EXPLORING THE ROLE OF FINANCIAL DEVELOPMENT IN FOSTERING ENTREPRENEURSHIP IN AFRICAN COUNTRIES

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Abstract: A number of obstacles faced by African entrepreneurship, and financial concerns are frequently covered in academic literature. Studies in this area have generated a range of results that demonstrate the intricacy of the relationship between entrepreneurship and financial development. This study examines the critical role that financial development plays in promoting entrepreneurship in Africa to contribute to the ongoing discussion. It does this by examining the short- and long-term impacts and the differential effects within the continent. The study employs panel data regression techniques to evaluate data from 28 African countries spanning between 2006 and 2020. The analysis reveals that entrepreneurial development is constantly boosted in both periods by financial development along with the establishment of financial markets and institutions. This implies that the influence of financial development and its components is consistently positive, with no appreciable differences in impacts noted in the short or long term, even though this is more pronounced in the long run. The results of the causality analysis demonstrate a unidirectional causal relationship between financial development and entrepreneurship, with the causality flowing from financial development and its components to the development of entrepreneurship. In light of this evidence, the study highlights the need for policymakers to prioritize sustainable financial development policies that improve stability and inclusivity in financial markets. Such efforts should include policies targeted at enhancing financial infrastructure and easing

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access to capital for entrepreneurs. This would include easing bottlenecks to financial services and giving schemes that directly assist entrepreneurship top priority.

Keywords: Africa; causality; entrepreneurship; financial development.

JEL Codes: F3, G2, M13, N27.

1. Introduction

Since 1990, entrepreneurship has become increasingly prominent as a global phenomenon. Its characteristics, extent, and socioeconomic impact, however, vary depending on the situation. Recent evidence shows that entrepreneurship is thriving more prominently in emerging nations, including Africa, because of the availability of public datasets (Bruton et al., 2008; Omri, 2020). These economies are characterized by lower entry barriers, an increasing focus on the market, and an expansion of economic activity. Despite these, the potential of entrepreneurship to promote sustainable, long-term economic development and growth has not yet been completely realized in African countries. Some obstacles, including legislative barriers, market accessibility issues, competition, skill shortages, and inadequate infrastructure, are impeding the growth of entrepreneurship in Africa; nonetheless, access to funds is seen as one of the key elements mentioned in the literature which creates a vicious cycle of poverty by lowering production and earnings (Abubakar, 2015; Ajide & Ojeyinka, 2022; Bayar et al., 2018). Though it is generally accepted that a strong financial system should promote the expansion of entrepreneurship, the level of financial development, especially in African countries, is alarming. For instance, despite previous financial reforms that allowed for unfettered inflows of foreign capital into the economy, such as financial integration and diversification, the African financial system's development status remains low compared to the global standard (Noah, 2023).

The International Monetary Fund's (IMF, 2023) latest data on financial development and its elements show that in 2021 only South Africa had an above average of about 0.55 on a scale of 1, followed by Mauritius with a nearly average value of 0.49. Countries that also witness development in the overall financial institutions include Namibia (0.72), followed by Seychelles (0.62). All the countries have low overall financial market development, except South Africa, which has the closest average of 0.49 and is closely followed by Mauritius with 0.46. Even though Africa lags behind other continents in the world, records show that most African nations have made significant progress between 1980 and 2021 (IMF, 2023). However, a global review of them shows that, as far as overall financial development is concerned, African countries perform low (Noah et al., 2023).

To address finance-related issues impeding entrepreneurship development, a number

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Studia Universitatis "Vasile Goldis" Arad. Economics Series Vol 35 Issue 4/2025
ISSN: 1584-2339; (online) ISSN: 2285 – 3065
Web: publicatii.uvvg.ro/index.php/studiaeconomia. Pages 27-50

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of empirical research have examined the relationship between finance and entrepreneurship Dutta & Meierrieks, 2021; Gaies et al., 2023; Léon, 2019; Omri, 2020). However, with a few notable exceptions like the works of Ajide and Ojeyinka (2022), and Babajide et al. (2020), these studies primarily concentrate on developed and emerging economies outside of Africa, particularly at the macro level. Individual, corporate, regional, and national levels are all included in the examination of entrepreneurship (Kraus et al., 2021). For example, risk preferences, education, experience, age, and other employment opportunities may be individual-level factors that affect entrepreneurial decisions (Brachert et al., 2020). On the other hand, competition, market size, firm size, and business culture are important factors at the firm or industry level (Silwal, 2022).

However, limited research has been conducted regarding the connection between entrepreneurship and financial development in Africa at the national level. Given the diverse political, cultural, and economic landscapes of African countries, this disparity implies a limited comprehension of the actual influence of financial expansion on entrepreneurship throughout the continent. Furthermore, a careful examination of the corpus of the literature reveals contradictory findings about the connection between finance and entrepreneurship. While some studies suggest a positive association between financial development and entrepreneurial success (Gaies et al., 2023; Jiang et al., 2019), others contend that various financial sector constraints, economic challenges, institutional shortcomings, inequality, and imperfect markets can all work against financial development and impede entrepreneurship, especially in developing economies (Amin et al., 2023). This ongoing discussion emphasizes the need for more research, especially in the African setting, to determine the true effects of financial development on entrepreneurship.

Understanding the growth of entrepreneurship in Africa requires a comprehension of the effectiveness of domestic financial development. Interestingly, this topic has received relatively little attention in the relevant literature, particularly at the national level, for which the current study is quite relevant. The study adds to the body of knowledge by examining how financial development and its components—financial markets and institutions affect entrepreneurship activities in the African context. Except for the study conducted by Ajide and Ojeyinka (2022), and Babajide et al. (2020), previous panel studies largely exclude Africa. These studies have their limitations as well. For instance, Babajide et al. (2020) focused solely on financial stability and encountered methodological constraints, including issues of endogeneity and cross-sectional dependence. Ajide and Ojeyinka (2022) addressed some of these limitations by adopting a broader measurement of financial development and the generalized method of moments (GMM) methodology but paid less attention to the long-term effects of financial development on entrepreneurship, as well as their causal relationships.

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In light of Léon's (2019), observation that short-term and long-term loans may have different effects on entrepreneurship, our research examines both time frames and possible differential effects to resolve the contradictory findings in the relationship between entrepreneurship and financial development. In addition, we examine how financial development and its components, as well as the control variables, affect entrepreneurship during these periods. Furthermore, extant theories, such as Schumpeter's work, maintain that financial development promotes entrepreneurship by providing the necessary funds. However, there is also a chance that the relationship could work the other way around: robust entrepreneurship can increase consumer demand for a variety of financial goods and services, which can further financial development. Theoretically difficult and understudied, determining the causality of this relationship within the African context. Additionally, there is a dearth of empirical studies that are particularly concentrated on Africa, and thoroughly investigate the causal relationships between entrepreneurship and financial development.

Moreover, considering the interdependence of countries in commerce, economy, and finance, ignoring cross-sectional dependency and slope heterogeneity in panel data may add bias and inconsistency in estimations. Therefore, if this problem is found in the panel data, it is required to test for cross-sectional dependency in the panel to choose the right estimate strategies. Furthermore, the measurements used in our study to quantify financial development are different. Unlike nearly all previous research that employed only one indicator or component, the measurement of financial development in this study takes into account the entire measures of financial development in terms of accessibility, efficiency, and depth. Similarly, this study employs a better measurement of entrepreneurship from the World Bank dataset, termed new entry density, capturing the essential aspect of entrepreneurial venturing and available for many African countries, ensuring robust estimations.

The primary aim of this study is therefore to address these gaps by investigating how financial development and its components (financial institutions and markets) affect entrepreneurship development in Africa. Specific objectives entail assessing the impacts of financial development and its components over both short and long durations. Employing both the system GMM, panel-corrected standard error (PCSE) and Dumitrescu-Hurlin Granger causality methodologies, the study further explores the varying effects of financial development and its components on entrepreneurship development, as well as the causal link between entrepreneurship development and financial development. The subsequent sections of the study delineate Sections 2 through 5.

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2. Review of related literature

Entrepreneurship entails the ability and readiness of individuals to identify and cultivate novel business opportunities and to effectively communicate their ideas to potential stakeholders in the market (Wennekers & Thurik, 1999). This process often requires individuals with enterprising qualities, who may not fit the traditional mold of entrepreneurs but act as agents of change. An entrepreneur can be described as a forward-thinking individual who identifies emerging opportunities and is proactive in pursuing them to establish new ventures. It is important to note that entrepreneurship extends beyond the realm of small business ownership and management, despite its common association with this demographic (Thompson, 1999).

Theoretically, the relationship between the growth of the financial sector and entrepreneurship dates back to Schumpeter's seminal work in 1912, which emphasized the role of the financial system in enabling entrepreneurs to obtain loans and other financial resources. The aforementioned viewpoint is corroborated by later researchers who also highlighted the crucial role the financial sector plays in fostering entrepreneurial endeavors (Goldsmith, 1969; Gurley & Shaw, 1967; Patrick, 1966). Meanwhile, Gerschenkron (1962) explicates that the degree of an economy's economic regression determines the influence of financial development on that sector. Furthermore, the four perspectives covered by Verheul et al. (2000) eclectic theory of entrepreneurship (ETE) include the disciplinary approach, level of analysis, differentiation based on supply and demand, and differentiation between the short- and long-term equilibrium levels of entrepreneurship. Even though individual decisions are made while starting a business, supply, and demand considerations are crucial in generating chances for new ventures (Ayob, 2021). The supply factors emphasize technological advancement, financial development, government regulations, globalization, and economic development that leads to more innovation opportunities, while the demand factors concentrate on population growth, density, and other demographic characteristics that lead to the supply of resources and abilities in an economy.

From the demand side of the ETE, more financial development boosts the nation's entrepreneurial activity since it creates more innovative business chances and has regulations that work (Amin et al., 2023). According to Čihák et al. (2012), financial systems are seen as important for providing risk management, information management, resource allocation, corporate control, mobilizing and pooling funds, and facilitating economic transactions. The IMF (2023) divides financial growth into two main categories: the development of markets and financial institutions. The ability of people and businesses to obtain financial services, their depth (size and liquidity), and their efficiency (the ability of institutions to deliver financial services at cheap cost and with sustainable revenues and the level of activity of capital

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markets) are all considered (Noah, Abdulmumini, Sanni, et al., 2023). As noted by Čihák et al. (2012), the relationship between entrepreneurship and financial intermediation is pertinent to each of these four aspects of financial development at the national level.

2.1. Entrepreneurship and Financial Development

There has been extensive theoretical and empirical discourse on the role of entrepreneurship as a significant driver of economic growth and development (Cieślik, 2017; Komninos et al., 2024; Matenda et al., 2023; Munyo & Veiga, 2022; Schumpeter, 1912; Su et al., 2023; Sutter et al., 2019). Given its importance, understanding the factors that influence entrepreneurship development, particularly at the national level, is crucial. However, there remains an ongoing debate on the relationship between financial development and entrepreneurship, characterized by contradictory evidence. For example, Abubakar (2015) highlighted the challenges in access to finance, market access, policy support, and entrepreneurship culture as significant constraints on entrepreneurship in Africa. In contrast, Kar and Ozsahin (2016) found that financial development positively affects entrepreneurship in emerging markets.

Similarly, Fan and Zhang (2017) revealed a positive association between financial inclusion and entrepreneur formation in China. Bayar et al. (2018) reported that financial sector development and openness positively impact entrepreneurial activity in upper-middle-income and high-income countries. However, Dutta and Meierrieks (2021) argued that the relationship between financial development and entrepreneurship varies across countries. Meanwhile, Dutta and Sobel (2018) explored the role of financial development in the human capital-entrepreneurship relationship, suggesting a nuanced impact. Contradictory findings persist, as seen in Léon (2019) study on the effect of long-term finance on firm entry, and concluded that long-term credit does not stimulate firm entry, except in short-term credit. After analyzing the relationship between financial development, governance, and formal versus informal entrepreneurship, Omri (2020) concluded that financial development has unquestionably beneficial and negative effects on formal and informal entrepreneurship, respectively.

Additionally, while Ajide and Ojeyinka (2022) proposed a threshold effect of financial development on entrepreneurship in Africa, they found that financial development does not stimulate entrepreneurship. In contrast, Amin et al. (2023) supported the eclectic theory of entrepreneurship, which holds that efficient resource allocation and transaction ease increase entrepreneurial activities, while less strict regulations do not. In addition to finding a U-shaped association between financial depth and emerging entrepreneurship in European nations, Gaies et al. (2023) also

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concluded that financial stability, rather than banking intermediation or venture capital, is what drives new business growth on a macro level. These diverse perspectives highlight the complexity of the financial development-entrepreneurship nexus and underscore the need for further research to elucidate its mechanisms and implications.

3. Methodology and empirical data
3.1. Data sources and measurements

The primary aim of this study is to investigate the extent to which the financial sector, including financial institutions and markets, influences entrepreneurship development across a panel of 28 African countries. The list of the countries included is presented in Table 1. Spanning from 2006 to 2020, this study utilizes data sourced from the World Bank and IMF databases to measure both financial development and entrepreneurship. Entrepreneurship is measured by the new business entry density. In contrast, the new business entry density metric which measures the number of registered businesses per 1,000 working adults is used to quantify entrepreneurship. The extensively used measure provides thorough coverage across nations, periods, and variables, in line with earlier research by Chambers and Munemo (2019), and Klapper et al. (2004). Furthermore, in line with previous research, we incorporate control variables obtained from the World Bank database. The details of the independent variables utilized in our model and the justifications for their inclusion in the model are therefore discussed as follows:

Financial development and its components: Financial development is measured by the financial development index. This is a composite index that encompasses various dimensions of financial development, ranging from 0 to 1. 0 signifies weak financial development and 1 indicates greater financial development. Unlike previous studies that often use a single indicator or component, this measurement includes dimensions such as financial deepening, stability, and growth. These encompass both financial institutions and market development. Specifically, it examines aspects like depth (size and liquidity), access (availability of financial services), and efficiency (cost-effectiveness of financial services provision and capital market activity). This approach aligns with recent studies such as Ajide and Ojeyinka (2022), and Munemo (2018). Data for the financial development and its components are sourced from the IMF database.

GDP per capita (Current US$): This serves as a proxy for the country's income level. We incorporated GDP per capita as one of the explanatory variables because empirical literature has shown that higher GDP per capita has been demonstrated to regulate the establishment of new businesses. A country's GDP is usually considered a key factor for the motivation of its entrepreneurs when they decide to start a venture, and GDP is a good indicator of a country's economic development and

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potential growth. It is generally and widely accepted that the level of economic development, measured by the GDP, can exert some positive influence on and drive motivated entrepreneurship (Fan & Zhang, 2017; Gaies et al., 2023; Jiang et al., 2019; Omri, 2020). However, the impact of this variable may differ depending on the entrepreneurship motivation (Cervelló-Royo et al., 2020). Data for GDP per capita is sourced from the World Bank WDI.

Population growth rate: We also consider the annual growth rate of the country's population as one of the drivers of entrepreneurship development. Evidence from previous studies has shown that a growing population increases the demand for goods and services, creating new business opportunities for entrepreneurs to cater to expanding markets. In addition, population growth leads to a larger labor force, which can foster a more dynamic economy where individuals are incentivized to start their businesses. A larger population often translates to greater diversity in needs, preferences, and consumer behaviors, encouraging innovation and the development of niche markets (Amin et al., 2023; Fan & Zhang, 2017; Gaies et al., 2023; Jiang et al., 2019). Data for the population growth is sourced from the World Bank WDI.

Urbanization: This is measured by the ratio of the urban population to the total population. Entrepreneurs have been tremendously motivated to create new enterprises by the increased options and choices brought about by the acceleration of urbanization. Thus, it is expected to positively influence entrepreneurship, as urbanization offers entrepreneurs more opportunities and choices (Amin et al., 2023; Fan & Zhang, 2017; Gaies et al., 2023; Jiang et al., 2019). Data for urbanization is sourced from the World Bank WDI.

Economic openness: This is represented by the ratio of total imports and exports to GDP. It indicates that a more developed financial environment fosters entrepreneurship. It is argued that economic openness, through efficient resource allocation and ease of cross-border transactions, positively contributes to the development of entrepreneurship (Bayar et al., 2018; Fan & Zhang, 2017; Gaies et al., 2023; Jiang et al., 2019). Data for economic openness is sourced from the World Bank WDI.

Inflation rate: This is measured by the GDP deflator. It portrays pricing consistency, which is essential for successful entrepreneurship. A high inflation rate can impede the growth of entrepreneurship by raising the expenses of operations and creating unpredictability in finances. Higher costs for labor, overhead, and raw materials can lower the profit margins and deter new company endeavors for entrepreneurs. Inflation also reduces consumer purchasing power, which lowers demand for goods and services and inhibits the establishment of new businesses. Additionally, when interest rates rise, this raises the cost of borrowing and limits access to required

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resources. The confluence of elevated expenses, diminished demand, and unstable financial conditions pose a formidable obstacle to the flourishing of entrepreneurship, eventually impeding the commencement and growth of businesses (Ajide & Ojeyinka, 2022; Kar & Ozsahin, 2016). Data for the inflation rate is sourced from the World Bank WDI.

Business start-up regulations: The number of start-up procedures to register a business serves as a proxy of business start-up regulations, with mixed effects on entrepreneurship. There are studies with the view that bureaucratic regulations may deter entrepreneurship (Ajide & Ojeyinka, 2022; Munemo, 2022), while favorable regulatory environments can encourage it (Omri, 2020). However, it is expected to promote entrepreneurship development in this study. Studies indicate that business regulation also influences entrepreneurial activity. A more friendly regulatory environment serves to incentivize the creation of new firms (Chambers & Munemo, 2019). Data for the business start-up regulations is sourced from World Development Indicators' doing business database.

Institutional quality: This is measured by a governance index comprising six indicators. This is identified as a driver of entrepreneurship development, supported by eclectic theory and recent studies. Institutional quality plays a crucial role in entrepreneurship development as it creates a supportive or restrictive environment for business activities. Strong institutions characterized by effective governance, clear regulatory frameworks, property rights protection, and low corruption provide entrepreneurs with the confidence and security to invest and innovate. When institutions function effectively, they reduce transaction costs, enhance contract enforcement, and ensure fair competition, all of which foster entrepreneurship. Conversely, poor institutional quality, marked by bureaucratic inefficiencies, regulatory uncertainty, and corruption, discourages business formation and growth by increasing risks, costs, and barriers to entry (Amin et al., 2023; Ayob, 2021). In summary, based on theoretical justifications and empirical findings, all explanatory variables (except the inflation rate) are expected to positively influence entrepreneurship development in Africa.

Table 1. List of selected African countries

cid	Country	Country code	cid	Country	Country code	cid	Country	Country code
1	Algeria	DZA	11	Lesotho	LSO	21	Senegal	SEN
2	Botswana	BWA	12	Madagascar	MDG	22	Sierra Leon	SLE
3	Burkina Faso	BFA	13	Mauritania	MRT	23	South Africa	ZAF
4	Congo Dem. Rep.	COD	14	Morocco	MAR	24	South Sudan	SSD
5	Egypt	EGY	15	Malawi	MWI	25	Togo	TGO
6	Ethiopia	ETH	16	Namibia	NAM	26	Tunisia	TUN

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7	Gabon	GAB	17	Niger	NER	27	Uganda	UGA
8	Ghana	GHA	18	Nigeria	NGA	28	Zambia	ZMB
9	Guinea	GIN	19	Rwanda	RWA			
				Sao Tome &				
10	Kenya	KEN	20	Principle	STP			

3.2. Model specification

Based on the theoretical and previously reviewed relevant studies justifications, we utilize panel data analysis to precisely achieve the objectives of this study, with a primary focus on the impact of financial development and its components on the development of entrepreneurship in Africa. This is because panel data analysis offers a better modeling capacity of economic reality, especially by capturing variances both between and within countries. This allows us to analyze the individual and temporal dynamics of African countries. Furthermore, we choose panel data analysis in response to a number of recent macro-level evaluations of entrepreneurship, such as those conducted by Amin et al. (2023), Dutta and Meierrieks (2021), Gaies et al. (2023), among others. As a result, we develop the following panel data model as follows:

$$ENP_{it} = \beta_0 + \beta_1 FID_{it} + \beta_2 X_{it} + \varepsilon_{it} \tag{1}$$

where *ENP* stands for the national level of entrepreneurship development in country i ($i = 1, 2 . . . 28$) and in year t ($t = 2006 . . . 2020$), *FID* stands for financial development, *X* stands for the explanatory control variables (GDP per capita, population growth, institutional quality, urbanization, economic openness, inflation rate, and business start-up regulations), β_0 is the slope, β_1 - β_n are the of coefficients of explanatory variables, and ε represents the error terms.

This study also uses the Granger causality test to ascertain the direction of causality between financial development and entrepreneurship for a better understanding of the relationship between the two. As a result, the following are the specific Granger equations for financial development, entrepreneurship, and its components:

$$ENP_{it} = \psi_{1j} + \sum_{j=i}^{k_1} \delta_{1ij} ENP_{it-j} + \sum_{j=i}^{k_2} \pi_{1ij} FID_{it-j} + + \sum_{j=i}^{k_3} \tau_{1ij} FII_{it-j} + + \sum_{j=i}^{k_2} \gamma_{1ij} FIM_{it-j} + \mu_{1it} \tag{2}$$

$$FID_{it} = \psi_{2j} + \sum_{j=i}^{k_1} \delta_{2ij} FID_{it-j} + \sum_{j=i}^{k_2} \pi_{2ij} ENP_{it-j} + \sum_{j=i}^{k_3} \tau_{2ij} FII_{it-j} + \sum_{j=i}^{k_4} \gamma_{2ij} FIM_{it-j} + \mu_{2it} \tag{3}$$

$$FII_{it} = \psi_{3j} + \sum_{j=i}^{k_1} \delta_{3ij} FII_{it-j} + \sum_{j=i}^{k_2} \pi_{3ij} ENP_{it-j} + \sum_{j=i}^{k_3} \tau_{3ij} FID_{it-j} + \sum_{j=i}^{k_4} \gamma_{3ij} FIM_{it-j} + \mu_{3it} \tag{4}$$

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$$FIM_{it} = \psi_{4j} + \sum_{j=i}^{k_1} \delta_{4ij} FIM_{it-j} + \sum_{j=i}^{k_2} \pi_{4ij} ENP_{it-j} + \sum_{j=i}^{k_3} \tau_{4ij} FID_{it-j} + \sum_{j=i}^{k_4} \gamma_{4ij} FII_{it-j} + \mu_{4it} \tag{5}$$

where k_1 - k_4 are lag lengths, μ_1- μ_4 are the stochastic error terms; all other variables are as defined. We use the paired (Dumitrescu & Hurlin, 2012) panel causality technique to investigate the direction of causality between financial development, entrepreneurship, and its constituents. The approach was selected because, as a dynamic panel test, it offers better estimation accuracy and reliability.

3.3. Analytical techniques

The data analysis methods encompass descriptive analysis, simple correlation, and panel data regression techniques. The long-term association between financial and entrepreneurship development is examined utilizing the PCSE in the panel data regression analysis. The study additionally performs the pertinent pre-estimation tests to ensure the validity of conclusions taken from the findings of the estimated regression models. Relevant diagnostic tests include cross-sectional dependency, cointegration, and unit root testing. The PCSE estimate technique is more popular than panel OLS, fixed, and random effect models due to its adaptability in managing possible problems with serial correlation, heteroscedasticity, and cross-sectional dependency. Although feasible generalized least squares (FGLS) can also be employed, PCSE is more appropriate in this study since the number of periods (T) is fewer than the cross-sectional dimension (N) (Beck & Katz, 1995; Reed & Webb, 2010).

In addition to static panel analysis, a significant concern is the possibility of endogeneity, which could result from the theories and empirical research's suggested bidirectional causal relationship between the development of finance and entrepreneurship. Consequently, the model is estimated in the study using the GMM. When there is a connection between the lagged dependent variables and the unobserved panel-level effects, GMM provides a consistent estimator for the model's parameters. It is also optimized for panel datasets with a larger country dimension and a shorter time dimension, like the one used in the present study, and it is more efficient when there is autocorrelation, heteroscedasticity, and endogeneity. We employ the first lagged level of the dependent variable, which is generated automatically by the over-identifying restriction technique, as instruments in the estimate process. The over-identifying limits would change depending on how many instruments were used (Roodman, 2009). Therefore, to verify the validity of the instruments and the dependability of the estimations, we perform the Arellano Bond and Sargan tests.

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4. Empirical results

4.1. Descriptive and correlation analyses

Table 2 presents the findings of the descriptive analysis. It indicates that the average number of entrepreneurs per 1,000 people is 1.9724, with a maximum value of 20.0906, a minimum value of 0.0222, and a standard deviation of 3.4413. These data suggest that the number of entrepreneurs in Africa is almost identical. Additionally, the financial development index's average, maximum, minimum, and standard deviation values are 0.1876, 0.5925, 0.0346, and 0.1299 respectively. Although the standard deviation indicates that financial development is not significantly different across African countries, the index's value range indicates that financial development is low in the continent. Except for labor force participation, urbanization, and economic openness, which all exhibit significant variation, this is also applied to all other explanatory variables, with the GDP per capita showing the most deviation. Table 2's correlation analysis shows that entrepreneurship has a positive relationship with financial development, GDP per capita, institutional quality, urbanization, and economic openness. It has a negative relationship with population growth, but not with labor force participation or business start-up regulations.

Furthermore, there was no evidence of a multicollinearity issue in our sample because the correlation coefficients were all less than 0.7. The values of the variable's variance inflation components also corroborate this. However, as correlation coefficients simply show how strongly the variables are linearly related to one another, a more succinct and detailed examination of the causal effects is required for this intuitive claim. To test this hypothesis further, the study creates multivariate models using the PCSE and system GMM techniques.

Table 2. Descriptive statistics and correlation matrix

Variables	ENP	FID	ECO	ISQ	LBF	INF	POP	URB	ECP	BRE
Mean	1.9724	0.1875	2592.0931	-0.9332	62.0130	6.0532	2.2024	43.5074	71.4556	8.3023
Maximum	20.0906	0.5925	16851.1215	2.1431	89.4500	85.3533	3.8671	90.0920	168.9713	17.0000
Minimum	0.0222	0.0346	191.7512	-4.1059	42.0570	-18.0745	-0.0326	16.2080	24.0061	2.0000
Std. Dev.	3.4413	0.1299	2981.9231	1.2549	11.4463	8.4873	0.9311	17.9287	27.0507	2.9549
ENP	1.0000 -----									
FID	0.5938[a] (0.0000)	1.0000 -----								
ECO	0.6041[a] (0.0000)	0.6753[a] (0.0000)	1.0000 -----							
ISQ	0.6788[a] (0.0000)	0.6787[a] (0.0000)	-0.0712 (0.1560)	1.0000 -----						
LBF	-0.0307 (0.5416)	-0.1837[a] (0.0000)	0.1581 (0.0020)	0.0059 (0.9068)	1.0000 -----					
INF	-0.0850[c] (0.0910)	-0.0543 (0.2806)	0.0733 (0.1470)	-0.0431 (0.3923)	0.1148[b] (0.0222)	1.0000 -----				

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-0.4799ᵃ	-0.5986ᵃ	0.2391	-0.5778ᵃ	0.3045ᵃ	0.0685	1.0000			
(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1729)	-----			
0.3273ᵃ	0.3575ᵃ	-0.2424	0.2636ᵃ	-0.5295ᵃ	-0.1224ᵇ	-0.2469ᵃ	1.0000		
(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0146)	(0.0000)	-----		
0.3239ᵃ	0.2495ᵃ	-0.1352	0.4269ᵃ	-0.2634ᵃ	-0.0487	-0.5901ᵃ	0.2323ᵃ	1.0000	
(0.0000)	(0.0000)	(0.0071)	(0.0000)	(0.0000)	(0.3329)	(0.0000)	(0.0000)	-----	
-0.0519	-0.0902ᶜ	0.0440	-0.0495	0.0976ᶜ	0.1856ᵃ	0.0008	-0.0805	-0.0530	1.0000
(0.3027)	(0.0726)	(0.3841)	(0.3253)	(0.0521)	(0.0002)	(0.9869)	(0.1094)	(0.2917)	-----

Row labels: POP, URB, ECP, BRE (aligned to the paired statistic/p-value rows above)

Source: Self Processing. Note: Values in the parentheses ( ) are the p-values of the test statistic, 'a', 'b', and 'c' imply significance @ 1, 5, and 10 percent. ENP is entrepreneurship development, FID is overall financial development, ECO is GDP per capita, ISQ is institutional quality, LBF is labor force participation, INF is inflation rate, POP is population growth, URB is urbanization, ECP is economic openness, and BRE is business start-up regulations.

4.2. Pre-estimation tests

Peseran abs, Friedman, and Pesaran CD tests were used in the empirical analysis of the pre-estimation assessment for cross-sectional dependence, with the null hypothesis being "there is cross-sectional independence." Table 3 presents the results, which show that the null hypothesis was rejected at the 1% and 5% significance levels for the Friedman and Peseran abs tests, and accepted for the Pesaran CD test. It is concluded from these findings that there is cross-sectional dependency among the cross-sectional units as two of the tests yield data that support this conclusion. Ignoring this element could result in the analysis presenting skewed and contradictory conclusions. Thus, as stated earlier, it is considered appropriate to use the PCSE technique in this study to address these challenges and the considerations that go along with them.

Table 3. Cross-sectional dependence test

Test	Statistic	Prob.
Pesaran abs	5.9484ᵃ	0.0000
Friedman	43.9882ᵇ	0.0478
Pesaran CD	8.2031	0.3600

Source: Self Processing. Note: 'a' and 'b' imply significance @ 1 and 5 percent respectively

The results of the PP-Fisher ADF-Fisher, Levin, Lin, and Chu (LLC), as well as Im, Pesaran, and Shin (IPS) stationarity tests, were used to determine whether there was a unit root in the variables; Table 4 presents the findings in detail. The panel series is either not stationary or includes a unit root, according to the null hypothesis for all stationarity tests. The conclusion was derived from the tests' agreement on each variable's integration status. The findings showed that while financial development,

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institutional quality, labor force participation, inflation rate, urbanization, and economic openness showed a unit root at the level but achieved stationarity after first-differencing, entrepreneurship, GDP per capita, population growth, and business start-up regulations are stationary at levels. The different integration patterns seen throughout the panel series are highlighted by these stationary tests.

Table 4. Panel unit roots test results

Series	Stationary	PP-Fisher	ADF-Fisher	LLC	IPS	Decision
ENP	Level	109.8271[a]	91.5374[b]	-12.6251[a]	-1.4622[c]	
		(0.0010)	(0.0213)	(0.0000)	(0.0720)	I(0)
	First difference	-	-	-	-	
FID	Level	104.6323[a]	82.3862	-2.7074[a]	-0.4854	I(1)
		(0.0071)	(0.1899)	(0.0031)	(0.3149)	
	First difference	409.1370[a]	188.8631[a]	-7.3373[a]	-7.6695[a]	
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	
ECO	Level	138.0811[a]	108.4521[a]	-0.0430	-1.4672[c]	I(0)
		(0.0000)	(0.0042)	(0.4832)	(0.0716)	
	First difference	-	-	-	-	
INS	Level	96.5561[b]	85.7287	-6.4932[a]	-1.0999	I(1)
		(0.0280)	(0.1290)	(0.0000)	(0.1360)	
	First difference	402.4951[a]	205.1072[a]	-11.0451[a]	-8.5112[a]	
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	
LBF	Level	67.5190	37.4332	-0.7931	6.4398	I(1)
		(0.5620)	(0.9999)	(0.2142)	(1.0000)	
	First difference	181.9521[a]	105.5931[a]	-2.4516[a]	-1.3193[c]	
		(0.0000)	(0.0043)	(0.0071)	(0.0932)	
INF	Level	271.6810[a]	191.7562[a]	-26.7514	10.5290[a]	I(1)
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	
	First difference	-	-	-	-	
POP	Level	113.1111[a]	102.2530[b]	-4.6441[a]	-1.8062[b]	I(0)
		(0.0014)	(0.0116)	(0.0000)	(0.0360)	
	First difference	-	-	-	-	
URB	Level	158.1500[a]	128.0601[a]	-0.1884	8.7131	I(1)
		(0.0000)	(0.0000)	(0.4252)	(1.0000)	
	First difference	129.0307[a]	121.6983[a]	-1.5762[c]	-3.2091[a]	
		(0.0000)	(0.0000)	(0.0581)	(0.0000)	
ECP	Level	87.4873[b]	76.1321	-1.4922[c]	-0.6514	I(1)
		(0.0270)	(0.1435)	(0.0680)	(0.2586)	
	First difference	313.1702[a]	207.0605[a]	-14.3594[a]	-9.7625[a]	
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	
BRE	Level	129.5261[a]	114.2490[a]	-18.8312[a]	-6.5967	I(0)
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	
	First difference	-	-	-	-	

Source: Self-Processing. Notes: Values in the parentheses ( ) are the p-values of the test statistic, a, b, and c imply significance @ 1, 5, and 10 percent. ENP is entrepreneurship development, FID is overall financial development, ECO is GDP per capita, ISQ is institutional quality, LBF is labor force participation, INF is inflation rate, POP is population growth, URB is urbanization, ECP is economic openness, and BRE is business start-up regulations.

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To determine whether there is a long-term link between the variables, a cointegration test needs to be performed after conducting the unit root tests. Table 5 displays the panel's long-term cointegration relationship as determined by the Kao-Engle Granger test. Compared to the constrained Pedroni and Westerlund cointegration tests, this test performs better since it can support a higher number of regressors. The Kao cointegration test findings show that all panel series are cointegrated, and almost all statistics are significant at the one percent level, indicating that cointegration is present.

Table 5. Kao-Engle-Granger panel cointegration results

Tests	Statistic	p-value	Conclusion (H_0)
Modified Dickey-Fuller	3.128[a]	0.001	Reject
Dickey-Fuller	2.982[a]	0.001	Reject
Augmented Dickey-Fuller	2.152[b]	0.016	Reject
Unadjusted Modified Dickey-Fuller	1.497[c]	0.067	Reject
Unadjusted Dickey-Fuller	1.051	0.147	Accept

Source: Self-Processing. Note: H_0: No cointegration, a implies significance @ 1 percent and H_0 is rejected

4.3. Presentation and discussion of empirical results

The findings from the PCSE regarding the long-run effects of overall financial development, its components, and the control variables on entrepreneurship are presented in columns (1), (2), and (3) of Table 6, respectively. As part of a robustness analysis aimed at verifying potential factors responsible for the differential effects of financial development on entrepreneurship, we employed the system GMM (SGMM) method to examine the short-run effects of financial development, financial institutions, and markets development components of financial development measures, as indicated in columns (4), (5), and (6). Importantly, post-estimation tests confirm the robustness of the estimates derived from both the PCSE and SGMM models. The variance inflation factors (VIF) for financial development, financial institutions, and market development models are relatively low, with values of 1.81, 1.95, and 1.63, respectively, indicating no significant multicollinearity among the explanatory variables. This finding is supported by the correlation analysis. Additionally, the Wald Chi-square (X^2) statistics, all significant at the 1 percent level, and the R-square (R^2) statistics, ranging from 0.51571 to 0.52290, suggest that the model estimations are reliable and suitable for decision-making purposes. Furthermore, results from the SGMM indicate no second-order serial correlation, and the Sargan test confirms the validity of the instruments used for estimation, thus passing diagnostic tests.

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Based on the empirical findings derived from the PCSE analysis, the coefficients associated with financial development, financial institutions, and market development demonstrate positive and statistically significant relationships at the 1 percent level. This indicates that considering the direct impacts of financial development, financial institutions, and market development, they positively influence entrepreneurship development over the long run. Specifically, a one percentage point increase in financial development, financial institutions, and market development corresponds to a 7.7010, 5.7520, and 6.1462 units increase in entrepreneurship development, respectively. The observed beneficial relationship between financial development, financial institutions, and market development and entrepreneurship development may arise from financial development's role in creating a conducive environment for entrepreneurship. This includes providing access to capital, mitigating risks, facilitating transactions, offering support services, and fostering market confidence. These findings align with previous studies such as those by Amin et al. (2023), Babajide et al. (2020), and Dutta and Meierrieks (2021), which suggest that improved access to finance promotes entrepreneurial activities. However, this contradicts some earlier research that proposed no significant influence of financial development on entrepreneurship development due to various complexities (Gaies et al., 2023; Léon, 2019).

Table 6. PCSE and SGMM estimations

Variables	PCSE			SGMM		
	(1)	(2)	(3)	(4)	(5)	(6)
L.ENP	---	---	---	0.0809[a]	0.0811[a]	0.0820[a]
				(17.9054)	(32.5471)	(12.5322)
ECO	0.0004[a]	0.0005[a]	0.0005[a]	-0.0353[a]	-0.0342[a]	-0.0319[a]
	(6.5480)	(6.1072)	(7.5091)	(-15.5781)	(-30.2433)	(-9.1363)
INF	-0.0099	-0.0026	-0.0150[c]	0.0032[a]	0.0031[a]	0.0028[a]
	(-1.1751)	(-0.2860)	(-1.7999)	(2.9805)	(4.2462)	(3.0901)
LBF	0.0484[a]	0.0438[a]	0.0511[a]	0.1142[a]	0.1170[a]	0.1172[a]
	(10.5401)	(9.1076)	(12.0953)	(15.8939)	(38.2217)	(14.3313)
ECP	0.01351[a]	0.0084[b]	0.0140[a]	0.0231[a]	0.0257[a]	0.0241[a]
	(4.4583)	(2.5600)	(4.5770)	(11.8346)	(29.8233)	(8.3258)
POP	-0.2452[a]	-0.3091[a]	-0.3960[a]	-0.2155[a]	-0.1602[a]	-0.2697[a]
	(-2.5510)	(-3.0180)	(-3.9691)	(-2.8330)	(-3.5631)	(-4.2000)
URB	0.0266[a]	0.0281[a]	0.0284[a]	0.0888	0.0792	0.0940
	(5.8190)	(6.8973)	(5.7500)	(7.8051)	(9.6263)	(8.4761)
INS	1.8429[a]	1.9162[a]	2.1690[a]	0.1889	-0.0463	0.4135
	(6.7610)	(6.7425)	(8.9386)	(0.8040)	(-0.3291)	(1.4770)
BRE	0.0397	0.0126	0.0631[b]	0.0315[a]	0.0213[b]	0.0314[a]
	(1.5720)	(0.4941)	(2.2210)	(4.0500)	(2.4742)	(3.9110)
FID	7.7010[a]	---	---	2.7614[a]	---	---
	(8.6381)			(5.5746)		

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FII	---	5.7520[a]	---	---	4.0331[a]	---
		(6.6701)			(11.0032)	
FIM	---	---	6.1462[a]		---	1.0250[a]
			(7.1323)			(4.4135)
Constant	-3.2574[a]	-2.5477[a]	-2.3925[a]	-12.2743[a]	-12.8773[a]	-11.9901[a]
	(-5.2473)	(-3.4681)	(-4.0240)	(-12.2441)	(-42.9051)	(-10.5271)
R-squared	0.52289	0.51571	0.52290			
Wald χ^2 –statistic	843.18	526.29	995.38	369791.36	401655.16	280419.89
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}
Multicollinearity (VIF)	1.81	1.95	1.63	1.68	1.77	1.59

Source: Self Processing: Note: Figures between ( ) and { } are z-statistic and probability values respectively. 'a', 'b', and 'c' imply significance @ 1, 5, and 10 percent respectively. ENP is entrepreneurship development, FID is overall financial development, ECO is GDP per capita, ISQ is institutional quality, LBF is labor force participation, INF is inflation rate, POP is population growth, URB is urbanization, ECP is economic openness, and BRE is business start-up regulations.

The empirical findings derived from the SGMM analysis presented in Table 6 reveal that the coefficients associated with financial development, financial institutions, and market development are all positive and statistically significant at the 1 percent level. This indicates that financial development, financial institutions, and market development have a positive impact on entrepreneurship development in the short run. Specifically, a one percentage point increase in financial development, financial institutions, and market development corresponds to a 2.7614, 4.0331, and 1.0250 units increase in entrepreneurship development, respectively. Moreover, it suggests that the coefficients of financial development and its components are lower in the short run compared to the long run.

The observed beneficial relationship between financial development, financial institutions, and market development and entrepreneurship development in the short run may be attributed to their crucial role in enhancing liquidity, acting as a price discovery mechanism, and establishing institutional infrastructure. This finding is consistent with related studies such as those by Amin et al. (2023), Munemo (2018), Omri (2020). However, it also contradicts the findings of Gaies et al. (2023), and Léon (2019), which indicate that rising borrowing prices and a lackluster financial sector constitute major obstacles to the expansion of entrepreneurship. Additionally, the results indicate that labor force participation, urbanization, and economic openness positively influence entrepreneurship development in the long and short run, while population growth and inflation rate negatively impact entrepreneurship development over both time frames. Furthermore, GDP per capita and start-up business regulations exhibit differential effects on entrepreneurship development in the short and long run.

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Table 7. Causality between entrepreneurship and financial development

Null Hypothesis:	F-Statistic	Probability value	Decision
FID does not homogeneously Granger Cause ENP	10.0298[a]	0.0000	Unidirectional
ENP does not homogeneously Granger Cause FID	0.0101	0.9900	
FII does not homogeneously Granger Cause ENP	8.2318[a]	0.0003	Unidirectional
ENP does not homogeneously Granger Cause FII	0.0581	0.9436	
FIM does not homogeneously Granger Cause ENP	6.4644[a]	0.0017	Unidirectional
ENP does not homogeneously Granger Cause FIM	0.0758	0.9271	

Source: Authors' Processing: Note: Probability value 'a' implies significance @ 1 level.
ENP is entrepreneurship development, FID is overall financial development, FII is financial institution development, and FIM is financial market development.

The empirical results shown in Table 7 show that financial development and its components are Granger-caused in the development of entrepreneurship. However, the rise of entrepreneurship does not necessarily lead to the Granger-caused development of finance and its components. This illustrates the unidirectional causal relationship that exists between entrepreneurship, financial development, and its components. In other words, the growth of entrepreneurship is correlated with the components of financial development. This supports Schumpeter's contention that financial development propels entrepreneurial activity. This bolsters the notion that financial resources are necessary for entrepreneurship, hence demonstrating the importance of financial infrastructure in economic theories of growth. However, it challenges the presumptions of reciprocal causality and highlights the significance of financial institutions in fostering entrepreneurial activities.

In addition, financial development has a crucial role in promoting entrepreneurship since entrepreneurs need access to capital, credit, and financial services to start and grow their businesses. Banks, investment funds, and credit facilities are examples of the infrastructure that well-developed financial systems offer to lower barriers to entry, foster innovation, and accelerate the expansion of businesses. The converse link, in which financial progress is driven by entrepreneurship, is less evident. This could have to do with the fact that institutional strength, regulatory frameworks, and more general economic policies influence financial infrastructure more so than individual entrepreneurial activities. These results underscore the unidirectional dependence of entrepreneurial growth on financial development rather than mutual causation, emphasizing the necessity of strong financial institutions to foster an environment that is supportive of entrepreneurship.

5. Conclusions

This study examines the impact of financial development and its components on entrepreneurship development across 28 African economies between 2006 and 2020. It adds to the body of knowledge by investigating the short- and long-term effects of financial development on entrepreneurship. The study also examines the causal relationship between financial development, its components, and entrepreneurship. The differential effects of financial development, financial markets, and financial institutions along with other control variables on the development of entrepreneurship within the periods are further investigated in this study, using PCSE and SGMM estimations.

The results show that, in both short- and long-term scenarios, financial development, financial institutions, and markets all positively impact the growth of entrepreneurship. This implies a steady link across Africa with no appreciable differences in effects across the two time frames. Furthermore, causality results show that there is a unidirectional causal relationship that flows from financial development and its components to the development of entrepreneurship. Furthermore, the results of the control variables show that while population growth and inflation rates have negative long-term effects on entrepreneurship development, labor force participation, urbanization, and economic openness positively impact entrepreneurship activities in Africa. The only factors that show differing effects on the development of entrepreneurship in short- and long-term scenarios are GDP per capita and start-up business regulations.

Recommendations for improving the development of entrepreneurship in Africa are derived from these empirical findings. First and foremost, through measures that support stability and inclusivity in the financial markets, authorities ought to give priority to long-term, sustainable financial development. Initiatives that improve financial infrastructure and lower obstacles to financial services to provide access to capital for entrepreneurs should also be prioritized. Policymakers should prioritize financial inclusion to ensure entrepreneurs, particularly in underserved regions, have access to credit, savings, and insurance products. This can be achieved by supporting microfinance institutions and fintech solutions that can reach remote and marginalized populations.

Moreover, fostering conducive environments for entrepreneurship through policies promoting job creation, urban development, and economic diversification is crucial. Measures to control inflation, manage population growth, and promote sustainable economic growth are essential for creating an enabling environment. Investment in skill development programs to improve labor force participation and enhance the quality of the workforce will enable entrepreneurs to access a more skilled and productive labor pool, driving business innovation and growth. Urbanization policies should also focus on creating business-friendly cities with adequate infrastructure,

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including transportation and communication networks, that support entrepreneurial activity and foster market access. Trade liberalization and policies that encourage foreign direct investment can spur entrepreneurship by increasing access to markets and capital. African countries should also continue to foster regional integration to expand market opportunities for entrepreneurs.

Furthermore, efforts must be geared towards managing population growth and inflation to avoid their negative impacts on entrepreneurship. Population growth should be balanced with economic growth through investments in education and job creation, while inflation should be controlled through sound fiscal and monetary policies to maintain business stability and predictability. Trade liberalization and policies that encourage the mobilization of foreign financing can spur entrepreneurship by increasing access to markets and capital. African countries should continue to foster regional integration to expand market opportunities for entrepreneurs. Finally, the differential effects of GDP per capita and start-up business regulations on entrepreneurship development in the short and long run suggest the need for tailored policy interventions that can promote sustainable economic growth and streamline regulatory processes to facilitate entrepreneurship development over time.

The conclusions from our study might not apply to all of Africa because it used data from 28 African economies, which could present availability and quality issues. The time horizon of our study, which spans from 2006 to 2020, may not fully capture structural changes and long-term trends in financial development and entrepreneurship. Additional time research could provide more insight into these dynamics. Furthermore, we exclusively consider formal entrepreneurship when considering our entrepreneurship measurement. While these are not significant issues, future research may cover a larger period if more data become available. Future studies could focus on accounting for informal entrepreneurship, which accounts for a large share of all types of entrepreneurship in Africa.

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Author Contributions

Noah Afees O. and David Oladipo O. conceived the study and were responsible for the design and development of the data analysis. They were responsible for data collection and analysis and also for data interpretation. Noah Afees O. was responsible for the literature review section.

Disclosure Statement

The authors do not have any competing financial, professional, or personal interests from other parties.

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