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Effect of financial development on capital flows in Sub-Saharan Africa: Empirical analysis of the moderating role of institutional quality

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Abstract--This study examines the role of institutional quality in the effect of financial development on capital flows in 31 sub-Saharan African countries over the period 2005-2022. To achieve our objectives, we use the generalized method of moments (GMM) and the threshold dynamic panel model with endogeneity. The GMM results indicate that financial development has a negative and significant effect on FDI. However, it promotes FDI inflows in a strong institutional framework. It stimulates remittances, but its effect is amplified when countries have good institutions. It also promotes official development assistance, but its influence becomes negative when accompanied by a strong institutional framework. Furthermore, the results of the dynamic threshold model estimation reveal that the positive effect of financial development on FDI only manifests itself when the quality of institutions exceeds the threshold of -0.914, and its positive effect on remittances becomes more pronounced when the quality of institutions exceeds the threshold of 0.177. Its negative effect on aid is only observed when the quality of institutions exceeds the threshold of -0.475. These results support the idea that strengthening the institutional framework and financial development policies can help countries in the region attract more FDI and migrant

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remittances, while reducing their dependence on official development assistance.

Keywords---Capital flows, Institutions, Financial development, Sub-Saharan Africa.

JEL classification: E440, F43, F65, O43, P48.

Introduction

In the context of globalization, capital flows are an essential source of financing for economies, particularly in developing countries, where domestic resources remain insufficient (Zardoub, A., & Sbouï, 2023). Foreign direct investment (FDI), migrant remittances, and official development assistance (ODA) provide recipient countries with greater access to external financing, thereby helping to alleviate financing constraints (Imran et al., 2025). In addition to financial support, they generate positive spillover effects such as technology and skills transfers, job creation, and improved living standards in recipient countries (Nhlangwini et al., 2024).

While these capital flows have beneficial effects in recipient countries, they can also have adverse effects by exposing them to financial crises (Karadam and Ocal, 2014), particularly when they lack sound institutions and developed financial markets (Ohonba & Akinola, 2023). In addition, many of the problems associated with absorbing capital flows relate to the degree of development of the financial sector in recipient countries (Gholizadeh, 2020). This is undoubtedly what has motivated researchers to show a growing interest in the relationship between financial development and capital flows. However, there is less agreement on the nature of this relationship. Some authors argue that a developed financial sector can attract foreign capital by reducing information asymmetry and facilitating the enforcement of financial contracts (King and Levine, 1993; Mendoza et al., 2007; Islam and Alhamad, 2022). Others, however, believe that the effect of financial development on capital flows depends primarily on the quality of institutions (Aggarwal et al., 2011; Beine et al., 2012; Islam et al., 2020; Aluko, 2020). According to the latter, a developed financial sector supported by effective institutions inspires greater confidence among foreign investors and lenders, which can promote capital flows.

Sub-Saharan African countries have undertaken various initiatives to enhance the attractiveness of capital flows to the region. These initiatives aim not only to boost the development of the financial system, but also to facilitate the entry of foreign capital into the region. Financial policy reforms in most of the region's economies have evolved from financially repressive to liberalized systems. The reforms carried out in the 1980s were mainly aimed at increasing financial depth while stabilizing key macroeconomic indicators such as economic growth, inflation, exchange rates, and financial stability. They also opened up the capital account to facilitate the entry of capital. Thus, since the early 1990s, they have gradually integrated into the global economy (Ohonba & Akinola, 2023).

These reforms have led to a significant improvement in financial development in the region. Between 2005 and 2022, the financial development index rose from 0.12 in 2005 to 0.16 in 2022 (IMF, 2024). Over the same period, several institutional indicators also improved. The corruption control index rose from -0.65 in 2005 to -0.54 in 2022, the regulatory quality index from -0.63 to -0.58, government effectiveness from -0.74 to -0.65, the rule of law from -0.75 to -0.65, and the voice and accountability index from -0.49 to -0.42. On the other hand, political stability has deteriorated in the region, with the index falling from -0.49 to -0.61 (Worldwide Governance Indicators, 2025).

In terms of capital flows, FDI to the region initially increased, rising from 2.4% of GDP in 2005 to 3% in 2012, before declining over the rest of the period to reach 1.8% in 2022 (World Bank, 2025). Remittances from migrants declined slightly between 2005 and 2012, from 2.4% of GDP in 2005 to 2.2% in 2012, but then grew exceptionally, reaching 33% of GDP in 2022 (World Bank, 2025). Official development assistance received by the region increased significantly during the period 2005-2022, reaching US\$61 billion in 2022, compared to US\$39 billion in 2005 (World Bank, 2025).

In light of these developments, it is difficult to identify a clear relationship between financial development and capital flows in sub-Saharan Africa. The relationship is less obvious. This article therefore sheds light on the issue by providing scientific answers to the following questions. To what extent does financial sector development influence capital flows in sub-Saharan Africa? Does the effect of financial development on capital flows depend on the quality of institutions? If so, what threshold of institutional quality determines this effect in sub-Saharan Africa?

This study examines the role of institutional quality in the effect of financial development on capital flows in sub-Saharan Africa. It differs from previous work, which has focused primarily on the link between financial development and capital flows (Pandikasala et al., 2022; Haque et al., 2022) and, on the other hand, on the relationship between institutions and capital flows (Ohonba & Akinola, 2023; Imran et al., 2025), ignoring the effect of the interaction between financial development and institutions on the attraction of foreign capital. This study attempts to fill this gap for the case of sub-Saharan Africa. It will not only identify the effect of financial development on FDI, migrant remittances, and official development assistance, but also determine the thresholds of institutional quality that condition this effect. To do so, it uses the generalized method of moments (GMM) developed by Arellano and Bond (1991) and the threshold dynamic panel model with endogeneity initially proposed by Kremer et al. (2013) and then extended by Seo and Shin (2016), estimated according to the approach of Diallo (2020). The Dynamic Threshold Panel Model with endogeneity has recently attracted considerable interest in the literature due to its ability to analyze dynamic effects in a framework where both regressors and the transition variable can be endogenous (Issahaku et al., 2024; Ahmat-Tidjani, 2025).

The rest of this paper is structured as follows. The second section presents a review of the literature on the link between financial development, institutions, and capital flows. The third section outlines the methodology and describes the

variables used. The fourth section presents the estimation results and discussion, while the fifth section concludes the study.

Literature Review

This section reviews theoretical and empirical contributions on the relationship between financial development, capital flows, and institutions.

Theoretical contributions

The development of the financial sector plays a key role in attracting foreign investors. Indeed, in a context of information asymmetry, the development of the financial function can help foreign investors in their decision-making process. Financial institutions contribute to improving capital mobility by reducing information asymmetry (King and Levine, 1993). Financial development also promotes the enforcement of financial contracts (Mendoza et al., 2007). In this sense, other authors emphasize the crucial role that the quality of institutions can play in the relationship between financial development and FDI. Good institutions offer a country greater absorption capacity (Jude and Leveuge, 2017), which is an essential prerequisite for its attractiveness to FDI (Durham, 2004). Conversely, poor institutions are likely to create barriers to FDI by increasing investment costs and uncertainty (Daude and Stein, 2007) due to the lack of protection for investors' rights (Buchanan et al., 2012). Similarly, Islam et al. (2020) emphasize that a country's financial system is closely linked to the transparency and reliability of financial transactions and contract enforcement, which are only possible if the country has strong institutions. The quality of institutions helps establish the rule of law, guarantee the protection of property rights, fight corruption, and reduce uncertainty in the business environment, thereby strengthening investor confidence (Law and Habibullah, 2006).

Furthermore, a developed financial system can attract remittances from migrants. Islam and Alhamad (2022) argue that an efficient and reliable financial system encourages migrants to transfer their money through official channels, thereby helping to reduce the use of informal transfer routes. Sufian and Moise (2010) argue that a developed financial system is able to disseminate relevant information on financial products and promising investment opportunities, attract both formal and informal transfers, and facilitate the optimal allocation of financial resources. Another strand of the literature argues that when remittance-receiving countries have strong institutions, their financial systems can develop more successfully and functionally, leading to lower remittance costs (Aggarwal et al., 2011; Beine et al., 2012; Olaniyan et al., 2022).

In addition, a developed financial system operating within a solid institutional framework can influence official development assistance. Indeed, when the financial sector develops within a favorable institutional framework, this strengthens savers' confidence and enables the financial sector to mobilize more internal resources (Levine, 1997), thereby reducing countries' dependence on external aid. Conversely, Aluko (2020) emphasizes that a developed financial sector supported by effective institutions inspires greater confidence among donors in the ability of recipient countries to use aid effectively to achieve their development objectives, which can increase aid.

Empirical contributions

Empirical studies identified in the literature have mainly focused, on the one hand, on the influence of financial development on capital flows and, on the other hand, on the effect of institutions on capital flows. However, only a few studies have attempted to examine the role of institutions in the relationship between financial development and capital flows.

With regard to studies that have highlighted the effect of financial development on capital flows, Haque et al. (2022) examined the case of middle-income economies. They found a positive effect of financial development on FDI using the Pooled Mean Group (PMG) method over the period 1980-2020. Using the generalized method of moments (GMM) method, Pham et al. (2022) also found a positive effect of financial development on FDI in 30 developing countries in Asia over the period 1986-2019. For their part, Pandikasala et al. (2022) use an ARDL model to show that financial development and financial openness have a positive effect on remittances in India in both the short and long term.

Furthermore, studies on the effects of institutions on capital flows have generally concluded that institutions stimulate capital flows. Among these studies, Lartey & Mengova (2016) used the GMM method to show that improved institutions increase remittance flows in 90 developing countries. Using the same method, Ajide & Raheem (2016) also showed that governance promotes the attraction of remittances in the ECOWAS region over the period 1996-2013. Saha et al., (2022) used the GMM method to show that corruption control and regulatory quality promote FDI, while the rule of law tends to slow it down in 28 middle- and low-income countries over the period 2002-2018. However, they find no significant effect of government efficiency and political stability on FDI. Based on a sample of 10 Asian countries covering the period 2002-2016, Behera et al. (2020) showed that institutional improvements promote FDI in the short term but hinder it in the long term, while financial development and exports stimulate FDI in the long term. Ohonba and Akinola (2023) examined 31 sub-Saharan African countries and concluded that institutions promote the attraction of capital flows to the region.

Unlike the above studies, a few studies have examined the role of institutions in the relationship between financial development and FDI. Using the GMM method, Islam et al. (2020) found a positive effect of financial development on FDI in 79 partner countries of the Belt and Road Initiative (BRI), while showing that institutional quality plays a moderating role. Lestari et al. (2022) analyzed the effect of financial development and corruption on FDI in 108 developing countries for the period 1993-2017. They conclude that financial development has a positive and significant effect on FDI, while corruption has no significant impact but reduces the positive effect of financial development.

A review of empirical work reveals that the moderating role of institutional quality in the relationship between financial development and capital flows remains largely unexplored. Our contribution will therefore be to highlight this moderating role of institutions.

Methodology

Specification of the Empirical Model

This study aims to analyze the moderating effect of institutions on the relationship between financial sector development and capital flows in sub-Saharan Africa. In addition to variables related to financial development and institutional quality, we incorporate control variables into the model specification, drawing on existing literature. According to the economic literature, capital flows are influenced in particular by the recipient country's income level, inflation, degree of trade openness, and financial openness. Mudiyansele et al. (2021) point out that per capita income can reflect the size of a country's market, which can be a key factor in attracting foreign capital. Kok and Ersoy (2009) argue that high inflation tends to discourage capital inflows. For his part, Asiedu (2002) highlights the positive effect of trade liberalization on capital flows in Africa. Montiel and Reinhart (1999) emphasize the role of financial liberalization and show that capital controls have a greater influence on capital flows. Furthermore, Coeuré and Rabaud (2003) indicate that capital inflows may also depend on existing capital flows. Indeed, large capital inflows send a positive signal to investors about the attractiveness and stability of the host country, thereby encouraging additional capital flows. This dimension should therefore be incorporated into the econometric model specification, which makes dynamic panel models particularly well suited to taking into account the autoregressive effect of capital flows. The model specification used in the study is therefore based on the following theoretical dynamic panel model:

$$y_{i,t} = \beta_0 + \rho y_{i,t-1} + \beta' X_{i,t} + \varepsilon_{i,t} \quad (1)$$

By replacing y with our dependent variable, we obtain the following specified dynamic panel model:

$$CAPFLOWS_{i,t} = \beta_0 + \rho CAPFLOWS_{i,t-1} + \beta' X_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where $CAPFLOWS$ denotes the vector of capital flows, namely foreign direct investment, official development assistance, and migrant remittances. X is the vector of explanatory variables comprising financial development, institutions, recipient country income, inflation, degree of trade openness, and financial openness. When we disaggregate equation (2), we obtain the following equations:

$$FDI_{i,t} = \alpha_0 + \varphi FDI_{i,t-1} + \alpha_1 FDI_{i,t} + \alpha_2 INST_{i,t} + \alpha_3 (FDI_{i,t} * INST_{i,t}) + \alpha_4 \ln REV_{i,t} + \alpha_5 INF_{i,t} + \alpha_6 TRADE_{i,t} + \alpha_7 FOPEN_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$REM_{i,t} = \delta_0 + \omega REM_{i,t-1} + \delta_1 FDI_{i,t} + \delta_2 INST_{i,t} + \delta_3 (FDI_{i,t} * INST_{i,t}) + \delta_4 \ln REV_{i,t} + \delta_5 INF_{i,t} + \delta_6 TRADE_{i,t} + \delta_7 FOPEN_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$\ln FAID_{i,t} = \theta_0 + \vartheta \ln FAID_{i,t-1} + \theta_1 FDI_{i,t} + \theta_2 INST_{i,t} + \theta_3 (FDI_{i,t} * INST_{i,t}) + \theta_4 \ln REV_{i,t} + \theta_5 INF_{i,t} + \theta_6 TRADE_{i,t} + \theta_7 FOPEN_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where $\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \delta_0, \delta_1, \delta_2, \delta_3, \delta_4, \delta_5, \delta_6, \delta_7, \theta_0, \theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6, \theta_7, \varphi, \omega$ and ϑ are the parameters to be estimated. α_3, δ_3 and θ_3 are the interactive

effects of financial development and institutions on the respective capital flows. $\varepsilon_{i,t}$ is the error term.

FDI_{it} refers to foreign direct investment inflows into country i in year t . REM_{it} represents remittances from migrants. $\ln FAID_{it}$ is the logarithm of official development assistance. FD_{it} is financial development. $INST_{it}$ is the quality of institutions. $\ln REV_{it}$ is income. INF_{it} is the inflation rate. $TRADE_{it}$ corresponds to trade openness. $FOPEN_{it}$ indicates the degree of financial openness. $FD_{i,t} * INST_{i,t}$ is the interaction variable between financial development and institutions. The conditioned effects of financial development on different capital flows are as follows:

$$\frac{\partial FDI}{\partial FD} = \alpha_1 + \alpha_3 INST$$

(6)

$$\frac{\partial REM}{\partial FD} = \delta_1 + \delta_3 INST$$

(7)

$$\frac{\partial \ln FAID}{\partial FD} = \theta_1 + \theta_3 INST$$

(8)

These equations show that the effects of financial development on different capital flows depend on institutions. Indeed, if $\alpha_1, \delta_1, \theta_1$ and $\alpha_3, \delta_3, \theta_3 > 0$, then this would mean that financial development tends to slow down the inflow of capital flows into sub-Saharan Africa, but, in the presence of good institutions, it can become a lever for attracting foreign capital. On the other hand, if $\alpha_1, \delta_1, \theta_1 < 0$ and $\alpha_3, \delta_3, \theta_3 < 0$, then financial development has a deterrent effect on capital inflows and institutions contribute to reinforcing this negative effect. If $\alpha_1, \delta_1, \theta_1 > 0$ and $\alpha_3, \delta_3, \theta_3 > 0$, then this would imply that financial development promotes capital inflows into sub-Saharan Africa, and that good institutions reinforce this positive effect. If $\alpha_1, \delta_1, \theta_1 > 0$ and $\alpha_3, \delta_3, \theta_3 < 0$, then we would say that financial sector development stimulates capital inflows into sub-Saharan Africa, but that good institutions reverse this effect and reduce the attractiveness of this capital.

Interaction models can be used to analyze how financial development and institutions interact to influence capital flows in sub-Saharan Africa. However, they do not highlight the threshold level of institutional quality at which financial development begins to have an effect on these flows. For this reason, in addition to interaction models, we also use the dynamic threshold panel model. The panel threshold model based on Hansen (1999) is extended to obtain the dynamic panel threshold model (Caner and Hansen, 2004). Kremer et al. (2013) extend the estimation of the static panel threshold model proposed by Hansen (1999) and the cross-sectional threshold model with instrumental variables (IV) by Caner and Hansen (2004), in which generalized method of moments (GMM) estimators are used to address endogeneity. Following the dynamic panel threshold regression approach proposed by Kremer et al. (2013), we specify the models to be estimated as follows:

$$FDI_{i,t} = \alpha_0 + \varphi FDI_{i,t-1} + \alpha_1 FDI_{i,t} (INST < \gamma_1) + \alpha_2 DF_{i,t} (INST > \gamma_2) + \alpha_3 INST_{i,t} + \alpha_4 \ln REV_{i,t} + \alpha_5 INF_{i,t} + \alpha_6 TRADE_{i,t} + \alpha_7 FOPEN_{i,t} + \varepsilon_{i,t} \quad (9)$$

$$REM_{i,t} = \delta_0 + \omega REM_{i,t-1} + \delta_1 FDI_{i,t} (INST < \gamma_1) + \delta_2 DF_{i,t} (INST > \gamma_2) + \delta_3 INST_{i,t} + \delta_4 \ln REV_{i,t} + \delta_5 INF_{i,t} + \delta_6 TRADE_{i,t} + \delta_7 FOPEN_{i,t} + \varepsilon_{i,t} \quad (10)$$

$$\ln FAID_{i,t} = \theta_0 + \vartheta \ln FAID_{i,t-1} + \theta_1 FD_{i,t} (INST < \gamma_1) + \theta_2 DF_{it} (INST > \gamma_2) + \theta_3 INST_{i,t} + \theta_4 \ln REV_{i,t} + \theta_5 INF_{i,t} + \theta_6 TRADE_{i,t} + \theta_7 FOPEN_{i,t} + \varepsilon_{i,t} \quad (11)$$

Where $INST$, the transition variable, represents the quality of institutions and constitutes the threshold variable used to divide the sample into different regimes. γ_1 and γ_2 are the unknown threshold parameters. $FD_{i,t}$ denotes the financial development variable, whose effect depends on the threshold for institutional quality. This modeling approach allows the effect of financial development to vary depending on whether the institutional level is below or above a certain unknown threshold γ . The coefficients α_1 , δ_1 and θ_1 measure the effects of financial development on the respective capital flows when the quality of institutions is below the threshold, while α_2 , δ_2 and θ_2 reflect the effects of financial development when the quality of institutions is above the threshold.

Study Data

The study uses annual data from 31 sub-Saharan African countries covering the period from 2005 to 2023. The data comes mainly from the databases of the World Bank (World Development Indicators, 2025), the IMF (2025), Worldwide Governance Indicators (2025), and the KOF Swiss Economic Institute (2025).

The FDI used in this study is net inflows (net investment flows minus divestments) as a percentage of GDP. These are net investment inflows to acquire a lasting interest (10% or more of voting shares) in a company operating in an economy other than that of the investor. Migrant remittances include personal transfers and employee compensation. Personal transfers encompass all current transfers, in cash or in kind, made or received by resident households to or from non-resident households. They are expressed as a percentage of GDP. Official development assistance (ODA) this refers to disbursements of concessional loans (excluding principal repayments) and grants from member agencies of the Development Assistance Committee (DAC), multilateral institutions, and non-DAC member countries to promote economic development and welfare in countries and territories on the DAC list of ODA recipients. It is expressed in millions of US dollars, but we use the logarithm since most of the data we use in this study are percentages.

We measure the development of the financial sector using the financial development index constructed by Svirydzienka (2016), which takes into account the depth, accessibility, and efficiency of the financial sector. This index better captures the development of the financial sector than other traditional indicators such as private credit granted by the banking sector and market capitalization as a percentage of GDP. This index ranges from 0 to 1. A value close to 1 indicates a developed financial sector. Conversely, a value close to 0 indicates an underdeveloped financial sector.

With regard to institutions, we have constructed an institutional quality index using principal component analysis (PCA) based on six institutional indicators, namely political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, control of corruption, and voice and accountability. This index, like the institutional indicators, ranges from -2.5 to

2.5. A value close to 2.5 indicates good institutional quality, while a value close to -2.5 reflects poor institutional quality.

Per capita income is generally measured by real GDP per capita in US dollars. In this study, we use the logarithm of real GDP per capita, as most of our data is expressed as a percentage. Inflation is measured here by the GDP deflator, calculated as the ratio of nominal GDP to real GDP, then expressed as a percentage. Trade openness is measured by the ratio of total imports and exports to GDP, also expressed as a percentage.

In this study, we measure financial openness using the de jure financial globalization index, which takes into account restrictions on investment and the openness of the capital account. This index ranges from 0 to 100. The higher the index value, the greater the level of financial globalization. Table 1 presents a summary of the data, their respective measures, and sources.

Table 1. Summary of variables, description and data sources

Variables	Description and Measurements	Sources
FDI	Inward foreign direct investment as a percentage of GDP	WDI (2025)
InFAID	Official development assistance, used logarithmically	WDI (2025)
REM	Remittances received from migrants as a percentage of GDP	WDI (2025)
FD	Financial development, measured by the Svirydenka index (2016), which varies between 0 and 1	FMI (2025)
INST	Institutions, measured by an index constructed from six institutional indicators. This index ranges from -2.5 to 2.5.	WGI (2025)
InREV	Per capita income, measured by the logarithm of GDP per capita.	WDI (2025)
INF	Inflation, measured by the GDP deflator (ratio of nominal GDP to real GDP) in %.	WDI (2025)
TRADE	Trade openness, measured by: $\frac{Exports+Imports}{gdp} \times 100$.	WDI (2025)
FOPEN	Financial openness, measured by the financial globalisation index, which ranges from 0 to 100.	KOF Swiss Economic Institute (2025)

Note: WDI (World Development Indicators), WGI (Worldwide Governance Indicators).

Source: Authors, based on literature.

Estimation Methods

As an estimation technique, we use the generalised method of moments (GMM) to estimate the interaction model. This choice is justified, on the one hand, by the structure of our panel, which is characterised by a relatively short time dimension (16 years) compared to the number of individual units (31 countries). On the

other hand, the dynamics of the model, revealed by the presence of the lagged dependent variable among the explanatory variables, make GMM particularly appropriate compared to the usual estimation approaches for panel data, such as OLS or the fixed effects method.

According to Arellano and Bond (1991), generalised method of moments (GMM) estimators use exogenous or endogenous variables with one or more time lags as instrumental variables. Compared to the first difference generalised method of moments, which eliminates individual effects but can present problems of weak instruments, the system method overcomes these difficulties. Therefore, this study uses the system-generalised method of moments.

With regard to the dynamic threshold model, there are individual fixed effects, and these effects must be eliminated before estimation. According to Kremer et al. (2013), the standard methods of within transformation and first differentiation used to eliminate country-specific effects in a dynamic panel are not applicable because they violate the underlying distribution assumptions in Hansen (1999), and Caner and Hansen (2004). They point out that transformation into advanced orthogonal deviations more effectively eliminates fixed effects by subtracting the mean of the other observations. The particularity of this transformation is that it avoids serial correlation of the transformed error terms and preserves the lack of correlation of the error terms. The transformation into advanced orthogonal deviations is therefore used in this study to eliminate the fixed effects of equations (9), (10) and (11). The transformed model for the error term is as follows:

$$\varepsilon_{it}^* = \sqrt{\frac{T-1}{T-t-1}} \times \left[\varepsilon_{it} - \frac{1}{T-t} (\varepsilon_{it+1} + \dots + \varepsilon_{iT}) \right], t = 1, \dots, T-1. \quad (12)$$

The transformation into advanced orthogonal deviations of the other variables is consistent with the error terms. Due to the strong endogeneity of the one-period lagged explanatory variables in equations (9), (10) and (11), this study follows the treatment proposed by Caner and Hansen (2004) for dynamic threshold panel models including endogenous explanatory variables. To estimate the specified dynamic threshold models, in accordance with Caner and Hansen (2004), we adopt a three-step procedure. First, a reduced-form regression is estimated for the endogenous variables, based on the instruments. Given an arbitrary γ , the slope coefficient can be estimated based on the instrumental variables. Second, we estimate the threshold γ , i.e. the models using the ordinary least squares (OLS) method in a panel to obtain the sum of the squares of the residuals ($S(\lambda)$). The estimator of the threshold $\hat{\lambda}$ is therefore the one that minimises the sum of the squares of the residuals:

$$\hat{\lambda} = \operatorname{argmin} S_n(\lambda) \quad (13)$$

Thirdly, once $\hat{\lambda}$ has been determined, the sample is divided in two and the coefficient associated with the threshold is estimated using the generalised method of moments (GMM) according to Chao et al. (2017).

Results and Discussion

Before proceeding with the estimates, we present descriptive statistics for the study variables in Table 2.

Table 2. Descriptive Statistics

Variables	Mean	Std. dev.	Min	Max	Observations
FDI	3.848	5.356	-17.292	38.942	N = 558
REM	3.215	3.927	0.001	27.160	N = 558
FAID	1 060 000 000	1 110 000 000	14 600 000 000	11 400 000 000	N = 558
FD	0.148	0.117	0.026	0.592	N = 558
INST	-0.080	1.419	-2.508	2.5496	N = 558
REV	1985.845	2252.431	158.243	11643.46	N = 558
INF	7.038	9.316	-21.165	85.353	N = 558
TRADE	62.799	23.811	21.256	148.586	N = 558
FOPEN	42.887	14.324	18.646	79.434	N = 558

Source: Authors, based on data from the World Bank (2025), IMF (2025) and KOF Swiss Economic Institute (2025).

FDI averages 3.84% of GDP and reaches a maximum of 38.94%. Remittances average 3.21% of GDP and reach a maximum of 27.16%. Official development assistance averages US\$1,060 million, with a maximum value of US\$11,400 million. The financial development index averages 0.15 and ranges from 0.03 to 0.59. The institutional quality index averages -0.08, with a maximum value of 2.54. Income, measured by real GDP per capita, averages 1,985.84 and ranges from 158.24 to 11,643.46. Inflation and trade openness have averages of 7.04% and 62.80%, respectively. Financial openness has an average of 42.89 and a maximum value of 79.43.

The results of the correlation matrix are summarized in Table 3. There is a high correlation coefficient (0.64) between institutions and financial development, as well as between per capita income and financial development, where the correlation coefficient is 0.69. We therefore performed a multicollinearity test (VIF), the results of which are presented in Table 4.

Table 3. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)FDI	1						
(2)FD	-0.036	1					
(3)INST	0.054	0.639*	1				
(4)lnREV	-0.056	0.678*	0.423*	1			
(5)INF	-0.024	-0.058	-0.078	-0.107*	1		
(6)TRADE	0.3968*	0.332*	0.161*	0.453*	0.041	1	
(7)FOPEN	0.0319	0.282*	0.385*	0.164*	-0.024	0.044	1
(1)REM	1						
(2)FD	-0.163*	1					
(3)INST	0.003	0.639*	1				

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(4)lnREV	-0.095*	0.678*	0.423*	1			
(5)INF	-0.185*	-0.058	-0.078	-0.107*	1		
(6)TRADE	-0.171*	0.332*	0.161*	0.453*	0.041	1	
(7)FOPEN	0.081*	0.282*	0.385*	0.164*	-0.024	0.044	1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)lnFAID	1						
(2)FD	-0.101*	1					
(3)INST	-0.032	0.639*	1				
(4)lnREV	-0.404*	0.678*	0.423*	1			
(5)INF	0.190*	-0.058	-0.078	-0.107*	1		
(6)TRADE	-0.305*	0.332*	0.161*	0.453*	0.041	1	
(7)FOPEN	0.068	0.282*	0.385*	0.164*	-0.024	0.044	1

Note: The asterisk * indicates significance at the 5% threshold.

Source: Authors, based on data from the World Bank (2025), IMF (2025) and KOF Swiss Economic Institute (2025).

According to Gujarati and Porter (2009), if the VIF value is greater than 10, this indicates strong multicollinearity. The results in Table 4 indicate that none of the VIF values are greater than 10. This implies that there is no severe multicollinearity problem between the explanatory variables in this study if we use all the variables in the regression.

Table 4. Multicollinearity Test (VIF)

Variables	VIF	1/VIF
FD	2.73	0.366523
REV	2.28	0.437825
INST	1.84	0.542202
TRADE	1.30	0.770299
FOPEN	1.18	0.847774
INF	1.02	0.980282
Mean VIF	1.73	

Source: Authors, based on data from the World Bank (2025), IMF (2025) and KOF Swiss Economic Institute (2025).

In the first stage of the empirical analysis, we must examine the assumptions of slope homogeneity, cross-sectional dependence and stationarity. The results of the Pesaran and Yamagata (2008) slope homogeneity tests are shown in Table 5.

Table 5. Pesaran and Yamagata (2008) slope Homogeneity Test

	Delta	Adjusted delta	Decision
FDI	6.911*** (0.000)	10.448*** (0.000)	Heterogeneity
REM	2.210 ** (0.027)	3.341*** (0.001)	Heterogeneity
FAID	-2.006 ** (0.045)	-3.033*** (0.002)	Heterogeneity

Note: Asterisks *** and ** indicate rejection of the null hypothesis of homogeneity at the 1% and 5% thresholds, respectively. Values in parentheses are p-values.

Source: Authors, based on data from the World Bank (2025), IMF (2025) and KOF Swiss Economic Institute (2025).

The results of the homogeneity test show that the null hypothesis that the slopes of the estimates are homogeneous is rejected at the 5% level, as both the delta and adjusted delta statistics are statistically significant at the 5% level. There are therefore specific effects in the sample for the specified models.

After the homogeneity test, we check the data for cross-sectional dependence. The results of the dependence test presented in Table 6 show that the null hypothesis of cross-sectional independence is rejected at the 1% significance level for all variables. This confirms the existence of cross-sectional dependence between the panel units.

Table 6. Pesaran's (2004) Cross-Sectional Dependence Test

	CD-test	Decision
FDI	18.22*** (0.000)	Dependency
REM	11.89*** (0.000)	Dependency
FAID	28.39*** (0.000)	Dependency

Note: An asterisk *** indicates rejection of the null hypothesis of inter-individual independence at the 1% level. Values in parentheses are p-values.

Source: Authors, based on data from the World Bank (2025), IMF (2025) and KOF Swiss Economic Institute (2025).

Logically, the presence of cross-sectional dependence should lead us to use second-generation unit root tests. However, the relevant implementation of these tests generally requires an observation period of at least 20 years. It takes at least 20 years for the stationarity test to be necessary. However, our sample only covers the period from 2005 to 2022, i.e. 18 years. Consequently, verifying the stationarity of the variables is not necessary in our case.

To analyze the role of institutions in the relationship between financial development and capital flows, we used two models. The first is a dynamic model with interaction, which we estimated using the generalised method of moments in a system. The estimation results for this model are presented in Table 7. The second is a dynamic threshold effect model. This model is used not only to make the results more robust, but also to highlight the institutional quality thresholds that determine the effects of financial development on capital flows in sub-Saharan Africa. The estimation results for this model are shown in Table 8.

Table 7. Estimation results using the Generalised Method of Moments (GMM)

Variables	FDI	REM	FAID
<i>L.FDI</i>	0.364*** (0.000)	-	-
<i>L.REM</i>	-	0.998*** (0.000)	-
<i>L.lnFAID</i>	-	-	0.857*** (0.000)
<i>FD</i>	-0.037** (0.037)	0.014** (0.018)	1.379* (0.066)
<i>INST</i>	0.034* (0.064)	0.669** (0.045)	0.088** (0.035)
<i>FDxINST</i>	0.074*** (0.000)	0.992** (0.011)	-0.503* (0.091)
<i>lnREV</i>	0.066** (0.030)	0.002** (0.017)	0.527*** (0.000)
<i>INF</i>	-0.049** (0.024)	-0.008* (0.095)	0.003* (0.084)
<i>TRADE</i>	0.086*** (0.000)	-0.155** (0.041)	-0.001*** (0.002)
<i>FOPEN</i>	0.468 (0.125)	0.004** (0.023)	0.005*** (0.000)
<i>CONST</i>	14.866*** (0.000)	0.924** (0.022)	3.767*** (0.002)
<i>Number of observation</i>	527	527	527
<i>AR(1) P-value</i>	0.026	0.031	0.004
<i>AR(2) P-value</i>	0.243	0.306	0.413
<i>Hansen J-test P-value</i>	1.000	1.000	1.000

Note: ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Values in brackets are p-values.

Source: Authors, based on data from the World Bank (2025), IMF (2025) and KOF Swiss Economic Institute (2025).

The results in Table 7 indicate that the Lagrange multiplier (LM) test for autocorrelation, AR (1) and AR (2), reveals autocorrelation of order 1 but not autocorrelation of order 2. Thus, the results in Table 7 meet the necessary conditions for applying the GMM estimator. The results show that financial development has a negative and statistically significant effect on FDI at the 5% threshold, while institutions have a positive and statistically significant effect at the 10% threshold. The coefficient of their interaction is positive and statistically significant at the 1% threshold. This suggests that financial development stimulates FDI inflows when the financial sector operates within a sound institutional framework. This result shows that the institutional framework is a moderating factor in the effect of financial development on FDI in sub-Saharan Africa. This could be explained by the fact that a country's financial system is closely linked to the transparency and reliability of financial transactions and the enforcement of contracts, which are only possible if the country has institutions of satisfactory quality (Islam et al. 2020). The quality of institutions helps to establish the rule of law, guarantee the protection of property rights, combat

corruption and reduce uncertainty in the business environment, thereby strengthening investor confidence (Law and Habibullah, 2006; Khan and Khan, 2019).

Furthermore, the results indicate that financial development has a positive and significant effect on migrant remittances in sub-Saharan Africa, with a significance threshold of 5%. Similarly, institutions have a positive and significant effect on migrant remittances at the 5% threshold. These results suggest that financial sector development and institutions promote migrant remittances in sub-Saharan Africa. Furthermore, the interaction between financial development and institutions reveals a positive and statistically significant impact on remittances. In other words, while financial development already promotes migrant remittances, as indicated by the results, this effect is reinforced when the financial sector operates within a solid institutional framework. When countries receiving remittances have strong institutions, their financial systems can develop more successfully and functionally, leading to lower remittance costs (Aggarwal et al., 2011; Beine et al., 2012). This result confirms those of Olanipekun (2024), who found that institutions complement financial development in attracting remittances in sub-Saharan Africa.

With regard to official development assistance, the results indicate that financial development and institutions have a positive and significant effect on aid, with respective significance thresholds of 10% and 5%. However, the coefficient of their interaction is negative and statistically significant at the 10% threshold. This implies that, although financial sector development promotes official development assistance, the latter tends to decline when the financial sector operates in a favorable institutional environment. This result, which may seem paradoxical, contradicts the idea that a developed financial sector supported by effective institutions inspires greater confidence among donors in the ability of recipient countries to use aid effectively to achieve their development objectives (Aluko, 2020). One possible explanation for this result is that when the financial sector develops within a favorable institutional framework, it strengthens savers' confidence and enables the financial sector to mobilize more domestic resources (Levine, 1997), thereby reducing countries' dependence on external aid.

With regard to control variables, per capita income has a positive and statistically significant effect on FDI, remittances and aid, with significance thresholds of 5% and 1%. This result corroborates the idea put forward by Mudiyansele et al. (2021) that per capita income may reflect the size of a country's market, which can be a key factor in attracting foreign capital. Inflation, on the other hand, has a negative and significant effect on FDI and migrant remittances, with significance thresholds of 5% and 10% respectively, while it has a negative and significant effect on aid at the 10% threshold, confirming the idea of Kok and Ersoy (2009) that high inflation tends to discourage capital inflows. Trade openness has a positive and significant effect on FDI, confirming the theoretical prediction that trade openness, through the removal of state controls on trade in goods and services, promotes FDI (Vo and Ho, 2021). On the other hand, it has a significant negative effect on migrant remittances and aid, with significance thresholds of 5% and 1% respectively. In fact, trade openness increases local employment opportunities and improves income, reducing the dependence of households and

countries on external resources. As for financial openness, it has a positive but insignificant effect on FDI. On the other hand, it has a positive and statistically significant effect on remittances and aid, with significance thresholds of 5% and 1% respectively, confirming the findings of Montiel and Reinhart (1999) that less capital control stimulates capital flows.

Table 8. Estimation results of the Dynamic Panel Model with threshold effects

Variables	FDI	REM	FAID
L.FDI	0.170*** (0.000)	-	-
L.REM	-	0.613*** (0.000)	-
L.lnFAID	-	-	0.343*** (0.000)
BelowthresFD	-0.042** (0.040)	0.038*** (0.000)	-0.511 (0.709)
AbovethresFD	0.331*** (0.000)	0.574** (0.025)	-0.251* (0.098)
INST	0.462** (0.032)	0.695*** (0.001)	-0.244* (0.069)
lnREV	0.245*** (0.000)	0.452** (0.016)	0.745*** (0.000)
INF	-0.028*** (0.006)	-0.007* (0.059)	0.010*** (0.000)
TRADE	0.104*** (0.000)	-0.016*** (0.000)	-0.003* (0.053)
FOPEN	0.039 (0.267)	0.047*** (0.000)	0.010** (0.042)
CONST	9.410*** (0.004)	-4.699*** (0.000)	8.037*** (0.000)
Threshold of INST(γ)	-0.914	0.177	-0.475
90%Confidence Interval	[-1.766 ; 2.262]	[-1.766 ; 0.350]	[-0.650 ; -0.271]
Test of linearity	395.854*** (0.001)	40.915*** (0.002)	11.581*** (0.000)
<i>Number of observation</i>	527	527	527

Note: ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Values in brackets are p-values.

Source: Authors, based on data from the World Bank (2025), IMF (2025) and KOF Swiss Economic Institute (2025).

The estimation results of the dynamic threshold model presented in Table 8 reveal, in accordance with the linearity test, the existence of a threshold effect in the three regressions, with a significance level of 1%. This confirms the relevance of using the dynamic threshold model. The thresholds determined are therefore statistically significant and can be interpreted. According to the results, the institutional quality threshold that determines the effect of financial development on FDI is -0.914. Below this threshold, the effect of financial development on FDI

is negative and significant, with a significance level of 5%. Above the threshold, however, the effect becomes positive and statistically significant, with a significance level of 1%. These results suggest that the effect of financial development on FDI is non-linear. The effect of financial development on FDI depends on the level of institutional quality. Financial development promotes FDI attraction in sub-Saharan Africa when the quality of institutions exceeds the threshold of -0.914. These results corroborate the thesis put forward by Islam et al. (2020) that the quality of institutions is a force that moderates the relationship between development and FDI. A country's financial system is closely linked to the transparency and reliability of financial transactions and the enforcement of contracts, which is only possible if institutions are of high quality (Islam et al., 2020), thereby strengthening the confidence of foreign investors.

With regard to remittances, the results of the dynamic threshold model estimation indicate that, although the effect of financial development remains positive and significant, it increases when the institutional quality threshold exceeds 0.177. Institutional quality reinforces the positive effect of financial development on remittances from migrants in sub-Saharan Africa. This result confirms the theory that remittances sent by migrants to their countries of origin become less costly, faster and safer when there is a developed financial system operating within a solid and reliable institutional framework (Olaniyan et al., 2022).

In terms of aid, the results of the dynamic threshold model estimates reveal that there is a threshold of -0.475 for institutional quality that determines the effect of financial development on aid in sub-Saharan Africa. Below this threshold, the effect of financial development on official development assistance is negative but not significant. Above this threshold, its effect remains negative but becomes significant at the 10% level, reflecting a substitution dynamic. Indeed, when institutional quality exceeds the threshold of -0.475, financial system development can reduce sub-Saharan African countries' dependence on aid by mobilizing more domestic resources. This result implies that in a context of better institutional quality, financial development can gradually replace official development assistance by mobilizing domestic savings and diversifying sources of financing. With regard to the control variables, the results are identical to those of the GMM analyzed above.

Conclusion and Implications

This study aimed to examine the role of institutional quality in the relationship between financial development and capital flows in sub-Saharan Africa. It focused on a sample of 31 countries and covers the period 2005-2022. Methodologically, it used the generalised method of moments (GMM) and the dynamic threshold panel model. The GMM results indicate that financial development has a negative and significant effect on FDI. However, it promotes FDI inflows in a strong institutional framework. It stimulates remittances, but its effect becomes more pronounced when countries have good institutions. It also promotes official development assistance, but its influence becomes negative when accompanied by a strong institutional framework. Furthermore, the results of the dynamic threshold model estimation reveal that the positive effect of financial development on FDI only manifests itself when institutional quality exceeds the threshold of -

0.914, and its positive effect on remittances becomes more pronounced when institutional quality exceeds the threshold of 0.177. Its negative effect on aid is only observed when the quality of institutions exceeds the threshold of -0.475. In light of these results, the main lesson of this study is that the quality of institutions is a key factor determining the effect of financial development on capital flows in sub-Saharan Africa. Thus, in terms of economic policy implications, strengthening the institutional framework and financial sector development policies appears to be a preferred way to enable countries in the region to attract more FDI and migrant remittances, while reducing their dependence on official development assistance.

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