclusive growth in Africa.

Whilst the approach developed by Baron and Kenny (1986) enables us to establish the logical structure of our mediation model, it has limitations when it comes to accurately quantifying the strength of the indirect effect, particularly in contexts involving asymmetric data. To overcome these limitations, we follow the recommendations of Preacher and Hayes (2008) by prioritizing the formal testing of the indirect effect of using the Bootstrap method.

Figure 4: Mediation model



This approach is based on the estimation of the two models described:

Model 1 : $Med_i = \alpha_1 + b_1 FD_i + c_1 X_i + \mu_i$ (2)

Model 2 : $IGI_i = \alpha_2 + b_2 FD_i + b_3 Med_i + c'_2 X_i + v_i$ (3)

where Med_i represents the mediating variable (institutional transaction costs). The composition effect follows from the above models as follows: Indirect effect: $b_1 \times b_3$; direct effect b_2 and the total effect $(b_1 \times b_3) + b_2$.

First, we estimate model (1), which presents the effect of financial development on the mediator (institutional transaction cost); the parameter describing this effect is b_1 . Secondly, we estimate model (2), in which we regress financial development on inclusive growth while controlling for mediators. The magnitude of this effect is given by the coefficient of financial development. (b_2). The indirect effect is obtained by the product of b_1 et b_3 , where b_3 measures the strength of the correlation between financial development and the mediator in model (2). This term also reflects the size of the mediation, which depends mainly on the extent to which financial development affects the mediator (b_1) and the extent to which mediators influence inclusive growth (b_3). The methodological challenge of mediation analyses is to test the significance of the various effects (hypothesis H0: effect = 0; hypothesis H1: effect $\neq$ 0). With regard to the effects b_1, b_2, b_3 et $(b_1 \times b_3) + b_2$, they can be easily estimated and tested using linear regression and Student's t-test. However, with regard to the indirect effect $b_1 \times b_3$, It is easy to estimate, but much more complex to test its significance. Therefore, we use Michael Sobel's statistic,

which tests the significance of the indirect effect based on the standard error (SE) of the indirect effect and then determines the statistic. $t = \frac{b_1 \times b_3}{SE}$ (Sobel, 1982).

The results in Table 13 show that, overall, the estimation of Equation 2 (mediation model 1) suggests that (i) financial development and its components, such as 'domestic credit', the 'bank score' and the 'bank branches' significantly reduce institutional transaction costs (columns 1a, 2a, 3a and 5a). This result shows that financial development reduces institutional transaction costs by facilitating remittances, improving access to information, and reducing information asymmetries by standardizing remittance services (Levine, 2005). It also promotes financial inclusion, institutional efficiency, and risk management (Demirgüç-Kunt and Maksimovic, 1998); The most significant effect is that of domestic credit (-0.120), suggesting that it is the provision of credit that reduces transaction barriers. Only bank net interest (4a) has a positive sign (0.085); this shows that high interest margins increase transaction costs for borrowers. Only 'Bank net interest' significantly increases institutional transaction costs;

(ii) across all columns, the mediator (transaction costs) has a negative and significant effect on inclusive growth. Columns 1b, 2b, 3b, 4b and 5b present the analysis of the effect on inclusive growth and demonstrate the existence of the mediating effect, as the coefficients of the institutional transaction costs variable are negative in models 1 to 4. This sufficiently proves that high institutional transaction costs reduce quality and hinder inclusive growth. In other words, the lower the transaction costs, the greater the inclusive growth.

These results also highlight the complexity of the effects of financial development on institutional transaction costs (ITC) and inclusive growth in Africa. On the one hand, traditional components of financial development such as domestic credit, the number of bank branches and the Bank Z-score (an indicator of banking stability) help to reduce ITCs, which is consistent with the literature on financial intermediation. These factors facilitate access to financial services, improve the dissemination of information and enhance the security of economic transactions. This is in line with the work of Levine (2005) and Demetriades & Law (2006), who emphasize that banking density and sector stability reduce institutional frictions. However, banks' net interest rates, which drive up borrowing costs, significantly increase IFCs. When rates are too high, they deter the most vulnerable economic agents from using formal services, pushing them towards costly and less secure informal alternatives. This creates a financial exclusion effect. Expanded access to financial services helps to stimulate investment, entrepreneurship and economic resilience. However, two indicators, the Bank Z-score and the net interest rate, reduce inclusive growth, likely because they reflect a logic of banking prudence and profitability that can hinder access to financial services for disadvantaged populations.

As for institutional transaction costs (ITCs), they significantly reduce inclusive growth in Africa overall. This finding confirms the moderating role played by ITCs in the relationship between financial development and inclusive growth. Institutional transaction costs (ITCs) act as a structural constraint, moderating the positive effect that financial development has inclusive economic growth in Africa. By reducing the fluidity of trade, complicating access to financial services and maintaining administrative barriers, ITCs limit the ability of vulnerable populations to fully benefit from the opportunities created by an expanding financial system. The moderating role of institutional frictions is documented in the work of Hounguevou and Eggoh (2021), who show that financial inclusion stimulates growth only when institutional frictions are low. Similarly, Tchouassi et al. (2022) emphasize that high CTI hinders access to formal banking services, thereby reducing the impact of financial inclusion policies on growth. In other words, even if financial development progresses through increased credit, digitalization or the expansion of bank branches, its effect on inclusive economic growth remains contingent on the ability of institutions to reduce transaction costs.

The mediation test shows full convergence for the three tests: Sobel, Monte Carlo and Delta. All p-values are below 0.05 (or 0.10 for Model 3). It is clear that mediation is statistically proven for all financial dimensions. Model 4 (Bank net interest: the difference between lending and borrowing rates) shows a mediation rate of 34%, closely followed by domestic credit (31%). This means that for credit or interest margins, approximately one-third of their impact on the population is channeled through improvements in the institutional framework (reduction in transaction costs) in Africa. These results suggest that financial liberalization policies in Africa can only achieve their full potential for inclusivity if they are accompanied by a significant reduction in transaction barriers.

Model 4, for example, explores the impact of the net interest margin. The results highlight a crucial transmission mechanism. The positive and significant coefficient of 0.085 (4a) between the interest margin and ICRs suggests that high margins act as an institutional barrier. High interest margins in Africa are not only a sign of weak competition, but they reflect and fuel the inefficiencies of the institutional framework (poorly managed default risks, information asymmetries, collection costs).

Furthermore, the negative and significant coefficient of -0.120 (4b) for the 'Institutional Transaction Costs' variable on Inclusive Growth confirms that rising transaction costs stifle the inclusiveness of growth. Indeed, when banks maintain high margins, they effectively exclude SMEs and low-income households. This exclusion is mediated by institutions: if the courts are slow or if credit registers are unreliable (high ICI), the bank increases its margin, which reduces the capacity of growth to be redistributive. This proves that to make growth more inclusive via the banking sector, it is not enough to simply ask banks to lower their rates. Action must be taken on the 34% of the effect that depends on institutions. Thus, reducing information asymmetries (credit bureaus) and securing collateral (land and legal reforms) would help lower bank margins and, in turn, boost the inclusiveness of growth.

Model 5 (Bank branches) has a mediation coefficient of 16%. This is interesting because it shows that geographical access (branches) is important, but that financial access (the cost/rate in Model 4) is twice as dependent on the quality of institutions to generate inclusivity. Similarly, Model 1, which takes into account the financial development index, has a mediation coefficient of 14%.

Table 13: Effect of financial development on inclusive growth: Mediating role of transaction costs

Variables	Mediation variable: Transaction costs									
	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b
	ITCs	IGI	ITCs	IGI	ITCs	IGI	ITCs	IGI	ITCs	IGI
FD Index	-0.034*** (0.009)	0.056*** (0.018)								
Domestic credit			-0.120*** (0.008)	0.048** (0.025)						
Bank Z-score					-0.056*** (0.019)	-0.152*** (0.041)				
Bank net interest							0.085*** (0.018)	-0.019*** (0.041)		
Bank branches									-0.090*** (0.007)	0.147*** (0.018)
Transaction costs		-0.256*** (0.160)		-0.187*** (0.116)		-0.161** (0.099)		-0.120*** (0.106)		-0.221** (0.099)
Control variables	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Constant	-1.387*** (0.018)	-0.374 (0.224)	-0.947 *** (0.023)	-0.605*** (0.125)	-1.145*** (0.050)	-0.019*** (0.156)	-1.447*** (0.033)	-0.320*** (0.171)	-1.168*** (0.020)	-0.113 (0.816)
Bootstrap rep	500	500	500	500	500	500	500	500	500	500
Obs	248	248	248	248	248	248	248	248	248	248
Transaction cost mediation tests										
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
Delta	0.009 (0.006)	0.021	0.022 (0.014)	0.011	0.009 (0.006)	0.061	-0.010 (0.009)	0.019	-0.020 (0.009)	0.029
Sobel	0.009 (0.006)	0.021	0.022 (0.014)	0.011	0.009 (0.006)	0.061	-0.010 (0.009)	0.019	-0.020 (0.009)	0.029
Monte Carlo	0.009 (0.006)	0.023	0.022 (0.014)	0.011	0.009 (0.006)	0.061	-0.010 (0.009)	0.023	-0.020 (0.009)	0.028
Composition of the mediation effect										
Indirect	0.009		0.022		0.009		0.010		0.020	
Direct	0.056		0.049		0.152		0.020		0.147	
Total	0.065		0.071		0.143		0.03		0.127	
% de méd.	13,8 %		31 %		6 %		33 %		16 %	

Source : Author's own construction

The table below summarizes the decisions made regarding the research hypotheses in light of the various estimations (OLS, GLS, Driscoll-Kraay, Lewbel 2SLS, and GMM):

Table 14: Results Summary and Hypotheses Validation

Hypothesis	Statement	Empirical result (sign + significance)	Decision/Status	Synthetic justification
H1 (Direct effect)	Financial development (FD) has a positive effect on inclusive growth (IQCI).	(+) Significant (Stable across all estimators)	Validated	The DF facilitates access to basic services and reduces barriers to entry for marginalized populations. However, it remains fragile in the African context.
H2a (Mediation)	Transaction costs (TCI) play a mediating role in the transmission of the effects of the DF.	Significant (Indirect effect of 14%)	Validated	A significant part (14%) of the impact of the DF comes from reducing institutional barriers, thereby facilitating economic inclusion.
H2b (Moderation)	Transaction costs (TCI) play a moderating role in the DF-IQCI relationship	(+) Significant (Interaction Term)	Not robust	Despite a positive coefficient in the regressions, the analysis of marginal effects shows statistical fragility (interval including zero), indicating a non-uniform effect

Source : Author's own construction

5. Conclusion

This article aimed to demonstrate the mechanisms through which financial development influences inclusive growth in Africa, while highlighting the pivotal role of institutional transaction costs (ITC). We first examined the direct relationship between these two variables, followed by an analysis of the indirect relationship. In the latter, we emphasized the role of institutional transaction costs by testing the hypotheses that: (1) financial development exerts a positive effect on inclusive growth in Africa, and (2) financial development effectively transmits its effects to inclusive growth when institutional transaction costs act as a mediator (2a) and/or a moderator (2b).

Following a rigorous empirical analysis conducted on a panel of African countries, utilizing robust econometric techniques (such as Driscoll-Kraay, GMM, 2SLS) and based on the results from Tables 12 and 13 as well as the analysis of Figure 3, it is appropriate to conclude that the interaction between financial development and institutional transaction costs lacks the robustness required to produce a uniform effect across all African countries. While financial development asserts itself as a genuine determinant of inclusive growth, its fragility within the African context suggests that its effectiveness is contingent upon complementary structural policies. Thus, the reduction of institutional transaction costs appears to be a necessary condition for the financial lever to effectively achieve its inclusive growth objectives.

Based on these results, policymakers are recommended to: (i) Prioritize the securing of property rights and ensure transparency in contracting to alleviate institutional transaction costs, thereby transforming rural assets into eligible bank collateral; (ii) Foster data sharing between traditional banks and Fintechs to dismantle the barriers of informality, including administrative and legal hurdles, information asymmetry, the fear of taxation, and technological or psychological gaps to better support vulnerable populations; (iii) Encourage the diversification of credit portfolios toward non-extractive sectors (such as agriculture, local processing, and services) in order to transform surplus bank liquidity into a powerful engine for redistributive

growth.

Regarding limitations: (i) although the study covers 53 African countries, data on Institutional Transaction Costs (ITC) are not always available continuously over long periods. A sample size of 248 observations limits the ability to conduct robust sub-regional analyses (e.g., West Africa vs. East Africa) or analyses by income level. This may also reduce the statistical power of certain mediation tests, although Bootstrapping helps compensate for this risk. (ii) Given that Institutional Transaction Costs are, by nature, difficult to observe directly, the use of composite indicators (such as those by Kaufmann et al., 2010) remains an approximation (proxy). These indices may not capture the full range of informal transactional barriers prevalent in African economies. (iii) Despite the use of robust methods (Sobel, Monte Carlo, Bootstrap), the relationship between financial development, institutional transaction costs, and inclusive growth remains complex and may exhibit reverse causality (endogeneity issues). While financial development reduces institutional transaction costs, it is also possible that better institutions foster financial development. Although the mediation model structures the hierarchy of effects, a System GMM analysis (if data permitted over a longer period) could refine the management of this circularity.

This study also opens new horizons. The advent of green finance and digital technologies offers opportunities to automate the reduction of transaction costs. Exploring these tools at the microeconomic level constitutes a future research frontier for a more resilient and inclusive Africa.

References:

- (1). Abdulahi, M. E., Shu, Y., & Khan, M. A. (2019). Resource rents, economic growth, and the role of institutional quality: A panel threshold analysis. *Resources Policy*, 61, 293–303.
- (2). Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Sage Publications.
- (3). Aisen, A., & Veiga, F. J. (2013). How does political instability affect economic growth? *European Journal of Political Economy*, 29, 151–167.
- (4). Ali, I., & Son, H. H. (2007). Measuring inclusive growth. *Asian Development Review*, 24(1), 11–31.
- (5). Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277–297.
- (6). Asongu, S. A. (2013). How has mobile banking stimulated financial development in Africa? Evidence from Algeria, Egypt, Morocco and Tunisia. *Research in International Business and Finance*.
- (7). Asongu, S. A. (2014). Financial development dynamic thresholds of financial openness: Evidence from Africa. *Journal of Economic Studies*, 41(2), 273–295.
- (8). Baltagi, B. H. (2008). *Econometric analysis of panel data* (4th ed.). John Wiley & Sons.
- (9). Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182.
- (10). Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality, and poverty. *Journal of Economic Growth*, 12(1), 27–49.
- (11). Beck, T., Fuchs, M. J., & Uy, M. (2009). Finance in Africa: Achievements and challenges. *World Bank Policy Research Working Paper*, (5020).
- (12). Ben Naceur, S., & Omran, M. (2011). The effects of bank regulation, competition, and financial reforms on banks' performance. *Emerging Markets Review*, 12(1), 1–20.

- (13). Berry, W. D., Golder, M., & Milton, D. (2012). Improving on interpretive practice in the use of interaction models. *American Journal of Political Science*.
- (14). Bhattacharyya, S., & Hodler, R. (2010). Natural resources, corruption and bank development. *Journal of Development Economics*, 92(1), 43–52.
- (15). Bhattacharyya, S., & Hodler, R. (2014). Do natural resource revenues hinder financial development? The role of political institutions. *World Development*, 57, 101–113.
- (16). Bitoto, F. E., Ngounou, A. B., Messie, T. P., Juakaly, E. W., & Njikam, C. N. M. (2024). When energy dispels curse: Linking natural resources, energy and inclusive growth in Africa. *Resources Policy*, 99, 105384.
- (17). Brambor, T., Clark, W. R., & Golder, M. (2006). Understanding interaction models: Improving empirical analyses. *Political Analysis*, 14(1), 63–82.
- (18). Cha'Ngom, N., & Manga, E. E. (2020). Migrants' remittances and inclusive growth in Sub-Saharan Africa. *HAL SHS*, halshs-02866942.
- (19). Čihák, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012). Benchmarking financial systems around the world. *World Bank Policy Research Working Paper*, No. 6175.
- (20). Coase, R. (1937). The nature of the firm. *Economica*, 4(16), 386–405.
- (21). Cui, L., Weng, S., & Song, M. (2022). Financial inclusion, renewable energy consumption, and inclusive growth: Cross-country evidence. *Energy Efficiency*, 15(6), 43.
- (22). Demetriades, P., & Law, S. H. (2006). Finance, institutions and economic development. *International Journal of Finance & Economics*, 11(3), 245–260.
- (23). Demirgüç-Kunt, A., & Levine, R. (2009). Finance and inequality: Theory and evidence. *Annual Review of Financial Economics*, 1(1), 287–318.
- (24). Demirgüç-Kunt, A., & Maksimovic, V. (1998). Law, Finance, and Firm Growth. *The Journal of Finance*, 53(6), 2107–2137. <https://doi.org/10.1111/0022-1082.00084>
- (25). Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics*, 80(4), 549–560.
- (26). El Balghity, I., & El Alaoui, A. (2022). Financial development and economic growth in Morocco. *International Journal of Accounting, Finance, Auditing, Management and Economics*, 3(5-2), 314–328.
- (27). Emara, N., & El Said, A. (2021). Financial inclusion and economic growth: The role of governance in selected MENA countries. *International Review of Economics & Finance*, 75, 34–54.
- (28). Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55(2), 251–276.
- (29). Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272–299.
- (30). Ferrini, L. (2012). *The importance of institutions to economic development*. E-International Relations.
- (31). Global Financial Development Database. (2023). *Global financial development databank*. World Bank. <https://www.worldbank.org>
- (32). Gupta, M., Saini, S., & Sahoo, M. (2022). Determinants of ecological footprint and PM2.5: Role of urbanization, natural resources and technological innovation. *Environmental Challenges*, 7, 100467.
- (33). Gurley, J. G., & Shaw, E. S. (1960). *Money in a theory of finance*. Brookings Institution.
- (34). Gyamfi, N. M., Bokpin, G. A., Aboagye, A. Q., & Ackah, C. G. (2022). Financial development, institutional quality and inclusive growth in Africa. *Global Business Review*, 23(3), 584–607.

- (35). Hounguevou, Y., & Eggoh, J. (2021). Financial inclusion and economic growth: A new investigation of the non-linearity. *Journal of Economic and Financial Policy Analysis*.
- (36). Houssou, K. P. (2021). *The impact of institutions on economic development in sub-Saharan Africa* (Doctoral dissertation). University of Abomey-Calavi.
- (37). Hsiao, C. (1986). *Analysis of panel data* (Econometric Society Monographs No. 11). Cambridge University Press.
- (38). Iacobucci, D., Saldanha, N., & Deng, X. (2007). Mediation on mediation: Evidence that structural equation models perform better than regressions. *Journal of Consumer Psychology*, 17(2), 139–153.
- (39). Ibrahim, M., & Alagidede, P. (2018). Effect of financial development on economic growth: Does institutional quality matter? *World Development Perspectives*.
- (40). Iddrisu, K., Abor, J. Y., & Banyen, T. K. (2024). Foreign bank presence and inclusive growth in Africa: The moderating role of financial development. *African Journal of Economic and Management Studies*, 15(3), 349–365.
- (41). Idowu, A. (2013). *The socio-cultural context of maternal health in Lagos State, Nigeria* (Unpublished doctoral dissertation). Covenant University, Ota, Nigeria.
- (42). International Monetary Fund. (2023). *Fiscal decentralization database: Quarterly public sector statistics*. <https://www.imf.org/en/Data>
- (43). Kang, H., & Martinez-Vazquez, J. (2022). When does foreign direct investment lead to inclusive growth? *The World Economy*, 45(8), 2394–2427.
- (44). Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010). The worldwide governance indicators: Methodology and analytical issues. *World Bank Policy Research Working Paper*, (5430).
- (45). Kaufmann, D., Kraay, A., & Zoido-Lobaton, P. (1999). Aggregating governance indicators. *World Bank Policy Research Working Paper*, (2195).
- (46). Kovac, M., & Spruk, R. (2019). The institutional evolution of economic development: From property rights to transaction costs. *Journal of Institutional Economics*, 15(6), 1081–1109.
- (47). Kovac, M., & Spruk, S. (2016). Institutional development, transaction costs and economic growth: Evidence from a cross-country investigation. *Journal of Institutional Economics*, 12(1), 129–159.
- (48). Laajoul, M., & Oulhaj, L. (2021). Financial development and economic growth: The case of China. *Revue Française d'Économie et de Gestion*, 2(6).
- (49). Law, S. H., Azman-Saini, W. N. W., & Ibrahim, M. H. (2013). Institutional quality thresholds and the finance–growth nexus. *Journal of Banking & Finance*, 37(12), 5373–5381.
- (50). Levine, R. (2005). Finance and growth: Theory and evidence. In P. Aghion & S. Durlauf (Eds.), *Handbook of economic growth* (Vol. 1, pp. 865–934). Elsevier.
- (51). Lewbel, A. (2012). Using heteroscedasticity to identify and estimate mismeasured and endogenous regressor models. *Journal of Business & Economic Statistics*, 30(1), 67–80.
- (52). Li, X., Yang, J., & Zeng, N. (2024). Natural resource rent and inclusive finance: An institutional perspective. *Economic Change and Restructuring*, 57(2), 45.
- (53). Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42.
- (54). MacKinnon, D. P. (2012). *Introduction to statistical mediation analysis*. Routledge.
- (55). Mauro, P. (1995). Corruption and growth. *The Quarterly Journal of Economics*, 110(3), 681–712.
- (56). McKinley, T. (2010). *Inclusive growth criteria and indicators: An inclusive growth index for diagnosis of country progress*. Asian Development Bank.

- (57). McKinnon, R. I. (1973). *Money and capital in economic development*. Brookings Institution Press.
- (58). Medjahed, K., & Hachim, M. N. (2023). Financial development and economic growth: An empirical study. *Les Cahiers du MECAS*, 19(1), 92–104.
- (59). Mignamissi, D., & Djeufack, A. (2022). Urbanization and CO₂ emissions intensity in Africa. *Journal of Environmental Planning and Management*, 65(9), 1660–1684.
- (60). Minea, A., & Villieu, P. (2010). Financial development, institutional quality and growth: A simple model with threshold effects. *Région et Développement*, 32, 31–58.
- (61). Mlachila, M., Tapsoba, R., & Tapsoba, S. J. (2014). A quality of growth index for developing countries: A proposal. *Social Indicators Research*, 134, 675–710.
- (62). Mohamed, E. S. E. (2020). Resource rents, human development and economic growth in Sudan. *Economies*, 8(4), 99.
- (63). Ngounou, B. A., Tekam Oumbe, H., Ongo Nkoa, B. E., & Noubissi Domguia, E. (2024). Inclusive growth in the face of increasing urbanization: What experience for African countries? *Review of Development Economics*, 28(1), 34–70.
- (64). Njoya, L., Ngouhouo, I., Ngounou, B. A., Njoupouognigni, M., & Nguena, C.-L. (2023). Informality and inclusive growth: What lessons in the literature from the African experience? *Environmental Modeling & Assessment*, 1–22.
- (65). Nketia, E. B., Kong, Y., Korankye, B., & Ampon-Wireko, S. (2022). The influence of inequality, institutional quality, and foreign aid on inclusive growth in Africa. *African Review of Economics and Finance*, 14(2), 160–182.
- (66). North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
- (67). North, D. C. (1991). Institutions. *Journal of Economic Perspectives*, 5(1), 97–112.
- (68). Nonvide, G. M. A., Faton, C. Y., & Togodo Azon, M. S. S. (2025). Inclusion Financière Digitale et Croissance Economique dans l'Espace UEMOA : Rôle de la Qualité des Institutions. *African Development Review*, 37(1), e70004.
- (69). Ofori, I. K., & Asongu, S. A. (2021). ICT diffusion, foreign direct investment and inclusive growth in Sub-Saharan Africa. *Telematics and Informatics*, 65, 101718.
- (70). Ofori, I. K., Osei, D. B., & Alagidede, I. P. (2022). Inclusive growth in Sub-Saharan Africa: Exploring the interaction between ICT diffusion and financial development. *Telecommunications Policy*, 46(7), 102315.
- (71). Oyinlola, M. A., & Adedeji, A. (2019). Human capital, financial sector development and inclusive growth in Sub-Saharan Africa. *Economic Change and Restructuring*, 52, 43–66.
- (72). Oyinlola, M. A., Adedeji, A. A., Bolarinwa, M. O., & Olabisi, N. (2020). Governance, domestic resource mobilization, and inclusive growth in Sub-Saharan Africa. *Economic Analysis and Policy*, 65, 68–88.
- (73). Pedroni, P. (2004). Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an aggregate idiosyncratic heterogeneity. *Econometric Theory*, 20(3), 597–625.
- (74). Pham, T. H. A., Lin, C. Y., Moslehpour, M., Van Vo, T. T., Nguyen, H. T., & Nguyen, T. T. H. (2024). What role financial development and resource-curse situation play in inclusive growth of Asian countries. *Resources Policy*, 88, 104498.
- (75). Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891.
- (76). Raheem, I. D., Isah, K. O., & Adedeji, A. A. (2018). Inclusive growth, human capital development and natural resource rent in SSA. *Economic Change and Restructuring*, 51, 29–48.

- (77). Ramey, G., & Ramey, V. A. (1995). Cross-country evidence on the link between volatility and growth. *NBER Working Paper*, (4959).
- (78). Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037.
- (79). Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, 9(1), 86–136.
- (80). Sarpong, B., & Nketiah-Amponsah, E. (2022). Financial inclusion and inclusive growth in Sub-Saharan Africa. *Cogent Economics & Finance*, 10(1), 2058734.
- (81). Shaw, E. S. (1973). *Financial deepening in economic development*. Oxford University Press.
- (82). Singh, N. S., & Prasad, B. C. (2014). Urbanization and economic growth: An empirical study of Pacific Island economies. *School of Economics Working Paper*, 1, 1–20.
- (83). Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology*, 13, 290–312.
- (84). Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288–1292.
- (85). Tchouassi, G., & Tomo, C. P. (2022). Modeling the effects of institutional reforms on financial development for economic growth in the CEMAC zone. *Working Paper*.
- (86). Tella, S. A., & Alimi, O. Y. (2016). Determinants of inclusive growth in Africa: Role of health and demographic changes. *African Journal of Economic Review*, 4(2), 138–146.
- (87). Ukwandu, D. C. (2018). Absence of electricity as a barrier to inclusive growth and development in Nigeria. *African Journal of Public Affairs*, 10(3), 23–42.
- (88). United Nations Conference on Trade and Development. (2023). *World investment report 2023: Investing in sustainable recovery*. United Nations Publications.
- (89). Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*. Free Press.
- (90). Wooldridge, J. M. (2001). Applications of generalized method of moments estimation. *Journal of Economic Perspectives*, 15(4), 87–100.
- (91). Wooldridge, J. M. (2009). *Introductory econometrics: A modern approach*. South-Western Cengage Learning.
- (92). World Bank. (2023a). *World development indicators*. <https://databank.worldbank.org/source/world-development-indicators>
- (93). World Bank. (2023b). *Worldwide governance indicators*. <https://www.worldbank.org/en/publication/worldwide-governance-indicators>
- (94). Yinusa, O. G., Aworinde, O. B., & Odusanya, I. A. (2020). Institutional quality, financial development and inclusive growth: Asymmetric cointegration approach. *International Journal of Management, Economics and Social Sciences*, 9(3), 182–205.
- (95). Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2), 197–206.
- (96). Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa. *Review of Development Finance*, 6(1), 46–57.

Appendices

Table 3: Eigenvalues of the principal component analysis

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.367	1.306	0.395	0.395
Comp2	1.061	0.061	0.177	0.571
Comp3	1.001	0.159	0.167	0.738
Comp4	0.842	0.242	0.140	0.878
Comp5	0.599	0.469	0.100	0.978
Comp6	0.130	.	0.022	1.000
Cronbach's Alpha			0.7339	
Kaiser-Meyer-Olkin (KMO)			0.768	
Bartlett specificity test (χ^2)			2027.067***	

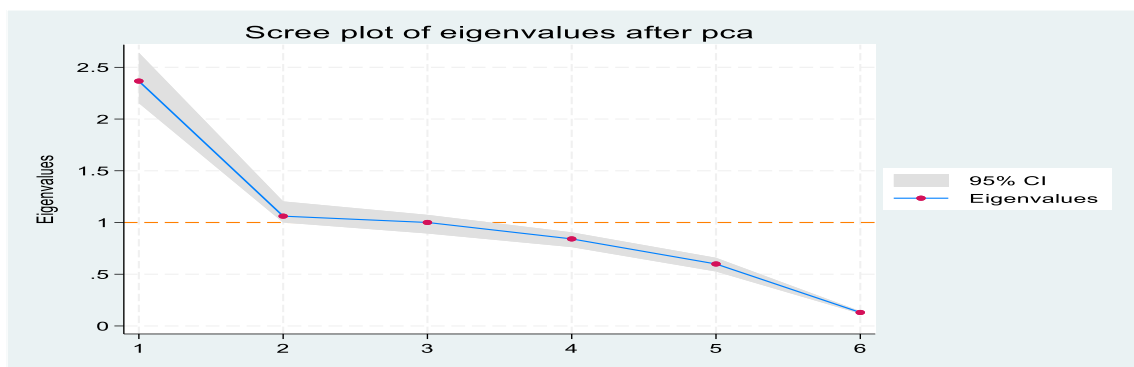
*** $p < 0.01$. The null hypothesis for the Bartlett test suggests that the variables (Inclusive growth variables) are not inter-correlated.

Table 4: Principal component loadings for exploratory component analysis with oblique rotation

Variable	PC 1	PC 2	PC 3	Unresolved
GDP	0.622	-0.140	0.770	0.019
External guidelines	0.220	0.975	0.000	0.047
Diversification	-0.001	0.001	0.000	0.007
1/cv	-0.007	0.017	0.010	112.800
Health	0.026	-0.033	0.005	30.560
Education	0.751	-0.169	-0.638	0.038

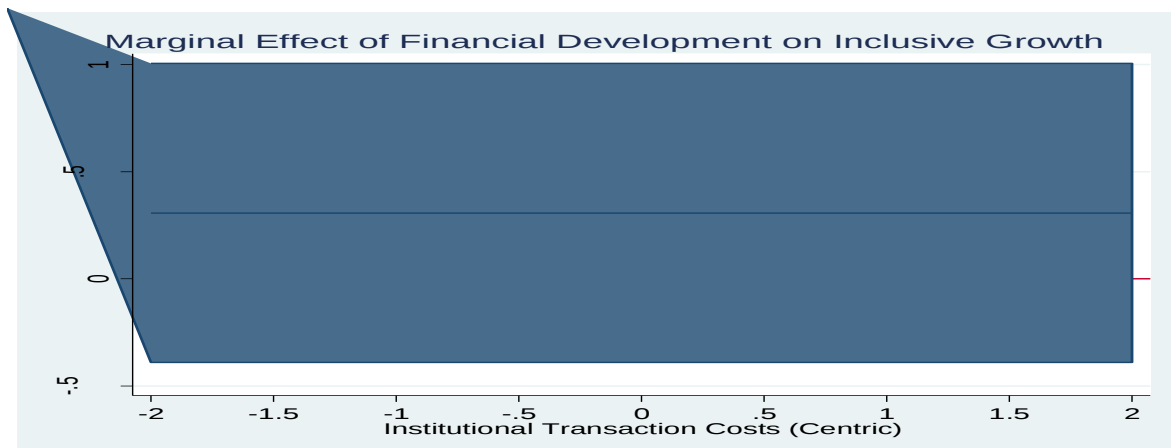
Note: factorial loads > 0.30 are in bold.

Figure 1: Graphical evolution of eigenvalues (screeplot)



Source : Author's own construction.

Figure 3: Graph of marginal effects



Source : Author's own construction.

Table 6: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) IQCI	1.000													
(2) FD index	0.362	1.000												
(3) Transaction cost	0.120	0.326	1.000											
(4) Urbanization	0.480	0.410	-0.045	1.000										
(5) Total Natural Resource	0.178	-0.321	0.433	0.113	1.000									
(6) Manufacturing	0.057	0.279	-0.118	0.081	-0.370	1.000								
(7) Mortality rate	-0.409	-0.563	0.500	-0.204	0.379	-0.256	1.000							
(8) Electricity	0.528	0.732	-0.315	0.641	-0.337	0.278	-0.612	1.000						
(9) Anti-corruption	0.125	0.405	-0.537	0.114	-0.538	0.107	-0.530	0.361	1.000					
(10) Political Stability	0.242	0.296	-0.460	0.273	-0.370	0.053	-0.485	0.343	0.725	1.000				
(11) Government effectiveness	0.306	0.576	-0.574	0.168	-0.542	0.149	-0.673	0.574	0.861	0.702	1.000			
(12) The role of laws	0.211	0.475	-0.581	0.116	-0.554	0.131	-0.644	0.482	0.895	0.770	0.926	1.000		
(13) Quality of control	0.236	0.538	-0.550	0.175	-0.543	0.126	-0.582	0.512	0.830	0.666	0.910	0.913	1.000	
(14) Roles and responsibilities	0.196	0.421	-0.505	0.242	-0.531	0.131	-0.409	0.431	0.723	0.710	0.756	0.829	0.808	1.000

Source: Author's own construction

Unit-root tests

Levin-Lin-Chu unit-root test for IQCI

Ho: Panels contain unit roots Number of panels = 53
Ha: Panels are stationary Number of periods = 19

AR parameter: Common Asymptotics: N/T -> 0
Panel means: Included
Time trend: Included

ADF regressions: 1 lag
LR variance: Bartlett kernel, 8.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-21.2951	
Adjusted t*	-5.6957	0.0000

Im-Pesaran-Shin unit-root test for IQCI

Ho: All panels contain unit roots Number of panels = 53
Ha: Some panels are stationary Number of periods = 19

AR parameter: Panel-specific Asymptotics: T,N -> Infinity
Panel means: Included sequentially
Time trend: Included

ADF regressions: No lags included

		Fixed-N exact critical			
values	Statistic	p-value	1%	5%	10%
t-bar	-3.6198		-2.380	-2.320	-2.280
t-tilde-bar	-2.6735				
Z-t-tilde-bar	-12.2404	0.0000			

Fisher-type unit-root test for IQCI

Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots Number of panels = 53
Ha: At least one panel is stationary Number of periods = 19

AR parameter: Panel-specific Asymptotics: T -> Infinity
Panel means: Included
Time trend: Not included
Drift term: Not included ADF regressions: 1 lag

Statistic		p-value	
Inverse chi-squared(106)	P	257.0416	0.0000
Inverse normal	Z	-7.3465	0.0000
Inverse logit t(269)	L*	-8.0924	0.0000
Modified inv. chi-squared	Pm	10.3736	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Bootstrap test

```
. estat bootstrap, all
```

```
Bootstrap results      Number of obs   =      248
                       Replications    =      500
```

```
command: med_bootstrap
       _bs_1: r(indirect)
```

(Replications based on 32 clusters in id)

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
_bs_1	.02429119	-.0094223	.02380281	-.0223615	.0709438	(N)
				-.0299121	.0719298	(P)
				.0003492	.1253252	(BC)

```
(N)  normal confidence interval
(P)  percentile confidence interval
(BC) bias-corrected confidence interval
```