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Article

Causality between Financial Development and Foreign Direct Investment in Asian Developing Countries

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Abstract: This study investigated the linkages between foreign direct investment (FDI) and financial development measured by banks and stock markets in 30 Asian developing countries from 1986 to 2019. We used a bivariate model with Granger causality tests to test the reverse causality between FDI and financial development and multivariate models with the system generalized method of moments (GMM) estimator to identify how one factor affected the other. Our Granger test results showed a bidirectional linkage between FDI and financial development. Using the system GMM estimator, we showed that greater financial development drew more inward FDI to host countries. Similarly, local financial markets benefited from FDI by improving capital mobilization and financial services and products to intensify economic activity. Our findings suggest that, to attract FDI, policymakers should improve local banks and the stock market environment with strong institutional backgrounds to enhance foreign investors' confidence and provide incentives to increase cross-border investments in host economies.



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Keywords: Asian developing countries; foreign direct investment; Granger causality; financial development; system GMM

1. Introduction

Foreign direct investment (FDI) is a fundamental pillar of the economic development of a country since it intensifies capital accumulation and technological innovation. Since the late 1980s, most Asian developing countries (ADCs) have reformed their business climate toward market liberalization, innovation, inventions, and technology transfer (Pradhan et al. 2017; Rao et al. 2020). Most ADCs' governments have enacted a wide range of policies attracting FDI, such as infrastructure subsidies, import duty exemption, tax incentives, free trade agreements, better union–employer partnership and cooperation, and other preferential concessions. From 1986 to 2019, inward FDI in ADC economies witnessed substantial growth from \$9.50 to \$473.89 billion (equivalent to 0.64% to 1.73% of GDP). This ranked the region among the largest global recipients of FDI inflows with over 30%; it became an attractive destination for foreign investors, especially in the manufacturing and services sectors. Such FDI growth could improve the host economies' capital stocks and accelerate international business knowledge, technological innovation, marketing techniques, and managerial skills of local enterprises. United Nations Conference on Trade and Development (UNCTAD) reported that, during 2014 to 2019, ADC economies recorded an average GDP growth rate of 4.5%, which was stronger than other areas such as Europe (1.87%), North America (1.71%), Latin America and the Caribbean (−0.92%), Africa (0.28%), Oceania (0.88%), and the global economy (1.85%).

Financial development plays a vital role in attracting FDI since foreign enterprises can have better access to financial services and external capital to increase their business

ventures (Ezeoha and Cattaneo 2012; Agbloyor et al. 2013; and Suliman and Elian 2014). A more developed financial market can lower transaction costs and improve the timing and settlement of trading by foreign investors. Stronger financial development gathers and disseminates market information promptly, which enables foreign investors to identify opportunities and potential risks to make informed investment decisions in host countries (Kinda 2010). However, an inefficient, fragile, and fragmented financial market (characterized by shortages of financial products, less attractive loans, less promotion, and regulation constraints) can dampen foreign investment (Ezeoha and Cattaneo 2012). On the other hand, financial development may adversely affect inward FDI. Higher financial development stimulates the entry and expansion of local enterprises, which leads to greater local competition intensity and reduces the profits of foreign enterprises in the same industries (Bilir et al. 2013). Local partners of multinational enterprises (MNE) can raise funds from local financial markets and reduce reliance on foreign financing and control of their business activities (Desbordes and Wei 2017).

In ADC economies, the association between FDI and financial markets (measured by both banks and stock markets) is under-researched. Most prior empirical studies have focused primarily on the question of whether FDI and financial development (represented mainly by banks) enhance economic performance (e.g., Hsueh et al. 2013; Tongurai and Vithessonthi 2018; Sethi et al. 2020; Jena and Sethi 2021). For example, Hsueh et al. (2013) showed that financial development, measured by the banking sector, propelled the advancement of 10 Asian economies. Tongurai and Vithessonthi (2018) indicated that banking development is negatively correlated to agricultural sector development, but insignificantly affects industrial sector development in advanced economies that have evolved into a knowledge-based system with non-traditional financial intermediaries (rather than bank loans). Sethi et al. (2020) and Jena and Sethi (2021) showed that FDI and financial development (measured by private credit) accelerated the economic prosperity of South Asian countries. However, previous studies did not address a direct linkage between FDI and financial development. In addition, most scholars mainly use bank-based proxies to measure financial development and neglect the role of the stock market, which has recently exerted a significant financial effect on ADC economies (Sharma and Kautish 2020). This raises the question whether stronger financial development represented by both banks and stock markets can attract greater inward FDI, and whether more inward FDI improves financial markets in ADC economies.

This study investigated the linkages between FDI and financial development measured by banks and stock markets in 30 ADC economies from 1986 to 2019. The study employed Granger causality tests in a bivariate model to test potential reverse causality between FDI and financial development. We used the dynamic panel approach in a multivariate model to examine how one sector influenced the other.

Our study contributes to the literature on the nexus between FDI and financial development in several ways. First, our research focused on two main channels of the ADC financial markets: banks and stock markets. According to Levine (2005) and Demirgüç-Kunt et al. (2013), both financial channels can facilitate investors with different financial services, and one financial channel can complement the other. Banks mobilize and allocate savings to the most productive enterprises and supervise the use of funds to make profits and loan repayments. An improved banking system helps investors reduce transaction costs, mitigate investment risks, and access external finance at lower cost to enhance their entrepreneurial activities. A well-functioning stock market enables investors to gather and process information about the market, industries, and listed enterprises, advancing corporate governance, risk-sharing, and market liquidity (Nguyen and Pham 2014). Second, we used data from 30 ADC economies (20 countries with stock markets), which extends literature that focused on only one country or several countries at one time. Third, we investigated the dynamic relationship between FDI and financial development in ADC economies, which is a limited topic in the literature. We combined two advanced methods, the Granger causality test proposed by Hood et al. (2008) in a bivariate model to test the

causality effect between financial development and FDI, and the system GMM estimator in a multivariate model to determine how one sector influenced the other sectors. Based on our results, the region can shape its policies and programs to encourage capital inflows from foreign investors and accelerate the development of financial markets.

The rest of this paper is organized as follows. Section 2 provides the relevant literature. Section 3 presents the data and methodology used in the study. Section 4 discusses the empirical results. Section 5 summarizes the study and provides policy implications.

2. Literature Review

2.1. Theoretical Framework for the Impact of Financial Development on FDI

There are several ways financial systems affect FDI such as allocating resources, mitigating transaction costs, upgrading liquidity, and enforcing financial contracts (Ezeoha and Cattaneo 2012). Efficient financial intermediaries reduce needless costly processes and channel resources directly to investment activities with high profitability and provide mechanisms to diversify risk. This enables both domestic and foreign enterprises to gain more access to external funds at lower cost. As noted by Kinda (2010), foreign investors may encounter insufficient information about their opportunities and potential risks in a local market compared with local investors. Developed financial markets, therefore, are required to provide investors with market information and financial support that enhances their ability to make informed investment decisions. Similarly, Bartels et al. (2009) highlighted that developed financial institutions help investors reduce transaction and information costs on markets, industries, and services. Hence, reductions in asymmetric information facilitates international capital mobility, inducing a higher investment return.

For an efficient banking system, Agbloyor et al. (2013) revealed that foreign enterprises can access well-functioning financial services (such as available funding to finance working capital and advanced payment systems) and reduce their cost of capital. Similarly, a developed banking system attracts inward FDI in terms of faster transactions, lower cost, funding availability, and competitive foreign exchange services (Kaur et al. 2013). However, an inefficient, fragmented, and fragile banking sector may discourage foreign investment (Ezeoha and Cattaneo 2012). Ezeoha and Cattaneo (2012) argued that MNE look for resources to finance operations only from their parent company rather than bank debt because of credit constraints. In addition, business activities may be distressed because of fragmented financial intermediation for domestic and international trading, which restricts FDI inflows.

In terms of well-developed stock markets, Otchere et al. (2016) affirmed that foreign enterprises are inclined to list on the stock exchange since they not only increase capital but also introduce their brand name to the domestic market. The presence of foreign investors who operate in countries with a developed financial system signals a good business environment and friendly market with greater access to diversified financial products and services to finance and support investment activity. However, an inefficient stock market may exist because of weak institutions and regulations, high volatility, asymmetric information, and speculative activity. As a result, foreign enterprises do not list their equity on such stock markets since they may get less value in their share price and cannot raise needed capital or recover their investment. An inefficient stock market, therefore, cannot act as a credible channel to encourage foreign companies to invest in the recipient countries (Agbloyor et al. 2013).

2.2. Theoretical Framework for the Impact of FDI on Financial Development

Greater inward FDI can accelerate improvement in the banking system. For example, Pradhan et al. (2019, p. 1205) suggested that foreign companies that plan to operate in another country should open a bank account to manage their local transactions. Since they are usually large enterprises with funding resources available, the banks can partially use those funds for their lending activity. Banks' resources can be improved if funds from diversified companies are deposited in the banks' accounts. This source of funds is

necessary to finance productivity investments with high future returns. In addition, foreign enterprises need a banking sector with well-functioning products and competitive services to facilitate their business, thus encouraging the improvement of banking products and financial offerings. Otchere et al. (2016) argued that the presence of foreign enterprises may stimulate economic activity in recipient countries. This amplifies the demand for financial services by both domestic and international customers. As a result, the banking system needs to strengthen its financial products and services to satisfy the greater requirements of its customers (Pradhan et al. 2019).

The stock market can benefit from inward FDI. When foreign enterprises list on a stock market, this improves the market capitalization since the listed foreign enterprises are usually large enterprises (Agbloyor et al. 2013). By selling and purchasing equity, listed foreign enterprises improve a stock market's liquidity. Hajilee and Al Nasser (2015) suggested that the presence of listed foreign enterprises may attract other foreign and local investors to the local stock market, which enhances market capitalization and liquidity. In addition to increasing the funds available in the local financial markets, Varnamkhasti et al. (2015) noted that the entry of foreign enterprises might reduce the power of the local elite and force them to follow friendly market regulations that foster the development of the financial markets.

However, Al Nasser and Gomez (2009) showed that FDI can negatively affect a local financial system. A less developed financial system can be substituted by inward FDI since it does not have enough capital to help the domestic enterprises to invest in productivity projects. Risky and undeveloped local financial institutions are replaced by large FDI with a greater capacity to meet market requirements. Zakaria (2007) believed that credit constraints hamper domestic enterprises from investing in potentially high-profit projects. Hence, FDI inflows can reduce the credit constraints in local financial markets, allowing them to finance domestic enterprises to undertake projects and boost growth. On the other hand, for short-term savings, Reisen and Soto (2001) asserted that a banking sector that depends on capital inflows is prone to the risk of bankruptcy and output losses when foreign savings abruptly withdraw.

2.3. Empirical Studies on the Linkage between Financial Development and FDI

Recent studies have attempted to address the relationship between financial development and FDI with different results (e.g., Agbloyor et al. 2013; Kaur et al. 2013; Hajilee and Al Nasser 2015; Sahin and Ege 2015; Gebrehiwot et al. 2016; and Otchere et al. 2016). Most studies report a bidirectional relationship between the two sectors (e.g., Agbloyor et al. 2013; Hajilee and Al Nasser 2015; Otchere et al. 2016). Most studies suggest that a developed financial system can attract inward FDI and an increase in inward FDI leads to a more developed financial system. For example, Otchere et al. (2016) considered the relationship between financial development and inward FDI for African countries from 1996 to 2009 and concluded that inward FDI promoted the liquidity, transparency, and depth of African financial markets. A more developed financial system improves the allocation of inward FDI to more productive sectors, which results in more profits for foreign investors. This further attracts more inward FDI. Hajilee and Al Nasser (2015) found that financial systems and inward FDI positively affected each other in Latin American countries. The authors suggested that inward FDI is an incentive for financial reforms toward stronger financial markets. Well-developed financial markets facilitate foreign investors with available financial services and reduce the cost of capital, thereby encouraging inward FDI.

In contrast, Gebrehiwot et al. (2016) failed to find a linkage between FDI and financial development in eight Sub-Saharan African (SSA) countries from 1991 to 2013. The author used both the two-stage least squares (2SLS) and Granger causality tests and suggested that the nexus between FDI and financial development is inconclusive. The author found a significant impact of FDI on credit to the private sector but an insignificant influence of FDI on liquid liabilities. The author could not find any evidence of financial indicators affecting FDI in eight SSA countries.

[Sahin and Ege \(2015\)](#) showed mixed results in the relationship between two sectors across countries. The authors found that FDI could predict financial development in three countries (Greece, Turkey, and Bulgaria). Their results showed that only Turkey had bidirectional causality between financial development and FDI. In a study of BRIC countries (Brazil, Russia, India, and China), [Kaur et al. \(2013\)](#) applied the fixed and random effects methods and reported that stock market capitalization and size of the banking sector (measured by liquid liabilities) were positively associated with inward FDI. However, bank credit hampered FDI in BRIC countries from 1991 to 2010. This is because, if there is more bank credit available, inflows of FDI tend to be less attractive financial resources for domestic investment. BRIC countries could carry out their domestic investments with funds from bank credit rather than inward FDI.

[Pradhan et al. \(2017\)](#) investigated the relationships between FDI, financial development, trade openness, and economic growth in 19 Eurozone economies from 1988 to 2013. The authors concluded that FDI and trade openness stimulated financial development (measured by banks and stock markets) and economic growth in host economies. Similarly, improvements in financial markets, trade openness, and economic growth helped the host economies attract FDI. In another study, [Pradhan et al. \(2019\)](#) showed that there were causal relationships between FDI, financial development (represented by banks, stocks and bonds markets), and economic growth in G-20 countries. The authors suggested that more well-functioning banks and other financial institutions enable the foreign enterprises to raise extra funds and access necessary financial offerings (e.g., payment systems, letters of credit, and foreign exchanges services) to support their entrepreneurial activities.

[Desbordes and Wei \(2017\)](#) investigated the impact of source and destination countries' financial development (SFD and DFD) on inward FDI. The authors used the data of 83 source countries with 3919 parent enterprises and 125 destination countries with 13 broad manufacturing sectors from 2003 to 2006. The results indicated that SFD and DFD stimulated greenfield, expansion, and mergers and acquisitions (M&A) FDI. Financial development enhanced inward FDI by directly improving access to funding resources and indirectly by supporting manufacturing activity.

[Nkoa \(2018\)](#) used the system GMM estimator to examine the determinants of FDI in 52 African countries from 1995 to 2015. The author showed that financial development, measured by banks and stock markets, played a key role in attracting FDI. Financial development could facilitate local and foreign enterprises with international financial products and services (e.g., global trading system, foreign exchanges services, workers' salaries payment system, overdrafts, and deposit insurances) for their investments in the host countries.

[Irandoust \(2021\)](#) investigated the impact of financial development on FDI in eight post-communist countries from 1990 to 2016. The author used the bootstrap panel Granger causality method and found unidirectional causality running from financial development to FDI. The author showed that financial development provided foreign enterprises and their local linkages with capital and financial services at a cheaper cost for investment expansion. A sound financial system with strong investor protection and better governance regulations could create more FDI attractiveness in host countries.

For ADC economies, there is a dearth of empirical evidence on the relationship between the two sectors. [Varnamkhasti et al.'s \(2015\)](#) study is among the few studies to include ADC economies in their sample. Investigating the impact of financial development on FDI in 33 developing countries (including ADC and other developing economies), the authors showed that financial indicators, divided into banks and stock markets, positively correlated with inward FDI. The authors suggested that the development of financial markets could facilitate financial services to encourage higher inward FDI. [Soumaré and Tchana Tchana \(2015\)](#) used panel data on 29 emerging economies (ADC, Eastern Europe, and Africa) from 1994 to 2015 to examine the relationship between FDI and financial development (measured by both banks and stock markets). The authors' Granger causality test results showed causality between FDI and financial development. Their 2SLS method

showed that the stock market development enabled the host economies to attract more FDI. Additionally, the greater presence of this cross-border capital stimulated higher development of the stock markets. However, the association between banking development and FDI in their study was inconclusive. [Aibai et al. \(2019\)](#) investigated the FDI and financial development nexus in 50 Belt and Road Initiative economies (including Europe and ADC economies) from 1989 to 2011 and found that the presence of inward FDI significantly accelerated the development of the financial markets (measured by the sum of the private credit and stock market value traded to GDP). More importantly, such an effect of FDI was stronger in countries with a better institutional environment. Improved institutional quality, such as higher property protection, better contract enforcement, less ethnic conflict, and lower corruption, helped foreign investors mitigate investment risks to allocate their capital resources to the most productive ventures. As a result, this drew more inward FDI into the host economies and encouraged financial markets to upgrade their financial products and services to satisfy the greater demands of the foreign customers.

3. Data and Empirical Methodology

3.1. Measures of Financial Development

The banking sector in our study was measured by bank credit to private sector over GDP (BACRED), total credit over GDP (TOCRED), and liquid liabilities over GDP (LIQUID). BACRED measures the probability of privately-owned enterprises' access to bank credit. More credit available helps private enterprises purchase superior technologies, employ competent workers, and apply new production methods to expand their business activities. Importantly, BACRED is extensively used as the main financial proxy in many studies because the private sector allocates its funds to the more profitable projects than the public sector (e.g., [Law and Singh 2014](#); [Anyanwu et al. 2018](#); and [Jena and Sethi 2021](#)). The second indicator, TOCRED, measures total credit provided to both private- and state-owned enterprises. Greater access to credit helps enterprises finance their productive investments promptly. The third indicator, LIQUID, is calculated by "currency plus demand and interest-bearing liabilities of bank and non-bank intermediaries divided by GDP" ([Otchere et al. 2016](#), p. 654). This indicator presents banks' ability to mobilize funds, and reflects the size of the banking sector relative to the economy ([Law and Singh 2014](#)). A larger banking system can provide more financial products and services to economic activities ([Cheng et al. 2014](#)).¹

For the stock market, we used three indicators, stock capitalization over GDP (STCAP), stock value traded over GDP (STVAL), and stock turnover (STTUR), to measure the two main channels through which the stock market affects economic growth, namely capitalization and liquidity. These indicators were widely used in previous studies, such as [Agbloyor et al. \(2013\)](#), [Sharma and Bardhan \(2018\)](#), and [Pradhan et al. \(2019\)](#). We used stock capitalization to reflect stock markets' ability to mobilize funds for listed entrepreneurial investments. With high stock market capitalization, investors can diversify their unsystematic risk and make profits. However, this indicator alone cannot capture stock market liquidity. Therefore, we used two other measures: stock value traded and stock turnover, to measure stock liquidity. Such indicators reflect investors' ability to purchase new shares or sell their shares to make profits or cut losses when required. The three indicators of the stock market were used to check our results' robustness.²

3.2. The Data

Our study sample comprised 30 ADC economies with a time span of 34 years from 1986 to 2019 based on data availability for FDI and financial indicators (see Appendix A for the list of countries). The ADC economies were selected based on UNCTAD whose goals are to help countries, particularly developing economies, promote their foreign investment, trading activity, and economic development. All data were extracted from World Bank Indicators ([WDI 2020](#)), except for financial openness indexes proposed by [Chinn and Ito](#)

(2008) and institutional quality indexes from World Governance Indicators (WGI). Table 1 defines the model variables and their measurements.

Table 1. Model variables definitions and measurements.

Variable Name	Symbol	Measurement	Source
Real GDP per capita	ECON	Economic development (measured by real GDP per capita)	WDI
Financial development	FINA		
Bank credit/GDP	BACRED	Credit by banks to private sector over GDP	WDI
Total credit/GDP	TOCRED	Credit by both banks and nonbanks over GDP	WDI
Liquid liabilities/GDP	LIQUID	Liquid liabilities over GDP	WDI
Stock capitalization/GDP	STCAP	Stock market capitalization over GDP (on listed companies)	WDI
Stock value traded/GDP	STVAL	Stock market value traded over GDP	WDI
Stock turnover	STTUR	Stock market turnover	WDI
FDI/GDP	FDI	Inflows of foreign direct investment over GDP	WDI
Domestic investment/GDP	DOME	Fixed capital formation over GDP	WDI
Government spending/GDP	GOVE	Government expenditure over GDP	WDI
Annual inflation rate	INFL	Annual percentage change of the consumer prices index (%)	WDI
Trade openness/GDP	TRADE	Imports plus exports over GDP	WDI
Energy security	ENERGY	Total natural resources rents over GDP	WDI
Age dependence ratio	AGE	Proportion of people under 15 and over 65 years old	WDI
Population	POPU	Total population	WDI
Population density	POPUD	Population over per square kilometer	WDI
Financial openness	FINO	Capital account openness index (KAOPEN) proposed by Chinn and Ito (2008) . This indicator ranges from 0 to 1, a higher score means a higher financial openness.	Chinn-Ito Indexes
Institutional quality	IQ	<p>Average governance institutional quality indicators, including:</p> <ul style="list-style-type: none"> • Voice and accountability index; • Corruption control index; • Rule of laws index; • Effectiveness of government index; • Quality of regulation index; and • Political stability index. <p>These indicators range from 0% to 100%, a higher score means better results relative to governance.</p>	WGI

Table 2 reports the descriptive statistics of five year average variables for a pooled sample of 30 ADC economies from 1986 to 2019. Taking five year average data can solve the missing data problem and eliminate short-run business-cycle fluctuations ([Law and Singh 2014](#); [Muhammad et al. 2016](#)). Using non-overlapping five year average data also reduces high degrees of persistence and potential bias from the use of long-time observations with the GMM estimator. Additionally, the use of the GMM technique with “small T and large N” becomes feasible. There were six five year and four year average periods for each variable per country: (1986–1990), (1991–1995), (1996–2000), (2001–2005), (2006–2010), (2011–2015), and (2016–2019). All variables were in natural logarithm form to reduce potential outliers and interpreted as elasticities ([Sethi et al. 2019, 2020](#)).

Table 2. Descriptive statistics with five year average unbalanced panel data of 30 ADC economies (1986 to 2019).

Variables	Obs	Mean	SD	Min	Max
Real GDP per capita	208	11,070.73	14,732.81	203.1859	64,689.00
FDI/GDP	198	0.040553	0.057280	0.000013	0.396290
Bank credit/GDP	199	0.541174	0.423041	0.005083	2.233389
Total credit/GDP	195	0.648945	0.476664	0.000300	2.171412
Liquid liabilities/GDP	198	0.772834	0.594834	0.063177	3.894476
Stock capitalization/GDP	105	0.974287	1.812469	0.031655	11.66435
Stock value traded/GDP	114	0.508735	0.969904	0.002321	6.738239
Stock turnover	104	0.591034	0.629391	0.019070	3.052046
Domestic investment/GDP	194	0.255891	0.081796	0.029180	0.608423
Government spending/GDP	196	0.136415	0.058513	0.041433	0.326867
Trade openness/GDP	201	1.010656	0.773830	0.004792	4.220850
Annual inflation rate	191	0.095544	0.227977	−0.013526	2.616143
Population	210	1.09×10^8	2.94×10^8	20,9749.0	1.39×10^9
Population/km ²	210	12.57524	35.58884	0.01	205.05
Energy	205	0.084022	0.123394	3.09×10^{-6}	0.663076
Financial openness	191	0.482612	0.356303	0	1
Institutional quality	150	45.40491	21.38126	2.609444	89.02875

3.3. Granger Causality Test

This study used the Granger causality test developed by Hood et al. (2008) for time-series cross-section data (TSCS) to investigate if there were bidirectional relationships between FDI and financial development. The TSCS framework allows Granger causality tests to be more efficient than a time-series approach (especially with small time-series dimensions). This is because TSCS provides more observations and information from cross-sectional countries. This helps improve the degrees of freedom and reduces the collinearity of the regressors (Hood et al. 2008; Law et al. 2013).

If a bidirectional relationship exists, this implies that FDI and financial development have a potential endogeneity issue. The equation is given as follows:

$$y_{i,t} = \alpha_i + \sum_{k=1}^p \phi^k y_{i,t-k} + \sum_{k=0}^p \lambda_i^k x_{i,t-k} + \varepsilon_{i,t} \tag{1}$$

Specifically, Equation (1) examines Granger causality running from financial development to FDI as:

$$FDI_{i,t} = \beta_i + \sum_{k=1}^p \omega^k FDI_{i,t-k} + \sum_{k=0}^p \pi_i^k FINA_{i,t-k} + \varepsilon_{1i,t} \tag{2}$$

where: FINA is financial development, i is country, t is time, and p is number of lag lengths. To examine Granger causality running from financial development to FDI, two hypotheses emerged from the TSCS framework:

H1. For all countries, financial development does not cause FDI (test of homogenous noncausality); and

H2. For all countries, financial development causes FDI (test of homogenous causality).

We tested the null hypothesis with all coefficients π_i^k equal to zero ($\pi_i^1 = \dots = \pi_i^k = 0$). This implies that financial development does not cause FDI for all countries. Hood et al. (2008) proposed using the F-test to test H1, and if the F-test is insignificant, then H1 cannot be rejected. As a result, we would conclude that financial development does not cause FDI for all countries. The process would end here. In contrast, if the F-test is significant, then H1 is rejected. This implies that financial development Granger-causes FDI in at least one country (or possibly all) (Hood et al. 2008). The process would continue with H2.

Having determined that financial development Granger-causes FDI in at least one (or more) country(ies), the process continued with the null hypothesis as $\pi_i^1 = \dots = \pi_i^k \neq 0$. This means that financial development causes FDI for all countries. Again, we used the F-test to test H2. If the F-test is insignificant, then H2 cannot be rejected and we would conclude that financial development causes FDI for all countries. In contrast, if F-test is significant, then H2 is rejected. This implies that financial development does not cause FDI in at least one country (or more).

Equation (3) examines Granger causality running from FDI to financial development as follows:

$$FINA_{i,t} = \delta_i + \sum_{k=1}^p \theta^k FINA_{i,t-k} + \sum_{k=0}^p \phi_i^k FDI_{i,t-k} + \varepsilon_{2i,t} \tag{3}$$

According to Equation (3), we tested two hypotheses which emerged from the TSCS framework:

H3. For all countries, FDI does not cause financial development (test of homogenous noncausality); and

H4. For all countries, FDI causes financial development (test of homogenous causality).

Given the results from the Granger causality tests in Equations (2) and (3), we could determine the nature of the causality between FDI and financial development. A bidirectional relationship means that there might be an endogeneity issue between FDI and financial development (Hood et al. 2008). Therefore, we used the system GMM estimator that can tackle endogeneity problems. The bilateral causality tests are used in many studies, but they can lead to spurious findings because of the omission of other relevant variables (Lütkepohl 1982). Based on these views, the link between FDI and financial development was investigated within multivariate models using the system GMM technique discussed in the next section.

3.4. System GMM Estimator

The general form of the dynamic model is given as:

$$F_{i,t} = \delta F_{i,t-1} + a_1 x_{i,t} + \omega_i + u_{i,t} \tag{4}$$

The slope coefficients, a_1 , are constant for all countries. The individual effect, ω_i , differs across countries; $x_{i,t}$ are independent variables, and $u_{i,t}$ follows the assumption that $u_{i,t} \sim N(0, \sigma_u^2)$. Equation (4) contains the individual effect ω_i ; Arellano and Bond (1991) proposed to take the first difference transformation of Equation (4) to remove ω_i as follows:

$$\Delta F_{i,t} = \delta \Delta F_{i,t-1} + a_1 \Delta x_{i,t} + \Delta u_{i,t} \tag{5}$$

Equation (5) is the equation for the difference GMM. To limit the potential problem of endogeneity since a likelihood of $E(\Delta F_{i,t-1}, \Delta u_{i,t}) \neq 0$ or even $E(\Delta x_{i,t}, \Delta u_{i,t}) \neq 0$, Arellano and Bond (1991) suggested that lagged regressors at levels should be included in the equation as instruments. By providing instrument variables that are not correlated with the disturbance terms, the difference GMM corrects potential endogenous bias of regressors that are not strictly exogenous. However, with a finite sample, the difference GMM is a poor estimator since it provides weak instruments if the time dimension is small and the time-series is relatively persistent (Blundell and Bond 1998). This is because the instruments at levels are less likely to be correlated with the first different equation. Hence, such weak instruments may generate a biased estimate in a finite sample (Wintoki et al. 2012). Additionally, the difference equation not only eliminates individual effects but also removes cross-country variations at the levels and exacerbates measurement error bias (Cojocaru et al. 2016). In our study, the five year average sample was relatively persistent. Hence, as suggested by Cojocaru et al. (2016), the difference GMM could lead to bias and inaccurate findings.

To overcome the restrictions of the difference GMM, [Blundell and Bond \(1998\)](#) introduced the system GMM, which combines Equations (4) and (5). This includes one equation at levels and one equation at first difference. Adding the equation at levels permit the presence of cross-country variation in regression and reduces measurement error bias derived from the difference equation ([Fukase 2010](#); [Cojocaru et al. 2016](#)). The system GMM uses two sets of internal instruments: one comprises a set of lagged levels to be instrumented (from lagged two or more) for the first difference equation; the other consists of a set of the most recent first difference to be instruments for the level equation ([Habibullah and Eng 2006](#)). These two sets of internal instruments of system GMM reduce the endogeneity bias of regressors that stems from heterogeneity, simultaneity, and dynamic relationships in the regressions ([Wintoki et al. 2012](#)). Robustness to heteroscedasticity of the disturbance terms is used for system GMM.

The lagged levels and lagged first difference can be valid instruments for system GMM when it satisfies two assumptions of the moment conditions:

Assumption 1. *The error term is not correlated with instruments of the regressors:*

$$E(F_{i,t-k}, \Delta u_{i,t}) = 0; E(x_{i,t-k}, \Delta u_{i,t}) = 0 \text{ where } k \geq 2, t = 3, \dots T \tag{6}$$

$$E(\Delta F_{i,t-k}, u_{i,t}) = 0; E(\Delta x_{i,t-k}, u_{i,t}) = 0 \text{ where } k \geq 1, t = 3, \dots T \tag{7}$$

Assumption 2. *Country-specific effects are not correlated with the lagged first difference of regressors:*

$$E(\Delta F_{i,t-k}, \omega_i) = 0; E(\Delta x_{i,t-k}, \omega_i) = 0 \text{ where } k \geq 1, t = 3, \dots T \tag{8}$$

3.4.1. The Impact of Financial Development on FDI

Following the framework proposed by [Ezeoha and Cattaneo \(2012\)](#), [Agbloyor et al. \(2013\)](#), [Otchere et al. \(2016\)](#), and [Ho and Gan \(2021\)](#), the empirical model to estimate the impact of financial development on FDI is given as:

$$FDI_{it} = \beta_1 FDI_{it-1} + \beta_2 FINA_{it} + \sum_{j=1}^n \varphi_j Y_{jit} + \eta_i + \zeta_{it} \tag{9}$$

Equation (9) can be rewritten as:

$$FDI_{it} = \beta_1 FDI_{it-1} + \beta_2 FINA_{it} + \varphi_1 ECON_{it} + \varphi_2 FINO_{it} + \varphi_3 IQ_{it} + \varphi_4 DOME_{it} + \varphi_5 GOVE_{it} + \varphi_6 INFL_{it} + \varphi_7 TRADE_{it} + \varphi_8 ENERGY_{it} + \eta_i + \zeta_{it} \tag{10}$$

where: *FINA* is financial development; *Y* includes indicators for real GDP per capita in 2010 (*ECON*), financial openness (*FINO*), institutional quality (*IQ*), domestic investment (*DOME*), government spending (*GOVE*), inflation (*INFL*), trade openness (*TRADE*), and energy security (*ENERGY*), and η_i is country-specific effects.

Control variables:

Economic development, measured by real GDP per capita, is an important factor to attract FDI to developing countries. Recipient countries with a higher degree of economic development can enhance their living standards to purchase high-quality goods and services provided by foreign enterprises ([Ezeoha and Cattaneo 2012](#); [Govil 2013](#); [Kumari and Sharma 2017](#)).

Financial openness, measured by the capital account openness index (KAPOPEN), is a significant factor in increased FDI. A country with a more open capital account encourages higher inward FDI. This is because foreign enterprises have fewer restrictions to access external resources, transfer capital within their subsidiaries, or repatriate profits to their home ([Agbloyor et al. 2013](#)).

Better institutional quality enables recipient countries to ameliorate the investment climate such as contract enforcement, economic policies, regulatory improvement, and protection of property rights that fosters FDI stocks (Daude and Stein 2007; Otchere et al. 2016). To measure institutional quality, we used the average of six indicators proposed by Kaufmann et al. (2011): (1) voice and accountability index, (2) corruption control index, (3) rule of laws index, (4) effectiveness of government index, (5) quality of regulation index, and (6) political stability index.

Domestic investment, measured by fixed capital formation over GDP, plays a vital role in attracting FDI. Increases in domestic investment reflect promotion of the business environment, which encourages foreign investors to achieve higher future returns on their investments (Lautier and Moreaub 2012; Varnamkhasti et al. 2015).

Government spending, measured by government expenditure over GDP, reflects a government’s capacity to control the use of financial resources in the country (Omri and Kahouli 2014). Omri and Kahouli (2014) argued that developing countries may suffer from corruption and misallocation of financial resources to unproductive sectors. Hence, more government expenditure may lead to a distortion of fund use and discouragement of inward FDI.

Inflation, measured by the annual percentage change in the consumer price index, can impede the motivation of the foreign enterprises to invest in a country. An increase in inflation rate may reflect an unstable economic environment and weak monetary management. This adversely affects the future profitability of the foreign enterprises in the recipient country (Ezeoha and Cattaneo 2012; Agbloyor et al. 2013).

Countries with more trade openness enable foreign enterprises to import advanced intermediate inputs at a competitive price from the global market and therefore can promote their production and entrepreneurial activity (Al Nasser and Gomez 2009). We measured trade openness by imports plus exports over GDP.

Energy security: countries with more energy or natural resources available can attract more FDI (Otchere et al. 2016; Avom et al. 2020; and Ho and Gan 2021). Following Avom et al. (2020) and Ho and Gan (2021), we used total natural resource rents over GDP as a proxy of the energy or resource factor.

3.4.2. Impact of FDI on Financial Development

Following the framework of Agbloyor et al. (2013), Allen et al. (2014), Otchere et al. (2016), and Aibai et al. (2019), our empirical model to estimate the impact of FDI on financial development was:

$$FINA_{it} = \delta_1 FINA_{it-1} + \delta_2 FDI_{it} + \sum_{j=1}^n \omega_j Z_{jit} + \eta_i + \xi_{it} \tag{11}$$

Equation (11) can be rewritten as:

$$FINA_{it} = \delta_1 FINA_{it-1} + \delta_2 FDI_{it} + \omega_1 GOVE_{it} + \omega_2 DOME_{it} + \omega_3 ECON_{it} + \omega_4 IQ_{it} + \omega_5 INFL_{it} + \omega_6 AGE_{it} + \omega_7 POPU_{it} + \omega_8 POPUD_{it} + \eta_i + \xi_{it} \tag{12}$$

where: *FINA* is financial development, *Z* includes indicators for government spending (*GOVE*), domestic investment (*DOME*), real GDP per capita in 2010 (*ECON*), institutional quality (*IQ*), inflation (*INFL*), age dependence (*AGE*), population growth (*POPU*), and population density (*POPUD*), and η_i is country-specific effects.

Control variables:

Government spending has a key position in providing financial services, especially in developing economies where bank ownership by the government is higher than in developed economies. Government spending on productive goods and services may result in higher economic performance and therefore higher demand for financial services (Adusei and Frimpong 2014). In contrast, ineffective government expenditure relative to

disincentive taxes, rent-seeking, and corruption may result in financial distress (Cooray 2011).

Increases in domestic investments stimulate economic activity and encourage the financial systems to strengthen their financial services and funding resources to serve higher market demands (Naceur et al. 2014).

Higher economic development can intensify the expansion of financial markets, since higher economic activity is a catalyst boosting financial services, competition, and the proficiency of financial markets to meet customers' higher demands (Dutta and Mukherjee 2012; Kim and Lin 2013).

Institutional quality is a significant factor fostering financial development (Voghouei et al. 2011; Law and Azman-Saini 2012; and Le et al. 2016). Financial systems with an efficient institutional background (such as an efficient legal system, prudent regulations, and supervision) can reduce market imperfection and the possibility of crisis, encourage investment, and monitor financial activities effectively.

Increased inflation rates may discourage investors from raising capital because of uncertainty in the financial markets with potentially high risks and low real returns (Boyd et al. 2001; Chinn and Ito 2002).

The age dependence ratio, measured by the proportion of people under 15 and over 65 years old, is a stimulus for financial development. A higher age dependence ratio can increase savings in an economy and enhance the level of financial development (Aibai et al. 2019).

Population, measured by total population, is a significant factor that enhances financial development (Allen et al. 2014). Increases in population can provide financial markets with higher demand for their financial products and services.

Population density, measured by the number of people per square kilometer, is a determinant of financial development because it reflects frequent interrelationships among companies, businesses, and households that require effective financial services (Allen et al. 2014).

4. Empirical Results and Discussion

4.1. Granger Causality

Based on the unbalanced panels, we used the Fisher's and modified Fisher's tests to test the stationarity of the FDI and financial development variables. Table 3 indicates that most variables, namely FDI, TOCRED, STCAP, STVAL, and STTUR, were stationary at the levels, whereas BACRED and LIQUID did not contain any unit-roots after first differencing. Having determined the stationarity of FDI and financial proxies, we next performed the Granger causality test developed by Hood et al. (2008). The new Granger approach modified the conventional Granger framework by adopting a panel series with possible short time-spans and heterogenous issues. The approach tackled the drawback of dynamic panel analysis, i.e., it provided the direction of the potential causal links between FDI and financial development (Naik and Padhi 2015). In other words, the bivariate approach helped us explore whether past values of FDI could predict financial development and vice versa.

Table 3. The unit root tests for FDI and the financial proxies.

Variable	Fisher’s		Fisher’s Modified	
	Constant	Constant and Time Trend	Constant	Constant and Time Trend
FDI	214.5771 ***	194.8332 ***	12.9320 ***	11.2135 ***
BACRED	41.5962	48.3175	−2.1241	−1.5391
D.BACRED	497.1931 ***	376.7853 ***	37.5305 ***	27.0504 ***
LIQUID	62.7806	97.6503 ***	−0.2802	2.7548 ***
D.LIQUID	731.9349 ***	628.8329 ***	57.9622 ***	48.9883 ***
TOCRED	204.1651 ***	142.8996 ***	12.3890 ***	6.9738 ***
STCAP	146.6215 ***	127.3379 ***	10.9395 ***	8.8838 ***
STVAL	93.5472 ***	76.8869 ***	5.2818 ***	3.5058 ***
STTUR	168.4750 ***	144.8435 ***	13.2691 ***	10.7500 ***

Note: *** = $p < 0.01$. We used annual data to test unit-roots for FDI and financial proxies.

First, in terms of the causal direction from financial development to FDI, the F-test was used to test the hypothesis (H1) that financial development does not Granger-cause FDI in all countries (homogeneity). Rejecting hypothesis (H1) means that financial development Granger-causes FDI in at least one country (or several). Table 4 shows that the F-test was significant at conventional levels for all financial dimensions. This indicates that the past values of financial development could significantly explain current inward FDI in at least one country. Hence, we sequentially considered the second hypothesis (H2) that financial development homogeneously Granger-causes FDI. Hypothesis (H2) was rejected at conventional levels, which implies that the past values of financial development may not affect the current inward FDI in all countries.

Table 4. The Granger causality test results.

Hypothesis	Homogenous No Granger-Cause (First Hypothesis)		Homogenous Granger-Cause (Second Hypothesis)	
	F-Test Statistic	Critical F-Value	F-Test Statistic	Critical F-Value
From financial development to FDI				
<i>From BANK to FDI</i>				
D.BACRED to FDI	1.960766 ***	1.72 (at 1%)	1.871463 ***	1.72 (at 1%)
TOCRED to FDI	2.853816 ***	1.72 (at 1%)	2.926715 ***	1.72 (at 1%)
D.LIQUID to FDI	1.779628 ***	1.72 (at 1%)	1.632403 **	1.47 (at 5%)
<i>From STOCK to FDI</i>				
STCAP to FDI	6.306072 ***	1.91 (at 1%)	3.739141 ***	1.91 (at 1%)
STVAL to FDI	5.051535 ***	1.91 (at 1%)	4.387758 ***	1.91 (at 1%)
STTUR to FDI	2.086677 ***	1.91 (at 1%)	2.194951 ***	1.91 (at 1%)
From FDI to financial development				
<i>From FDI to BANK</i>				
FDI to D.BACRED	4.808404 ***	1.72 (at 1%)	3.298815 ***	1.68 (at 1%)
FDI to TOCRED	5.686519 ***	1.72 (at 1%)	5.311295 ***	1.68 (at 1%)
FDI to D.LIQUID	1.288296	1.35 (at 10%)		
<i>From FDI to STOCK</i>				
FDI to STCAP	1.766628 **	1.59 (at 5%)	1.767393 **	1.59 (at 5%)
FDI to STVAL	2.036478 ***	1.91 (at 1%)	1.948785 ***	1.91 (at 1%)
FDI to STTUR	2.493683 ***	1.91 (at 1%)	2.515825 ***	1.91 (at 1%)

Note: ** = $p < 0.05$, *** = $p < 0.01$.

We obtained similar results for the causal direction running from FDI to financial development. The results in Table 4 rejected hypothesis (H3) that FDI does not Granger-cause financial development (except for LIQUID) for all samples. In other words, past

values of FDI could significantly explain current financial development in at least one country (or several countries). However, we rejected the hypothesis (H4) that FDI Granger-causes financial development for all samples, which means that the past values of FDI may not affect the current financial development in at least one country.

In summary, the results from all cases suggested that the causal links between two financial sectors and FDI were in the same direction, but such causality was heterogeneous across the panels. Our findings agree with [Soumaré and Tchana Tchana \(2015\)](#) who focused on emerging markets and verified that countries with higher levels of stock development attracted more inward FDI in the following years, whereas increasing FDI also induced a higher level of stock development. However, the causal links between FDI and banking expansion were inconclusive in their study. Our results are more consistent with [Otchere et al. \(2016\)](#) who used the Granger causality tests of [Hood et al. \(2008\)](#) to discover reverse causation between financial development and FDI in African economies. Such causal links were, however, performed with different structures (heterogeneous) across the African economies. As a result, the presence of two-way causation implies that financial development and FDI may endogenously determine each other. In the next section, we present our benchmark results for dynamic paths between the two financial sectors and FDI by using the multivariate models to control for other relevant factors (such as economic development, inflation, government spending, and domestic investment).

4.2. Empirical Results for the Impact of Financial Development on FDI

Based on the system GMM estimate, the results in Table 5 show there was a positive link between financial development and FDI. The AR (2) test of serial correlation and the Hansen test of instrument validity across models (1) to (6) showed the p -values were above the 5% level, which therefore confirmed the reliability of our estimates. For the banking dimensions, Table 5 shows that BACRED, TOCRED, and LIQUID positively and robustly affected FDI in all model specifications (models (1) to (3)). The results show that a 1% increase in banking development positively affected inward FDI in the ADC economies. Greater access to bank credit enhances investment opportunities for both local and foreign entrepreneurs since they can enhance their business activities with internal funds by borrowings from banks. The availability of banking services helps producers and customers improve their timing in seeking funds for production and the distribution of products. This results in reduced costs and enhanced productivity growth. Our findings confirm the studies by [Ezeoha and Cattaneo \(2012\)](#) and [Agbloyor et al. \(2013\)](#) that revealed that a well-developed financial sector attracted inward FDI in Sub-Saharan and African economies. Thus, higher financial development improves the networks between foreign entrepreneurs and their suppliers and buyers by efficiently facilitating resources and trading operations (such as available external finance, low transaction costs, improved settlements timing, and business related to services). Local suppliers and buyers can improve their likelihood of stimulating productivity growth by accessing technology transfer from foreign entrepreneurs ([Agbloyor et al. 2013](#)). However, our results differ from [Soumaré and Tchana Tchana's \(2015\)](#) study. Soumaré and Tchana Tchana could not provide evidence of significant effects of the banking sector on FDI in 29 emerging markets. One possible explanation is that the authors did not control for the presence of heterogeneity in the panels (such as regions and income levels) that may distort the banking effect on FDI.

Table 5. The regression results for the impact of financial development on FDI.

Variable	Banking Dimension			Stock Dimension		
	BACRED	TOCRED	LIQUID	STCAP	STVAL	STTUR
Model	(1)	(2)	(3)	(4)	(5)	(6)
FDI (−1)	0.200 ** (0.092)	0.375 ** (0.164)	0.236 ** (0.102)	−0.348 * (0.206)	0.067 (0.131)	−0.261 * (0.141)
BACRED	0.230 * (0.136)					
TOCRED		0.135 ** (0.062)				
LIQUID			0.272 * (0.158)			
STCAP				0.294 ** (0.145)		
STVAL					0.092 * (0.049)	
STTUR						0.043 (0.090)
ECON	0.074 *** (0.028)	0.184 ** (0.092)	0.086 (0.063)	0.026 (0.026)	−0.038 (0.035)	0.02 (0.024)
FINO	0.554 * (0.301)	0.613 *** (0.205)	0.548 ** (0.215)	0.095 (0.243)	−0.072 (0.193)	0.033 (0.208)
IQ	−0.479 (0.312)	−0.264 (0.298)	−0.314 (0.276)	−1.145 (0.767)	−0.605 * (0.361)	−0.824 (0.501)
DOME	0.209 (0.317)	−0.143 (0.362)	0.161 (0.381)	0.502 (0.508)	0.615 (0.404)	0.418 (0.466)
GOVE	−0.044 (0.148)	0.181 (0.252)	−0.115 (0.155)	0.420 (0.373)	0.097 (0.227)	0.359 (0.345)
INFL	0.371 (1.246)	0.465 (1.130)	0.558 (1.254)	−2.297 ** (0.984)	−2.279 ** (0.876)	−2.319 ** (0.896)
TRADE	0.724 ** (0.319)	0.518 * (0.310)	0.667 *** (0.233)	1.587 *** (0.477)	1.138 *** (0.310)	1.673 *** (0.396)
ENERGY	−0.038 (0.021)	−0.020 (0.024)	−0.022 (0.023)	−0.098 ** (0.040)	−0.072 ** (0.028)	−0.098 *** (0.035)
Constant	−0.346 (1.622)	−0.782 (1.425)	−1.101 (1.414)	1.201 (3.225)	−0.071 (1.624)	−0.059 (2.245)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observation	117	117	117	86	90	86
Groups	26	26	26	20	20	20
Instruments	21	19	21	19	19	19
AR (2) (p-value)	0.214	0.094	0.215	0.645	0.977	0.656
Hansen test (p-value)	0.160	0.571	0.143	0.269	0.371	0.603
Difference-in-Hansen test (p-value)	0.080	0.311	0.106	0.305	0.151	0.930

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$. Figures in brackets are robust-standard errors. All variables are in natural logarithm form.

Table 5 also shows that stock development measured by STCAP, STVAL, and STTUR was positively correlated with inward FDI in all model specifications (models (4) to (6)). This means that ADC economies with higher levels of stock market development encouraged inward FDI. The magnitudes of stock development for models (4) to (6) were between 0.043 and 0.294, which implies that a 1% increase in stock development could attract inward FDI by 0.043% to 0.294%. The expansion of the stock market channel enabled foreign entrepreneurs to acquire information about local industries and local markets at lower costs. Additionally, foreign entrepreneurs could access a liquid stock channel to raise long-term external funds for their investment projects. Our results are similar to the work of [Otchere et al. \(2016\)](#) who found that the stock market measured by STCAP, STVAL, and STTUR exhibited a favorable effect on inward FDI in African economies. Our findings also align with [Soumaré and Tchana Tchana \(2015\)](#) who revealed that a well-developed stock market reflects a market-friendly environment to attract greater inward FDI.

In terms of other factors, Table 5 shows that trade openness (TRADE) significantly stimulated inward FDI in all model specifications (models (1) to (6)). The coefficient of TRADE was between 0.518 and 1.673, which means that a 1% increase in trade openness enhanced inward FDI by 0.518% to 1.673%. This finding supports [Anyanwu's \(2012\)](#) and [Epaphra's \(2018\)](#) argument that countries with higher trade openness attract more foreign enterprises since they can access the global market to purchase material inputs at lower cost and sell their products at competitive prices. More trade openness enables foreign enterprises to improve their networks with international customers to undertake more productive contracts.

Our results in Table 5 in all model specifications except model (5) exhibited a positive sign of financial openness on FDI. This result confirmed that higher financial openness helped host countries attract more inward FDI. Higher levels of financial openness indicate that ADC economies reduced their capital controls on cross-border financial transactions by reducing control over current and capital accounts, cancelling multiple exchange rates, and abolishing mandatory export proceeds (see [Chinn and Ito 2008](#); [Tan et al. 2019](#)). Reduced capital controls enable foreign enterprises to receive and transfer capital more freely from one country to another. Foreign enterprises confront fewer restrictions (such as foreign ownership restrictions or cross-border transaction costs) on mobilizing capital resources from their subsidiaries and parent MNE to expand business activities in the host countries. Therefore, higher financial openness helped ADC economies attract more inward FDI. Congruent with our result, [Agbloyor et al. \(2013\)](#) revealed that financial openness is a significant driver of inward FDI. Since foreign enterprises are usually large MNE, more financial openness reduces capital controls and helps foreign enterprises mobilize needed capital from other MNE subsidies to improve output growth in the recipient countries.

4.3. Empirical Results for the Impact of FDI on Financial Development

All model specifications in Table 6 with the system GMM indicate that inward FDI significantly incentivized financial development. For the banking sector, Table 6 reveals that FDI was a significant driving force in banking development measured by the three dimensions, BACRED, TOCRED, and LIQUID. The results show that a 1% increase in inward FDI accelerated banking development by 0.050% to 0.099%. There are several reasons for our results. First, higher levels of inward FDI improve the funding resources of the local banking sector since foreign enterprises need to open bank accounts for their business activities. Subsequently, the banking channel can partially reallocate these funding resources to other productive sectors to make profits ([Agbloyor et al. 2013](#)). Secondly, increases in foreign customers force the local banking sector to upgrade its financial services such as international payment systems, foreign exchange services, and financial products (i.e., lending and savings) with more competitive prices ([Kaur et al. 2013](#)). Further upgrading of financial services improves the trading frequency and settlement timing to satisfy the flexible demands of both current and new customers ([Shah 2016](#)). Thirdly, the presence of foreign enterprises encourages a more competitive business climate in host countries

and reduces the power of monopolistic elites in the same industry. This enhances industry growth, international trading, and financial development (Rajan and Zingales 2003).

Table 6. The regression results for the impact of FDI on financial development.

Variable	Banking Dimension			Stock Dimension		
	BACRED	TOCRED	LIQUID	STCAP	STVAL	STTUR
Model	(1)	(2)	(3)	(4)	(5)	(6)
BACRED (−1)	0.495 *** (0.185)					
TOCRED (−1)		0.366 ** (0.153)				
LIQUID (−1)			0.692 *** (0.157)			
STCAP (−1)				0.128 (0.227)		
STVAL (−1)					0.377 * (0.204)	
STTUR (−1)						0.358 *** (0.104)
FDI	0.098 *** (0.032)	0.099 * (0.059)	0.050 ** (0.020)	0.131 * (0.079)	0.301 ** (0.133)	0.149 * (0.079)
GOVE	0.179 (0.284)	0.302 (0.338)	0.146 (0.137)	−0.184 (0.287)	−0.056 (0.465)	−0.297 (0.271)
DOME	0.355 (0.234)	0.031 (0.231)	0.174 (0.129)	−0.437 (0.346)	−3.048 *** (0.755)	−0.253 (0.214)
ECON	−0.204 (0.191)	−0.218 (0.287)	−0.132 * (0.075)	0.366 ** (0.184)	0.747 *** (0.280)	0.556 *** (0.199)
IQ	0.493 * (0.260)	0.585 * (0.315)	0.184 ** (0.091)	0.799 *** (0.269)	1.347 *** (0.367)	0.446 * (0.255)
INFL	−0.346 (0.507)	−0.226 (0.640)	−0.112 (0.378)	−0.328 (0.565)	0.642 (0.912)	−0.187 (0.709)
AGE	−0.770 (0.745)	−0.994 (0.752)	−0.350 (0.323)	0.745 (0.739)	0.502 (1.325)	0.909 (0.620)
POPU	0.054 (0.045)	0.225 (0.204)	0.016 (0.024)	0.145 ** (0.074)	0.750 *** (0.172)	0.521 *** (0.076)
POPUD	0.040 (0.053)	0.071 (0.060)	0.044 (0.039)	0.128 * (0.077)	0.010 (0.088)	−0.078 (0.051)
Constant	−1.228 (1.793)	−4.963 (5.248)	0.288 (0.893)	−9.497 *** (3.349)	−27.915 *** (5.559)	−15.579 *** (2.385)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	131	127	131	78	86	77
Groups	30	29	30	20	20	20
Instruments	21	21	21	19	19	19
AR (2) (p-value)	0.141	0.246	0.212	0.872	0.652	0.760
Hansen test (p-value)	0.348	0.733	0.242	0.335	0.936	0.491
Difference-in-Hansen test (p-value)	0.516	0.706	0.207	0.362	0.939	0.197

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$. Figures in brackets are robust-standard errors. All variables are in natural logarithm form.

For the stock channel, models (4) and (6) in Table 6 show that a 1% increase in inward FDI enabled the host countries to improve the stock market by 0.131% to 0.301%. The findings suggest that the presence of foreign enterprises significantly stimulated the development of the stock market. Foreign entrepreneurs can list on the local stock market to enhance their reputation to investors. The emergence of listed foreign enterprises inspires other investors' confidence to participate in the stock market, which further accelerates trading volume and capitalization. The attraction of foreign participants encourages the stock market to enhance its institutional quality and regulatory reforms (such as quality trading regulations, information disclosure, operational competence, and investor protection). Under the greater competitive pressure of foreign enterprises, local monopolistic elites reduce their power to adopt a friendly market environment that encourages trade, industrial growth, and financial development. Our results are similar to [Agbloyor et al.'s \(2013\)](#) and [Otchere et al.'s \(2016\)](#) studies that revealed that increasing inward FDI stimulated the expansion of banks and stock markets in African economies. Our findings are also consistent with [Hajilee and Al Nasser \(2015\)](#) who suggested that inward FDI was an incentive for financial reforms toward a vibrant deeper financial market in Latin America.

Table 6 shows that institutional quality (IQ) was a stimulus for both banks and stock markets in models (1) to (6). For the banking sector, the results from models (1) to (3) revealed that a 1% increase in the institutional environment enhanced the banking development by 0.184% to 0.585%. Our results support [Law and Azman-Saini's \(2012\)](#) study that indicated that improved institutional quality such as efficient financial regulations, an effective legal system, and improved property rights enhances the investors' incentives to engage in financial markets to accelerate capital mobilization and financial activity. Our findings are consistent with [Le et al. \(2016\)](#) and [Feng and Yu \(2021\)](#), who showed that better institutional structures with strong regulatory quality, secure property-rights system, and effective anti-corruption laws could reduce rent-seeking and opportunistic behaviors in Asian economies. This enables the banking system to attract and allocate more savings to productive entrepreneurial activity. However, our results differ from [Aluko and Ajayi's \(2018\)](#) findings that showed an insignificant effect of institutional quality on banking development in 25 SSA countries from 1997 to 2014. This is because most SSA countries have low institutional infrastructure, characterized by inadequate supervisory capacity, weak regulations, and low property rights protection ([David et al. 2014](#)). Such an ineffective institutional framework cannot hasten improvements in the banking industry in SSA countries.

For the stock channel, the results from models (4) to (6) revealed that the institutional environment was an important contributor to stock market development. A 1% increase in institutional quality could improve stock markets by 0.446% to 1.347%. The beneficial effect on stock market development is consistent with [Law and Azman-Saini \(2012\)](#) and [Otchere et al. \(2016\)](#), who found a positive association between the institutional infrastructure and stock market development in 55 economies and African countries, respectively. This is because stronger institutional improvements such as better property rights, enforcement of contracts, and sound accounting practices attract more participants to the stock markets. High-quality institutions help investors reduce information asymmetry and opportunistic behaviors to stimulate productive investments. Likewise, [Billmeier and Massa \(2009\)](#) indicated that good institutions with improved shareholder protection, information transparency, and less government corruption enhance the confidence of market participants to purchase listed securities in emerging economies. Therefore, listed entrepreneurs can accelerate capital accumulation and investment.

4.4. Additional Results

Since most ADC economies were affected by the 1997–1998 Asian crisis and the 2008–2009 global financial crisis, we checked the sensitivity of our results by excluding observations in 1997, 1998, 2008, and 2009. Table 7 presents the impact of financial development on FDI during non-crisis years, and Table 8 presents the impact of FDI on financial development during non-crisis years. Tables 7 and 8 show that the exclusion

of the crises did not contaminate our results. The positive relationship between FDI and financial development, measured by banks and stock markets, remained unchanged. This confirmed that our findings were not affected by the two financial crises.

Table 7. The regression results of the impact of financial development on FDI during non-crisis years.

Variable	Banking Dimension			Stock Dimension		
	BACRED	TOCRED	LIQUID	STCAP	STVAL	STTUR
Model	(1)	(2)	(3)	(4)	(5)	(6)
FDI (−1)	0.226 ** (0.111)	0.266 * (0.159)	0.210 ** (0.106)	−0.250 ** (0.124)	0.097 (0.205)	−0.112 (0.210)
BACRED	0.268 ** (0.127)					
TOCRED		0.154 ** (0.063)				
LIQUID			0.297 * (0.161)			
STCAP				0.293 ** (0.125)		
STVAL					0.100 ** (0.050)	
STTUR						0.071 (0.096)
ECON	0.073 ** (0.031)	0.182 ** (0.079)	0.057 * (0.031)	0.002 (0.037)	0.006 (0.031)	0.015 (0.040)
FINO	0.861 * (0.493)	0.651 *** (0.204)	0.557 *** (0.179)	0.143 (0.449)	0.008 (0.183)	0.341 (0.644)
IQ	0.063 (0.532)	−0.390 (0.374)	−0.544 (0.721)	−1.015 ** (0.507)	−0.435 (0.533)	−0.828 (0.661)
DOME	0.127 (0.310)	−0.290 (0.360)	0.224 (0.303)	0.384 (0.495)	−0.822 (1.373)	0.359 (0.470)
GOVE	−0.227 (0.373)	0.279 (0.264)	−0.021 (0.266)	0.320 (0.373)	0.159 (0.253)	0.181 (0.377)
INFL	0.618 (1.396)	1.012 (1.122)	0.872 (1.246)	−2.238 ** (0.874)	−2.303 *** (1.017)	−1.948 * (1.036)
TRADE	−0.137 (1.136)	0.679 ** (0.315)	0.778 ** (0.309)	1.397 *** (0.442)	0.996 ** (0.404)	1.336 *** (0.442)
ENERGY	−0.042 (0.033)	−0.016 (0.028)	−0.021 (0.023)	−0.095 *** (0.035)	−0.067 ** (0.030)	−0.085 ** (0.043)
Constant	−2.454 (3.474)	−4.190 ** (1.657)	−3.963 (2.689)	−6.008 ** (2.332)	−7.101 ** (3.284)	−6.104 ** (3.044)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observation	115	115	115	86	89	86
Groups	26	26	26	20	20	20
Instruments	21	19	21	19	19	19
AR (2) (p-value)	0.321	0.366	0.242	0.551	0.688	0.713
Hansen test (p-value)	0.536	0.738	0.427	0.261	0.792	0.544
Difference-in-Hansen test (p-value)	0.648	0.375	0.226	0.148	0.666	0.573

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$. Figures in brackets are robust-standard errors. All variables are in natural logarithm form.

Table 8. The regression results of the impact of FDI on financial development during non-crisis years.

Variable	Banking Dimension			Stock Dimension		
	BACRED	TOCRED	LIQUID	STCAP	STVAL	STTUR
	(1)	(2)	(3)	(4)	(5)	(6)
BACRED (−1)	0.459 *** (0.175)					
TOCRED (−1)		0.245 *** (0.084)				
LIQUID (−1)			0.815 *** (0.132)			
STCAP (−1)				0.460 ** (0.223)		
STVAL (−1)					0.172 (0.275)	
STTUR (−1)						0.398 *** (0.096)
FDI	0.062 * (0.034)	0.039 (0.054)	0.028 * (0.016)	0.017 (0.096)	0.302 ** (0.152)	0.121 * (0.066)
GOVE	−0.118 (0.108)	0.020 (0.235)	−0.031 (0.151)	−0.232 (0.245)	0.180 (0.370)	−0.191 (0.248)
DOME	0.193 * (0.117)	0.248 ** (0.110)	0.239 *** (0.091)	−0.250 (0.239)	−0.916 (0.586)	−0.329 * (0.175)
ECON	0.101 (0.079)	−0.048 (0.126)	−0.031 (0.072)	0.217 (0.186)	0.795 ** (0.383)	0.519 *** (0.184)
IQ	0.310 * (0.168)	0.363 * (0.204)	0.042 (0.100)	0.644 *** (0.219)	1.773 *** (0.424)	0.389 * (0.228)
INFL	−2.157 * (1.144)	−0.336 (0.747)	−0.353 (0.307)	0.537 (0.663)	1.227 (1.024)	−0.434 (0.798)
AGE	0.038 (0.243)	−0.472 (0.492)	−0.073 (0.269)	0.475 (0.660)	1.825 ** (0.885)	0.786 (0.521)
POPU	0.119 *** (0.041)	0.119 *** (0.034)	0.009 (0.016)	0.083 (0.072)	0.733 *** (0.248)	0.494 *** (0.080)
POPUD	0.002 (0.031)	0.116 * (0.062)	0.018 (0.035)	0.091 * (0.052)	0.064 (0.067)	−0.066 (0.048)
Constant	−3.804 ** (1.487)	−3.598 *** (1.066)	0.255 (0.562)	−6.819 ** (3.073)	−26.225 *** (8.581)	−14.714 *** (2.404)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	131	127	131	78	86	77
Groups	30	29	30	20	20	20
Instruments	21	21	21	19	19	19
AR (2) (p-value)	0.068	0.276	0.119	0.657	0.525	0.575
Hansen test (p-value)	0.441	0.363	0.628	0.827	0.777	0.529
Difference-in-Hansen test (p-value)	0.572	0.482	0.423	0.590	0.745	0.209

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$. Figures in brackets are robust-standard errors. All variables are in natural logarithm form.

To differentiate the impact of greenfield and brownfield (M&A) FDI on financial development, we reran all regression models; the results are presented in Table 9. We extracted the data of the brownfield FDI and net FDI inflows from UNCTAD. Since UNCTAD had the data of greenfield FDI only from 2003, we followed Harms and Méon (2018) and Gopalan et al. (2018) to recalculate greenfield FDI by subtracting brownfield FDI from net FDI inflows. Table 9 shows that greenfield FDI (GREEN) enhanced the development of the banks and stock markets. However, brownfield FDI (BROWN) exhibited an insignificant influence on financial development. Our results suggest that greenfield FDI produced a crowd-in effect on financial development. Greenfield FDI enterprises with their cross-border capital increase new ventures and business activity in the host economies, which encourages the development of financial markets to respond to the need for entrepreneurial investment. Our results support Gopalan et al.'s (2018) study that showed a key effect of greenfield FDI on economic development and an insignificant effect of brownfield FDI on economic development. This is because greenfield FDI, with its external capital, technology, and intellectual property, can create more employment, capital accumulation, and productive capacity in host economies.

Table 9. The regression results of the impact of greenfield and brownfield FDI on financial development.

Variable	Banking Dimension						Stock Dimension					
	BACRED		TOCRED		LIQUID		STCAP		STVAL		STTUR	
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BACRED (−1)	0.446 *** (0.105)	0.477 *** (0.121)										
TOCRED (−1)			0.280 *** (0.073)	0.316 *** (0.087)								
LIQUID (−1)					0.835 *** (0.097)	0.599 ** (0.233)						
STCAP (−1)							0.298 (0.194)	0.561 ** (0.278)				
STVAL (−1)									0.022 (0.493)	0.500 *** (0.185)		
STTUR (−1)											0.350 ** (0.147)	0.325 ** (0.155)
GREEN	0.093 ** (0.045)		0.258 * (0.132)		0.083 ** (0.038)		0.181 * (0.101)		0.589 * (0.310)		0.200 ** (0.098)	
BROWN		0.039 ** (0.016)		0.014 (0.075)		0.026 * (0.014)		−0.059 (0.054)		0.030 (0.062)		0.097 ** (0.043)
GOVE	−0.994 ** (0.411)	−0.175 (0.107)	0.122 (0.264)	−0.025 (0.241)	0.083 (0.192)	−0.292 (0.347)	0.173 (1.076)	−0.346 (0.277)	0.077 (0.596)	−0.158 (0.498)	−0.202 (0.268)	−0.122 (0.281)
DOVE	−0.123 (0.380)	0.189 (0.719)	0.109 (0.278)	0.328 (0.257)	0.058 (0.100)	−0.376 (0.491)	−0.413 (0.289)	−0.252 (0.209)	−2.602 *** (0.941)	−2.921 *** (0.736)	−0.531 ** (0.248)	−0.474 (0.296)
ECON	0.179 * (0.107)	0.026 (0.084)	−0.247 (0.210)	−0.140 (0.221)	−0.205 (0.159)	0.053 (0.128)	0.127 (0.256)	0.255 * (0.132)	0.555 * (0.316)	0.599 ** (0.269)	0.320 (0.202)	0.415 *** (0.129)
IQ	0.300 ** (0.144)	0.263 * (0.157)	0.189 (0.236)	0.380 * (0.229)	0.122 (0.138)	0.104 (0.162)	0.517 ** (0.235)	0.582 *** (0.194)	1.854 ** (0.781)	1.346 *** (0.345)	0.338 (0.268)	0.224 (0.259)
INFL	−1.421 *** (0.464)	−0.767 ** (0.390)	0.669 (0.813)	0.174 (1.092)	0.286 (0.541)	−0.544 (0.624)	0.164 (0.502)	−0.223 (0.553)	1.390 (1.082)	0.109 (1.039)	−0.072 (1.181)	−0.714 (1.092)
AGE	0.160 (0.563)	−0.222 (0.480)	−0.121 (0.493)	−0.702 (0.631)	−0.157 (0.296)	−0.122 (0.603)	0.819 (0.732)	0.295 (0.439)	2.186 (1.925)	0.378 (1.090)	0.296 (0.490)	0.144 (0.538)
POPU	0.015 (0.051)	0.006 (0.035)	−0.082 (0.110)	0.027 (0.255)	−0.071 (0.048)	0.024 (0.040)	−0.018 (0.073)	0.148 (0.062)	0.452 *** (0.170)	0.594 *** (0.169)	0.366 *** (0.119)	0.424 *** (0.117)
POPUD	−0.118 ** (0.053)	−0.023 (0.029)	0.086 (0.101)	0.078 (0.071)	0.008 (0.027)	−0.013 (0.029)	0.141 (0.135)	0.092 (0.063)	0.006 (0.082)	0.047 (0.104)	−0.090 (0.053)	−0.060 (0.055)
Constant	−5.246 ** (2.358)	−1.883 (1.558)	0.515 (2.549)	−1.531 (6.537)	1.993 (1.645)	−2.554 (2.323)	−4.713 (3.696)	−8.115 *** (2.255)	−27.899 *** (8.754)	−26.302 *** (5.898)	−13.549 *** (3.171)	−13.949 *** (3.472)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112	112	108	108	112	112	74	74	82	82	73	73
Groups	29	29	28	28	29	29	20	20	20	20	20	20

Table 9. *Cont.*

Variable	Banking Dimension						Stock Dimension					
	BACRED		TOCRED		LIQUID		STCAP		STVAL		STTUR	
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Instruments	21	21	21	21	21	21	19	19	19	19	19	19
AR (2) (p-value)	0.758	0.138	0.268	0.256	0.113	0.500	0.804	0.920	0.429	0.782	0.554	0.598
Hansen test (p-value)	0.575	0.155	0.622	0.728	0.230	0.700	0.481	0.903	0.825	0.889	0.555	0.376
Difference-in-Hansen test (p-value)	0.661	0.214	0.382	0.753	0.862	0.430	0.945	0.890	0.700	0.956	0.345	0.240

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$. Figures in brackets are robust-standard errors. All variables are in natural logarithm form.

5. Conclusions and Policy Implications

This study investigated the linkages between FDI and financial development measured by banks and stock markets in 30 ADC economies from 1986 to 2019. We used Granger causality tests and showed that past values of FDI could explain current financial development and past values of financial development could explain the present value of inward FDI. Such reverse causality between FDI and financial development provided evidence that one sector endogenously determined the other.

To control for endogeneity stemming from the link between FDI and financial development in our regression models, we used the system GMM estimator and discovered that increased levels of financial development helped ADC economies encourage more inward FDI. For the banking channel, greater access to credit and financial services enabled foreign enterprises improve their daily entrepreneurial activity and investment projects. Under prudent supervision and monitoring by the banking channel, foreign enterprises could reduce their investment risks and allocate their loans and funds to the most productive sectors. Similarly, the stock market helped foreign enterprises raise the long-term capital needed to carry out their investment ventures. Listing on the local stock market enabled foreign enterprises to introduce their brand names and products to local markets. Foreign investors could gather information about local markets and industries through the stock market to make more informed investment decisions. This helped them alleviate investment risk and invest in a timely way in more productive projects.

Our study also revealed that greater inward FDI tended to enhance improvements in ADCs' banks and stock markets. On the supply side, higher entry of inward FDI increases funding resources in the local banks that can be reallocated to their lending activities to make profits (Pradhan et al. 2019). More foreign listed enterprises motivate other foreign and domestic investors to engage in local stock markets. Such larger market participants with higher investment activity can enhance the stock market capitalization and liquidity (Agbloyor et al. 2013). On the demand side, local banks and stock markets also need to upgrade their international financial products and services (e.g., global trading system, deposit insurance, foreign exchange services, and workers' salaries payment system) to satisfy more flexible requirements of their local and foreign customers (Nkoa 2018; Kaur et al. 2013).

Our results suggest that, to attract FDI, ADC economies should devise policies and programs towards greater improvement in local banks and stock markets. This necessitates building better institutional infrastructure to strengthen the development of banks and stock markets, such as an efficient supervisory environment, effective regulations and legal system, good investor contractual safeguards, and secured property rights protection. A strong regulatory environment forces banks and stock markets to follow international standards and practices to improve their liquidity, capital allocation, supervisory capacity, and investment monitoring (Hsieh and Nieh 2010; Kaur et al. 2013). Financial markets can ensure the quality and quantity of financial products and instruments provided to their customers (e.g., payment systems, lending and savings products, international trad-

ing services, and information disclosures). High-quality institutions with information transparency, sound accounting practices, and low government corruption motivate more investors to engage in banks and stock markets to enhance capital mobilization and financial activity (Billmeier and Massa 2009; Law and Azman-Saini 2012; and Feng and Yu 2021). Banks and stock markets can reduce rent-seeking and opportunistic activities to attract more savings to productive sectors (Feng and Yu 2021). As a result, stronger institutional infrastructures hasten improvements in banks and stock markets to draw more inward FDI to ADC economies.

In addition, the ADC economies need to provide foreign investors with a friendly investment climate with more openness in trade policies and relaxed restrictions for the entry and exit of foreign capital flows, e.g., reducing capital controls over current and capital accounts of foreign investors, cancelling multiple exchange rates, abolishing mandatory export procedures, and removing foreign ownership restrictions (Tan et al. 2019). This attracts greater foreign customers to the ADC financial markets to further encourage their promotion and diversification of financial products and services to accelerate entrepreneurial activity and industry growth (Agbloyor et al. 2013).

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Appendix A

The 30 Asian developing countries: Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, China Hong Kong, China Macao, India, Iran, Iraq, Jordan, Korea Republic, Lao PDR, Lebanon, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Oman, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand, Turkey, UAE, and Vietnam.

The 20 Asian developing countries with stock markets: Bahrain, Bangladesh, China, China Hong Kong, India, Iran, Jordan, Korea Republic, Lebanon, Malaysia, Oman, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand, Turkey, UAE, and Vietnam.

Notes

¹ We used the bank credit to private sector over GDP (BACRED) as the main proxy for the banking sector. First, in most developing economies, bank credit is the primary funding source to finance investment activity (Law and Singh 2014; Jena and Sethi 2021). Secondly, the private sector tends to use capital resources more productively than the public sector (Beck and Levine 2004; Anyanwu et al. 2018). Thirdly, this indicator reflects banks' ability to attract and reallocate savings to the most productive activities and therefore stimulate economic development.

² For the stock market, Rabiul (2010) and Demirgüç-Kunt et al. (2013) suggested using the stock value traded over GDP (STVAL) as the main stock proxy. This indicator contains components of both stock market size and trading activity and is used to measure stock liquidity. A more liquid stock market can help investors purchase new shares and sell their shares to make profits or cut losses when required. This increases investors' incentives to engage in the stock market and further strengthens capital mobilization of the listed enterprises.

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