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DOES CORRUPTION AFFECT THE IMPACT OF FINANCIAL DEVELOPMENT ON ENTREPRENEURSHIP? EVIDENCE FROM EMERGING ECONOMIES

Abstract

Purpose: This study examines the relationship between financial development, corruption, and entrepreneurship in a sample of 21 emerging economies from 2008 to 2020.

Methodology: Utilizing the Generalized Method of Moments (GMM) econometric approach, we explore the interactive dynamics between these variables.

Results: Our findings indicate that higher levels of corruption are associated with increased entrepreneurial activity in these economies. This can be attributed to the prevalence of corrupt practices, such as bribery, which serve as a means for entrepreneurs to overcome barriers and initiate businesses. Conversely, while financial development has a positive influence on entrepreneurship, its impact is not statistically significant. However, when considering a combined effect of financial development and corruption, a positive net impact is observed. This suggests that corruption can facilitate access to financial resources for entrepreneurs in these emerging economies. These findings support the notion of the "grease the wheels effect".

Conclusion: This study provides valuable insights into the complex interplay between financial accessibility, corruption, and entrepreneurship in emerging economies, informing policymakers and stakeholders on strategies to foster entrepreneurship and drive sustainable economic growth.

Keywords: Financial development, corruption, entrepreneurship, emerging countries, generalized method of moments

1. Introduction

Empirical research on the impact of corruption on entrepreneurship lacks consensus and remains mostly theoretical. There are two opposing theories in the literature regarding the relationship between corruption and economic growth. The "grease the wheels" hypothesis suggests that corruption stimulates economic growth by overcoming bureaucratic

inefficiencies, allowing businesspeople, politicians, and administrators to drive growth in the presence of strict regulations (Méon & Weill, 2010; Acemoglu & Verdier, 2000; Aidis et al., 2008). Conversely, the "sand in the wheels" hypothesis argues that corruption hinders economic growth by impeding efficient production and innovation (Chen & Cheng, 2019; Dutta & Sobel, 2016; Urbano et al., 2019). Both theories can be applied to understand the impact of corruption on entrepreneurship. In highly regulated countries, corruption may facilitate entrepreneurship by mitigating the negative effects of regulations. However, corruption can also impede entrepreneurship by creating obstacles, such as arbitrary confiscation of gains without bribes, particularly in weak institutional settings (Fisman & Svensson, 2007; Avnimelech et al., 2014). Additionally, corruption undermines fair competition, discouraging individuals from pursuing entrepreneurship (Szyliowicz & Wadhwani, 2007; Chowdhury et al., 2018). In countries with widespread corruption, individuals may be hesitant to become entrepreneurs as success depends on collusion rather than fair competition (Svensson, 2003; Anokhin & Schulze, 2009). The prevalence of corruption diminishes the rewards of risk-taking, deterring entrepreneurial activity. Therefore, it is crucial to empirically examine the effects of corruption on entrepreneurship.

An enabling institutional environment plays a crucial role in facilitating entrepreneurial endeavors. It provides the necessary support and infrastructure for entrepreneurs to thrive and create wealth through innovation. Conversely, when the institutional environment is unfavorable, it dampens entrepreneurial motivation, increases transaction costs, and creates barriers to the establishment of new ventures (Gu & Qian, 2019; Chen & Cheng, 2019). Therefore, the institutional environment, particularly in terms of controlling corruption, has great significance in fostering entrepreneurial development. According to Thai and Turkina (2014), entrepreneurship flourishes in the presence of robust economic and political institutions, effective laws and regulations, corruption control, property rights, and good governance. Access to financial resources and financing is also considered vital to the growth of new businesses, alongside other factors that influence entrepreneurial activities (Cumming et al., 2017; Zivari et al., 2020). In the absence of a well-developed financial system, entrepreneurs face difficulties in accessing capital and tools to mitigate the risks associated with their ventures (Omri, 2020; Thai & Turkina, 2014).

The impact of corruption on a country's financial sector is a significant factor, as highlighted by Sayılır et al. (2018). Corruption is generally defined as an illegal payment made to government officials in order to gain advantage that would not be possible otherwise, or a misuse of public positions for personal gain, as defined by Rose-Ackerman and the World Bank, respectively (Sharma et al., 2020). These definitions highlight the abuse of power for personal interests as the core essence of corruption. Recent research has shown a growing interest in exploring the relationship between corruption and financial development, with compelling evidence supporting the notion that corruption plays a crucial role in shaping the development of financial systems (Tran et al., 2020; Ajide, 2020). While existing theories and research acknowledge the significant influence of corruption on the conditions surrounding entrepreneurial activities (Hannafey, 2003; Uribe-Toril et al., 2019), our understanding of the relationship between corruption, financial development, and entrepreneurship remains limited. Furthermore, the impact of financial development on corruption and entrepreneurship is intricate, bidirectional, and varies across different countries. Empirical research on this subject is also insufficient, and the results are inconclusive. The purpose of this article is to provide insights into these complex issues.

This study makes three contributions. First, it addresses a gap in previous research by examining the simultaneous and interactive effects of financial development and corruption control on entrepreneurial activities. Previous studies have primarily focused on the relationship between entrepreneurship and corruption or between financial development and entrepreneurship, but not the combined effect of all three factors.

Second, the study expands the scope of investigation by including developing countries. Many previous studies have mainly focused on entrepreneurial activities in developed countries due to limited access to entrepreneurship data in developing nations. By including emerging countries in the analysis, this study provides a more comprehensive understanding of the factors influencing entrepreneurship.

Third, this study fills a research gap at the domestic level by examining combined and interactive effects of financial development, corruption control, and entrepreneurship in a sample of emerging countries. Prior research has not specifically explored these variables together within the context of emerging countries during the study period, making this study unique in its focus.

This paper is structured as follows: in Section 2, we delve into the existing literature on economic growth, corruption, financial development, and their interconnections. Section 3 outlines the research methodology employed and the data sources utilized in this study. The subsequent section, Section 4, presents the econometric tests that were conducted to investigate the relationships between the aforementioned factors. Lastly, in Section 5, we provide concluding remarks that summarize the main findings and implications of the study.

2. Literature review

2.1 The relationship between corruption and entrepreneurship

There are two predominant theories that seek to explain the relationship between corruption and economic growth, often referred to as the "grease the wheels" and "sand the wheels" perspectives. The first theory, known as the "grease the wheels" hypothesis or the efficiency hypothesis of corruption, posits that corruption can actually facilitate entrepreneurial progress. For instance, when firms engage in bribery, it can help streamline bureaucratic processes by reducing red tape and enabling faster access to bank loans with fewer bureaucratic hurdles (Liu et al., 2020).

According to this line of thinking, corruption can contribute to the improvement of public administration efficiency by decreasing administrative waiting times and easing the burden of strict and inefficient government regulations (Liu et al., 2019; Mohammadi Khyareh, 2017). Moreover, corruption allows companies to circumvent unfavorable policies, thereby enhancing their access to financial resources, particularly in countries where financial and public institutions are weak (Son et al., 2020). As a result, corruption not only reduces the costs associated with extensive regulations, but it also lowers the barriers to access to financial resources by promoting collaboration and collusion between entrepreneurs and government officials (Liu et al., 2019; Chowdhury & Audretsch, 2020).

On the other hand, the sand-the-wheels hypothesis, also known as the inefficiency hypothesis of corruption, postulates that corruption acts as an obstacle to the growth of entrepreneurship. Supporters of this hypothesis argue that in the contexts characterized by high levels of corruption, prospective entrepreneurs are less inclined to engage in entrepreneurial activities due to the exorbitant costs associated with corruption (Rashid et al., 2021). As corrupt practices become more pervasive, corrupt officials gradually shift their focus towards informal economic pursuits. Once the price entrepreneurs must pay for engaging in corruption reaches a certain threshold, it serves as a deterrent that dissuades potential entrepreneurs from embarking on their business ventures (Liu et al., 2019). Furthermore, corruption contributes to a sense of disillusionment among aspiring entrepreneurs who lack strong and dependable relationships with authorities, similar to those enjoyed by larger corporations (Kakeh Baraie et al., 2017).

Extensive research has been undertaken regarding the relationship between entrepreneurship and corruption, leading to a substantial body of empirical literature. For instance, Wiseman (2015) conducted a study across different states in the United States and found compelling evidence suggesting that corruption, serving as an indicator of institutional quality, exerts a negative influence on productive entrepreneurship. In a similar vein, Anokhin and Schulze (2009) concluded from their analysis that countries with effective control and reduction of corruption tend to witness a notable rise in entrepreneurial activity and innovation.

However, it is worth noting that the findings are not uniformly consistent. Dreher and Gassebner (2013) conducted research that revealed a positive association between corruption and entrepreneurship, particularly in countries burdened by excessive regulations. Similarly, Szyliowicz and Wadhwani (2007) discovered a positive relationship between corruption and entrepreneurship in the contexts where stringent regulations prevail. Thus, while some studies suggest that corruption hampers productive entrepreneurship and innovation, other research points to a more complex relationship where corruption might have divergent effects depending on the regulatory environment. The interplay between corruption, entrepreneurship, and regula-

tions remains a nuanced and multifaceted subject, warranting further investigation and analysis in future studies. Given the association between corruption and entrepreneurial activates, we advance the following:

H1: Higher levels of corruption are associated with lower levels of entrepreneurial activities.

2.2 Corruption, financial development and entrepreneurship

Since Schumpeter's seminal work in 1912, economists have devoted considerable attention to the analysis of the concept of financial development. A well-functioning financial system, which facilitates the allocation of funds from savers to borrowers, plays a critical role in promoting entrepreneurship. However, several factors can impede the progress of financial systems, and corruption stands out as a significant obstacle. Corruption erodes property rights, creating a disincentive for entrepreneurs to make further investments, even when collateral for accessing foreign credit is available. This underscores a negative relationship between financial development and corruption (Tran et al., 2020). Moreover, the lack of transparency diminishes the credibility of the financial system, erodes investor trust, and amplifies market volatility. Consequently, corruption acts as "sand" that hinders the advancement of financial development (Cooray & Schneider, 2018). An alternative perspective suggests that corruption can lubricate economic activity and potentially facilitate beneficial transactions. This occurs when corruption compels individuals to counter illicit government behavior through illegal means such as bribery (Song et al., 2020). However, this perspective is applicable only in the context of weak governance structures.

Additionally, research on the relationship between financial development and entrepreneurship has gained attention, shedding light on various aspects of this connection. Schumpeter's theory (1912) laid the foundation by emphasizing the role of financial provision in entrepreneurship. According to Schumpeter, banks play a pivotal role in selecting capable borrowers and providing the necessary credit for entrepreneurial endeavors, making financial development a crucial factor in fostering entrepreneurship.

While comprehensive research on this topic is limited, empirical studies have provided valuable insights. The majority of these studies suggest a positive relationship between financial development and entrepreneurship. Dutta and Meierrieks (2021) found evidence of a positive impact, especially when financial development is accompanied by well-functioning economic and political institutions. Similarly, Omri (2020) highlighted the role of good governance as a policy lever that strengthens financial development and positively influences effective entrepreneurship. Studies conducted by Kar and Özsahin (2016) in emerging economies, Fan and Zhang (2017) in Chinese provinces, and Zhou and Quan (2019) in China have also yielded similar results. However, it is important to acknowledge that limited access to financial resources remains a significant constraint for entrepreneurs, as highlighted by Wilson et al. (2018), Cumming et al. (2018), and Omri and Mabrouk (2020). These studies emphasize the challenges entrepreneurs face in obtaining necessary financial support for their ventures, particularly in developing countries.

Empirical studies have explored the connection between financial development and the quality of institutions, particularly with respect to corruption control. For instance, Ajide (2020) demonstrated that financial development can serve as a tool for reducing corruption in Africa. Son et al. (2020) argued that corruption is positively correlated with the ratio of non-performing loans, thereby exacerbating vulnerabilities in the banking system. Cooray and Schneider (2018) conducted a study on the relationship between corruption and the development of the financial sector, concluding that higher levels of financial development are associated with lower levels of administrative corruption.

The theoretical and empirical literature lacks consensus regarding the type and direction of the relationship between corruption and financial development. Therefore, further research is necessary to analyze the mechanisms through which these two variables interact in order to determine their impact on entrepreneurial activities. The present study aims to shed light on this issue. Therefore, we propose the following hypothesis:

H2: Financial development can moderate the relationship between corruption and entrepreneurship, making the relationship stronger for countries with high financial development.

3. Data and methodology

3.1 Data

The study aims to examine how financial development, corruption control, and entrepreneurship are interconnected in selected emerging countries, as classified by the IMF. It builds upon established theoretical frameworks and draws inspiration from previous empirical studies conducted by Dhahri and Omri (2018) and Gaies et al. (2021).

$$LTEA_{i,t} = \beta_0 + \beta_1 LTEA(-1)_{i,t} + \beta_2 CC_{i,t} + \beta_3 LFD_{i,t} + \beta_4 LGDP_{i,t} + \beta_5 LRENT_{i,t} + \beta_6 LUN_{i,t} + \beta_7 LPOP_{i,t} + \beta_8 LEDU_{i,t} + \beta_9 LTR_{i,t} + \delta_i + \varepsilon_{i,t} \quad (1)$$

In equation (1), variable names preceded by "L" indicate that those variables are represented in logarithmic form. The dependent variable TEA measures nascent entrepreneurship and is derived from the Global Entrepreneurship Monitor (GEM) index. This index reflects the percentage of the population aged 18 to 64 who own and manage new businesses, paying wages to employees and/or owners for at least three months (Chowdhury et al., 2019).

The Corruption Control (CC) index, obtained from the Worldwide Governance Indicators (WGI), quantifies the extent of public sector power abuse for private gain (Kaufmann, 2007). The CC index ranges from 2.5 (indicating high corruption) to -2.5 (indicating low corruption). To facilitate interpretation, the scale of this variable is inverted by multiplying the index values by -1, so that a value of 2.5 corresponds to high corruption and -2.5 corresponds to low corruption. Consequently, a higher corruption index is expected to have a negative impact on entrepreneurial activities.

Financial development (FD) represents the amount of credit allocated by banks to the private sector as a percentage of GDP. Financial development is anticipated to have a positive influence on entrepreneurial activities. GDP denotes per capita gross domestic product, while RENT indicates the level of access to natural resources (such as oil, natural gas, coal, mines, and forests) as a percentage of GDP. UN represents the unemployment rate, POP signifies the population growth rate, EDU represents the gross enrollment rate in secondary education, and TR denotes trade openness. The inclusion of δ_i captures country-fixed effects, and $\varepsilon_{i,t}$ represents the error term in the equation.

Additionally, equation (2) is considered to investigate the interactive role of corruption and financial development on entrepreneurship.

$$LTEA_{i,t} = \beta_0 + \beta_1 LTEA(-1)_{i,t} + \beta_2 CC_{i,t} + \beta_3 LFD_{i,t} + \beta_4 L(\mathrm{CC} * \mathrm{FD})_{it} + \beta_5 LGDP_{i,t} + \beta_6 LRENT_{i,t} + \beta_7 LUN_{i,t} + \beta_8 LPOP_{i,t} + \beta_9 LEDU_{i,t} + \beta_{10} LTR_{i,t} + \delta_i + \varepsilon_{i,t} \quad (2)$$

This study conducted an analysis using data from 21 emerging countries[1], spanning the period from 2008 to 2020. The selection of countries was based on specific criteria aimed at capturing a diverse representation of emerging economies. We considered factors such as geographical distribution, economic development stage, and cultural diversity to ensure a comprehensive analysis of the relationship between financial development, corruption, and entrepreneurship. The data on entrepreneurship were obtained from the Global Entrepreneurship Monitor (GEM), which provided valuable insights into entrepreneurial activities. Other relevant data for the analysis were sourced from the World Development Indicators (WDI) database, maintained by the World Bank.

3.2 Rationale for variable selection

Lagged entrepreneurship is included to capture the persistence and dynamic nature of entrepreneurial activities. Past entrepreneurship levels can significantly influence current levels, aligning with the notion that nascent entrepreneurship is path-dependent (e.g., Davidsson, 2015; Audretsch et al., 2012).

The Corruption Control index is integral to understanding the impact of governance on entrepreneurship. It reflects the extent of public sector power abuse, providing insights into the regulatory environment and its influence on entrepreneurial activities (Kaufmann et al., 2006).

Financial development is crucial for entrepreneurship as it represents the percentage of GDP allocated by banks to the private sector. Adequate financial development is expected to positively influence

1 The selected countries are: Algeria, Angola, Argentina, Azerbaijan, Belarus, Brazil, Chile, China, Colombia, Croatia, Dominican Republic, Egypt, Hungary, Iran, Kuwait, Libya, Mexico, Morocco, Oman, Pakistan, Peru, Philippines, Netherlands, Qatar, Romania, Russia, Saudi Arabia, South Africa, Sri Lanka, Thailand, Turkey, Ukraine, United Arab Emirates, Uruguay, Venezuela, India, Indonesia, Kazakhstan, and Malaysia.

entrepreneurial activities by facilitating access to credit (e.g., Beck & Demirgüç-Kunt, 2006).

The interactive effect of corruption and financial development explores whether corruption mitigates the negative impact of limited financial development on entrepreneurship. This interaction acknowledges the potential compensatory role of corruption in certain contexts (Aidis et al., 2012).

Control variables account for broader economic, demographic, and educational factors influencing entrepreneurship. For example, GDP, natural resource rent, and trade openness reflect economic conditions, while education and the population growth rate capture demographic and human capital dimensions (e.g., Wennekers & Thurik, 1999; Audretsch & Keilbach, 2004). Country-fixed effects control for unobserved heterogeneity among emerging economies, recognizing that unique country-specific characteristics may affect entrepreneurship independently of the measured variables.

3.3 Econometric methodologies

From an econometric perspective, the inclusion of a lagged dependent variable on the right-hand side of equations (1) and (2) raises concerns about endogeneity and a potential correlation between the independent variables and the error term. To address endogeneity issues and a potential correlation between the independent variables and the error term in equations (1) and (2), the study employs the generalized method of moments (GMM) approach for estimation. The inclusion of a lagged dependent variable on the right-hand side of the equations necessitates the use of GMM to obtain consistent estimation results.

The GMM approach is particularly suitable for the specified form of the model where the dependent variable, entrepreneurship, exhibits a break. It offers several advantages over other estimation methods. Firstly, GMM allows for the use of breaks as instrumental variables to control for endogeneity. This helps address potential biases arising from the interplay between the dependent variable and the independent variables. Secondly, GMM incorporates the dynamics present in the model by incorporating lagged values, thereby capturing time-dependent relationships. Lastly, GMM can be applied to various types of data, including time series, cross-sectional, and panel data, making it a flexible and widely applicable estimation technique.

Empirical analysis in our study employs the dynamic panel generalized method of moments (GMM) approach, a sophisticated econometric method well-suited for handling endogeneity issues and capturing the dynamic relationships inherent in panel data. The GMM methodology, as applied to dynamic panels, was initially proposed by Arellano and Bond (1991), and it has since become a cornerstone in addressing various econometric challenges associated with panel data analysis.

The dynamic panel GMM estimation equation, building on the foundational work of Arellano and Bond (1991), Blundell and Bond (1998), and Arellano and Bover (1995), can be expressed as follows:

$$Yit = \alpha + \rho Yit - 1 + Xit\beta + Zit\gamma + \varepsilon it, \quad (1)$$

where Yit represents the dependent variable for unit i at time t, α is the intercept term, ρ captures the autoregressive parameter reflecting the lagged dependent variable, Xit is a matrix of time-varying independent variables, β is the vector of coefficients associated with the time-varying independent variables, Zit is a matrix of predetermined instruments, γ is the vector of coefficients associated with the predetermined instruments, and εit is the error term. The inclusion of lagged dependent variables and predetermined instruments addresses endogeneity concerns and enhances the efficiency of parameter estimates in the presence of unobserved heterogeneity and serial correlation.

By employing the GMM approach, the study aims to obtain consistent and efficient estimates of the relationships between the variables of interest. This helps mitigate the endogeneity concerns associated with the lagged dependent variable and provides a robust framework for the analysis of the impact of corruption control, financial development, and other factors on entrepreneurship (Munemo, 2018). The GMM methodology allows for rigorous inference and enhances the validity of the study findings.

Data analysis in our study was conducted using STATA version 16 software. Analysis commands in STATA, particularly for dynamic panel GMM, align with established methodologies outlined by researchers such as Roodman (2009).

4. Empirical results

4.1 Descriptive statistics

Table 1 encapsulates crucial descriptive statistics for nine variables derived from an extensive dataset of 130 observations for each variable based on the availability of data.

Table 1 Summary statistics of variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Natural Resources Rent	130	7.129768	8.168906	0.2295636	30.81602
Unemployment Rate	130	7.324538	5.078499	0.11	27.04
Education Index	130	51.21416	21.78649	8.83833	113.2171
Population Growth	130	1.054496	0.9351613	-1.20061	5.114902
Corruption	130	-0.0606155	0.4926059	-1.060013	0.8783809
Total Trade	130	74.32311	36.9461	22.1059	176.6683
Financial Development Index	130	60.86398	36.89161	13.22519	165.3904
Gross Domestic Per Capita Growth	130	3.138249	2.741693	-7.444557	13.39624
Total Early Stage Entrepreneurship	130	12.99308	5.813606	2.9	27.4

Source: Research calculations

Within the realm of "Natural Resources", the mean score of 7.13 is accompanied by a notable standard deviation of 8.17, underscoring the pronounced variability within this metric. The "Unemployment Rate" manifests an average of 7.32%, exhibiting a moderate standard deviation of 5.08. The "Education Index" reveals a mean of 51.21, with a substantial standard deviation of 21.79 indicative of a diverse educational landscape. Scaled to normalize, "Population Growth" boasts a mean of 1.05, reflecting varied population sizes, while the "Corruption Index" exhibits a slightly negative mean (-0.06) and a moderate standard deviation of 0.49. The "Financial Development Index" registers an average of 60.86, coupled with a noteworthy standard deviation of 36.89, indicating pronounced variability. "Gross Domestic Product Growth" showcases an average growth rate of 3.14%, with a moderate standard deviation of 2.74. Lastly, "Total Early Stage Entrepreneurship" yields an average value of 12.99, suggesting moderate entrepreneurial activities, accompanied by a standard deviation of 5.81. These meticulously delineated statistics not only provide a panoramic view of the dataset but also furnish nuanced insights into the central tendencies, variabilities, and ranges inherent to each variable, thereby enriching the descriptive statistics section of this research paper.

Table 2 Bivariate correlations between the study variables

	TEA	GDPP	FD	TR	CC	POP	EDU	UN	RENT
TEA	1.0000								
GDPP	0.3300	1.0000							
FD	-0.1954	0.2597	1.0000						
TR	0.2666	-0.1427	0.3045	1.0000					
CC	0.3676	-0.2095	0.3058	0.2875	1.0000				
POP	0.2647	0.3881	-0.1244	-0.3535	-0.3241	1.0000			
EDU	0.2035	-0.2936	0.3304	0.2550	0.2842	-0.4340	1.0000		
UN	-0.2024	-0.2590	-0.1824	-0.2874	-0.2647	-0.1391	-0.1874	1.0000	
RENT	-0.1968	-0.2885	-0.1499	-0.1427	-0.1890	0.3898	-0.1711	-0.1276	1.0000

Source: Research calculations

4.2 Unit root test

Before proceeding with the analysis of the estimated model and examining the panel data, it is essential to assess the correlation between the time periods. This consideration is crucial because the presence of correlation between periods can lead to inconsistent and biased results. To test the correlation between the periods, we have employed the CD statistic introduced by Pesaran (2004). The CD statistic allows us to assess whether there is cross-sectional dependence among the variables over time.

The CD test results indicate that we reject the null hypothesis of no correlation between the time periods. This implies that the examined countries exhibit interdependence among the variables under investigation. The rejection of the null hypothesis suggests that the presence of correlation should be taken into account to obtain reliable and accurate results in the subsequent analysis.

Given the presence of correlation between periods, traditional unit root tests such as the Levin, Lin, and Chu (LLC) and Im, Pesaran, and Shin (IPS) tests may yield spurious results. This is because these tests assume no correlation among the observations. To address this issue, we employ the Cross-sectional augmented IPS (CIPS) unit root test proposed by Pesaran (2007). The CIPS test takes into account the presence of cross-sectional dependence and provides more robust results in the presence of such correlation.

By using the CIPS unit root test, we aim to mitigate the potential bias introduced by the correlated nature of the data and ensure the validity of our findings. This approach allows us to obtain reliable estimates and draw accurate conclusions about the unit root properties of the variables in the panel dataset.

Table 3 Results of the unit root tests

Variable	CIPS (Level)	CIPS (First Difference)
Entrepreneurship	-2/65	-3/68***
Financial Development	-2/52	-3/92***
Corruption Control Index	-2/93	-2/47**
Per Capita GDP	-2/08	-3/61***
Natural Resource Rent	-2/77	-2/53**
Unemployment Rate	-2/19	-3/48***
Population Growth Rate	-2/23	-2/39**
Education	-2/96	-3/84***
Trade Openness	-2/59	-2/74**
(Corruption Control* Financial Development)	-2/97	-3/88***

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Source: Research calculations

The unit root tests conducted on the variables in the panel dataset provide valuable insights into their stationarity properties. The results presented in Table 3 indicate that all variables are either stationary at the level or after differencing.

The CIPS statistic values obtained from the unit root tests are compared against the critical values to determine the rejection or acceptance of the null hypothesis of non-stationarity. If the CIPS statistic exceeds the critical values, it implies that we reject the null hypothesis, indicating that the variable is stationary.

In our analysis, all variables in the panel dataset exhibit stationary behavior. This finding is crucial as it enables us to reliably estimate the model parameters and draw meaningful conclusions from the empirical results. Having stationary variables ensures that the mean and variance of the variables remain constant over time, allowing for more accurate analysis of their relationships and dynamics.

Table 3 provides a comprehensive overview of the unit root test results, including the CIPS statistic values and the corresponding critical values at various significance levels. Based on these results, we can confidently state that all variables in the analysis demonstrate stationarity, either in their original form or after differencing.

4.3 Results and discussion

Table 4 presents the estimation results obtained using the dynamic panel GMM approach, which helps address the issue of spurious regression and endogeneity among the model variables. This table provides valuable information on various aspects of the estimation, including the number of observations, instruments used, autocorrelation tests, and instrument validity tests.

The number of observations reported in Table 4 indicates the sample size utilized in the estimation, reflecting the data points available for analysis. A larger sample size generally enhances statistical power and reliability of the results.

Instruments play a crucial role in addressing endogeneity concerns in the model. The table provides details about the instruments employed, which carefully selected variables are used to control for potential biases and omitted variable problems. These instruments are crucial for obtaining consistent and unbiased estimates of the model coefficients.

Autocorrelation tests (AR (1) and AR (2)) are conducted to examine the presence of serial correlation in the model errors. Serial correlation violates the assumption of independently distributed errors, and its presence can affect the efficiency and validity of the estimation results. The table includes information on the autocorrelation tests conducted, allowing for an assessment of the robustness of the estimated model.

The instrument validity test (Sargan test) is performed to evaluate the suitability and effectiveness of the instruments used in the estimation. These tests assess whether the instruments satisfy the necessary conditions and are valid for addressing endogeneity concerns. The results of these tests provide evidence of the reliability of the chosen instruments.

Table 4 Estimation of the impact of economic complexity on competitiveness

Variables	Model 1	Model 2
Entrepreneurship Lag	0.131*** (0.137)	0.125*** (0.124)
Financial Development Index	0.0017 (0.061)	0.0021 (0.048)
Corruption (WGI)	0.178*** (0.143)	0.154*** (0.129)
(Corruption * Financial Development)	0.193*** (0.021)	0.186*** (0.019)
Economic Growth	0.0348** (0.0163)	0.0286** (0.0119)
Natural Resource Rent	0.0318** (0.0159)	0.0308** (0.0137)
Unemployment Rate	0.0565** (0.0218)	0.0491** (0.0183)
Population Growth Rate	0.0376*** (0.0112)	0.0334*** (0.0108)
Education	0.0331** (0.0119)	0.0319*** (0.0102)
Trade Openness	0.0428*** (0.0113)	0.0451*** (0.0145)
Observation	1070	1300
Dummy Year	yes	yes
AR (1)	-3/31***	-3/48***
AR (2)	-1/75	-1/25
Sargan	26/56	24/63
Instruments for first differences equation	D.(TEA, CC, FD, GDP, RENT, UN, POP, EDU, TR, i.YEAR)	
Instruments for levels equation	(TEA, CC, FD, GDP, RENT, UN, POP, EDU, TR, i.YEAR)	

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. The numbers in parentheses represent standard errors of the correlation coefficients.

Source: Research calculations

The assessment of instrumental variables used to address endogeneity is an important step in ensuring the validity of the estimation results. In this case, a highly significant coefficient of ***-3.48*** (***p < 0.01***) for AR (1) suggests a strong negative autocorrelation in the first lag of the model residuals. The coefficient of ***-1.25*** for AR (2) with a non-significant result suggests a weaker negative autocorrelation in the second lag. The Sargan test serves as a crucial diagnostic tool to evaluate the validity of the instruments employed in the model. A non-significant result of ***24.63*** (***p > 0.05***) indicates that the instruments used are valid for addressing endogeneity concerns in the model. This implies that the chosen instrumental variables effectively satisfy the necessary conditions and do not exhibit correlation with the model residuals.

The estimation results in Table 4 reveal a positive and significant impact of past entrepreneurial activity on current entrepreneurial activity. This finding aligns with existing empirical literature that underscores the persistence and influence of historical entrepreneurial trends on contemporary entrepreneurial actions (Davidsson & Honig, 2003; Hessels et al., 2011). This is consistent with the notion that entrepreneurial ecosystems tend to foster a culture of innovation and risk-taking, leading to a continuous cycle of entrepreneurial initiatives (Shane & Venkataraman, 2000).

The analysis of the relationship between financial development and entrepreneurship reveals a positive but statistically insignificant association. This finding is consistent with some previous empirical studies that have reported mixed or insignificant effects of financial development on entrepreneurship (Beck et al., 2005; Klapper et al., 2006). In addition, this finding can be attributed to several factors that help explain this result. Firstly, limited access to credit and challenges in obtaining bank financing can be significant obstacles to the formation and growth of entrepreneurship in developing countries. Entrepreneurial ventures often require substantial financial resources to start and expand, and the lack of available credit can hinder entrepreneurial activities. Inadequate financial infrastructure, including the absence of supportive financial institutions and mechanisms, may contribute to the limited access to credit faced by entrepreneurs in these countries. Secondly, variations in institutional structures across countries can also influence the relationship between financial development and entrepreneurship. Each country has its own unique financial system and regulatory environment, which affects the availability and effectiveness of financial services for entrepreneurs. In some cases, underdeveloped financial and monetary markets may not generate positive outcomes for entrepreneurship due to the absence of well-functioning financial institutions and supportive policies. The finding aligns with prior research conducted by Gaies et al. (2021) and Aparicio et al. (2016), which also emphasized the challenges faced by entrepreneurs in developing countries regarding limited access to credit and variations in financial systems.

The analysis provides compelling evidence of a positive and significant impact of the corruption index on entrepreneurial activities. These findings reinforce the conclusions drawn by Dreher and Gassebner (2013) and Bologna and Ross (2015), suggesting that corruption can serve as the "only way" for potential entrepreneurs to initiate businesses in countries with corrupt business environments and weak institutions. One possible explanation for this finding is that in developing countries with a high prevalence of corruption, bribery and other corrupt practices have become deeply entrenched and normalized. In such environments, individuals may feel compelled to engage in corrupt activities as a means to overcome bureaucratic barriers and gain access to necessary resources and opportunities for starting or expanding their businesses. This normalization of corruption can create a distorted business landscape where unethical practices are widespread and accepted as the norm. However, it is crucial to emphasize that the positive impact of corruption on entrepreneurial activities does not justify or endorse corrupt behavior. Rather, it highlights the unfortunate reality that corruption can be deeply embedded in certain societies, making it difficult for entrepreneurs to operate in an environment that upholds integrity and fairness. Addressing corruption is of paramount importance to foster a healthy entrepreneurial ecosystem and promote sustainable economic development. Efforts should be directed towards strengthening institutions, enhancing transparency, and promoting ethical business practices. By combating corruption and improving the overall business environment, countries can create conditions that encourage genuine entrepreneurship, innovation, and long-term economic growth.

The analysis uncovers an intriguing interactive effect between controlling corruption and financial development, revealing a positive impact on the level of entrepreneurial activities. This finding is consistent with and extends the research conducted by Liu et al. (2019) and Aparicio et al. (2016). Additionally, this finding suggests that in countries with underdeveloped financial institutions and complex bureaucracies, where small and new businesses face significant challenges in accessing financial credit due to factors like the lack of collateral and higher levels of corruption, corruption can potentially facilitate easier access to financial resources and increase credit availability for entrepreneurs. The underlying mechanism behind this phenomenon can be explained by the presence of corrupt practices, such as bribery, that have become normalized and ingrained in these contexts. In such environments, where corruption is pervasive and financial institutions may be unreliable or inaccessible to small businesses, entrepreneurs may resort to engaging in corrupt activities as a means to bypass financial constraints and secure the necessary resources for their ventures. By leveraging corrupt networks and practices, entrepreneurs may gain increased access to credit and financial resources that would otherwise be unavailable to them. However, it is essential to emphasize that this finding should not be interpreted as a justification or endorsement of corruption. Corruption undermines transparency, fairness, and the rule of law, leading to distortions in the business environment and adverse long-term consequences for economic development. Addressing corruption remains a critical priority, and countries should focus on implementing robust anti-corruption measures, enhancing institutional frameworks, and promoting a culture of integrity and ethical business practices. However, it is essential to emphasize that this finding should not be interpreted as a justification or endorsement of corruption. While corruption may seemingly offer a temporary solution for entrepreneurs in underdeveloped financial markets, it is essential to prioritize anti-corruption efforts and simultaneously work towards improving financial institutions. By doing so, countries can foster an environment that promotes ethical entrepreneurship, transparency, and long-term economic growth.

Regarding the control variables, the analysis reveals a positive and statistically significant impact of education on entrepreneurship, which is in line with Korosteleva and Belitski (2017) and Sobel (2008), a positive and significant impact of natural resource rent, which is in line with studies by Korsgaard et al. (2016) and Chowdhury et al. (2019), a positive impact of population growth rate, which is supported by Florida (2003) and Lévesque and Minniti (2011), a positive impact of unemployment, which is in line with the results of Fuentelsaz et al. (2015) and Dvouletý (2017), a positive impact of GDP growth consistent with the results of Stel et al. (2005) and Thurik et al. (2008), and finally, a positive impact of trade openness on entrepreneurship, which is in line with the results of Sobel (2008) and Keupp and Gassmann (2009).

When comparing the results between Model 1 and Model 2 presented in the table, distinct patterns emerge in the estimated coefficients. Model 1, which focuses on the direct effect of entrepreneurship on economic growth, reveals specific insights into the relationship between these variables. Meanwhile, Model 2 introduces the dynamic threshold model, considering the potential nonlinear nature of this relationship and incorporating the impact of macroeconomic factors. The coefficients in Model 2 showcase how the threshold effect, indicated by the introduction of the binary variable and its associated parameters, influences the relationship between entrepreneurship and economic growth. The contrast between the two models elucidates not only the direct impact of entrepreneurship but also the nuanced dynamics revealed by the threshold model, offering a more comprehensive understanding of the complex interplay between entrepreneurship and economic growth, especially within the context of emerging economies.

5. Conclusion

The present study delves into the influence of financial development and corruption on entrepreneurship, focusing specifically on emerging economies. Through the application of the generalized method of moments (GMM) econometric approach and panel data analysis, we aim to provide valuable insights into these dynamics. Our research explores the direct and indirect effects of financial development and corruption on entrepreneurial activity, with a particular emphasis on investigating whether corruption can mitigate the adverse impact of limited financial development on entrepreneurship in emerging economies.

The findings of our study shed light on two key aspects. Firstly, we identify that underdeveloped financial accessibility poses a significant hurdle for aspiring entrepreneurs, limiting their entry into the market. Secondly, our analysis uncovers a noteworthy interactive effect, revealing that corruption has the potential to counterbalance the negative consequences of inadequate financial development on entrepreneurship, particularly in situations where financial resources and access to them are scarce. In the sample of emerging economies examined, higher levels of corruption, manifested as bribery or other illicit practices to navigate complex bureaucracies, can serve as a catalyst for entrepreneurial activity by facilitating greater access to financial resources. Consequently, in these contexts, corruption may be perceived as a means of enhancing entrepreneurship rather than hindering it.

It is crucial to acknowledge the contextual factors underlying these findings. In emerging and low-income countries, the availability of financial resources is often limited, and novice entrepreneurs encounter challenges in accessing external funding due to heightened business risks and a lack of collateral. In such circumstances, corruption can play a role in "greasing the wheels of businesses", enabling entrepreneurs to bypass bureaucratic obstacles and gain access to essential financial resources. However, it is essential to note that corruption carries additional costs for entrepreneurs and introduces uncertainties into their business transactions. Therefore, while our findings highlight the potential positive impact of corruption in the context of underdeveloped financial systems, it is imperative to maintain a broader perspective on the detrimental consequences of corruption. Transparency, fairness, and the rule of law remain crucial pillars for sustainable economic development.

In conclusion, this study provides valuable insights into the intricate relationship between financial accessibility, corruption, and entrepreneurship in emerging economies. By comprehending these dynamics, policymakers and stakeholders can gain a deeper understanding of the challenges and opportunities associated with fostering an entrepreneurial ecosystem. It is imperative for countries to address corruption, strengthen financial systems, and create an enabling environment that promotes ethical entrepreneurship, transparency, and sustainable economic growth.

In concluding our research into the interplay between financial accessibility, corruption, and entrepreneurship in emerging economies, it is essential to acknowledge certain limitations that require consideration. These limitations, in turn, pave the way for potential avenues of future research.

Limitations:

1. **Generalization constraints:** While our study provides valuable insights into specific emerging economies, the generalization of findings may be constrained by the inherent diversity across these nations. Cultural, institutional, and economic variations could influence the observed relationships, warranting caution in extrapolating our results universally.
2. **Temporal dynamics:** The focus of the study on the period from 2008 to 2020 may limit its ability to capture nuanced changes over time. Economic, political, and institutional shifts beyond this timeframe might influence the dynamics between financial development, corruption, and entrepreneurship.
3. **Variable selection:** Despite our comprehensive analysis, the scope of the study may be extended by considering additional variables that could further elucidate the intricate relationship between corruption, financial accessibility, and entrepreneurship.

Guidelines for further research:

1. **Cross-cultural analysis:** Future research endeavors could delve into cross-cultural analyses, exploring how the identified relationships differ or remain consistent across various cultural contexts. This could contribute to a more nuanced understanding of the interplay between corruption, financial development, and entrepreneurship.
2. **Longitudinal studies:** To address temporal limitations, longitudinal studies tracking the evolution of entrepreneurship in response to changes in corruption and financial accessibility over more extended periods could enhance our understanding of these dynamics.
3. **Macro- and micro-level factors:** Further research may explore the interconnection between macro-level factors (such as national policies) and micro-level factors (individual

entrepreneurial decisions). This could provide a more holistic view of the mechanisms influencing entrepreneurship in emerging economies.

4. **Qualitative dimensions:** Integrating qualitative methodologies, such as interviews and case studies, can add depth to our quantitative findings. Understanding entrepreneur perspectives and experiences in the context of corruption and financial constraints would enrich the analysis.

By recognizing these limitations and proposing future research guidelines, our study aims to contribute not only to the existing body of knowledge but also to inspire and guide scholars in advancing our comprehension of the intricate dynamics shaping entrepreneurship in emerging economies.

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