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THE NEXUS OF ECONOMIC GROWTH AND ENTREPRENEURSHIP: TESTING REVERSE CAUSALITY IN BRICS COUNTRIES (2001–2023)

A RELAÇÃO ENTRE CRESCIMENTO ECONÔMICO E EMPREENDEDORISMO: TESTANDO A CAUSALIDADE REVERSA NOS PAÍSES DO BRICS (2001–2023)

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Abstract
This paper examines the dynamic link between economic growth and entrepreneurship in the BRICS nations during the period 2001-2023, with a special focus on reverse causality from economic growth to entrepreneurship. Although the majority of the literature on the topic has viewed entrepreneurship as the engine of economic growth, relatively less attention has been paid to the fact that economic growth may, in turn, fuel entrepreneurship by unlocking market opportunities, enhancing financial and human capital, and building institutional capacity. This paper uses a balanced macro-panel dataset of Brazil, Russia, India, China, and South Africa and applies standard panel models of economic growth and entrepreneurship together with dynamic econometric models that account for heterogeneity, persistence, and cross-sectional dependence. Panel causality tests are employed to determine the nature of causality between economic growth and entrepreneurship. The results of this study offer new evidence on the fact that economic growth has a significant role to play in determining the dynamics of entrepreneurship in emerging economies, although feedback effects are conditional in nature.

Keywords: Economic Growth. Entrepreneurship. Reverse Causality. BRICS. Dynamic Panel Data. Emerging Economies.

Resumo
Este artigo examina a relação dinâmica entre crescimento econômico e empreendedorismo nos países do BRICS durante o período de 2001 a 2023, com foco especial na causalidade reversa do crescimento econômico para o empreendedorismo. Embora a maioria da literatura sobre o tema considere o empreendedorismo como o motor do crescimento econômico, relativamente menos atenção tem sido dada ao fato de que o crescimento econômico pode, por sua vez, impulsionar o empreendedorismo ao desbloquear oportunidades de mercado, aprimorar o capital financeiro e humano e fortalecer a capacidade institucional. Este artigo utiliza um conjunto de dados macroeconômicos balanceados do Brasil, Rússia, Índia, China e África do Sul e aplica modelos de painel padrão de crescimento econômico e empreendedorismo, juntamente com modelos econométricos dinâmicos que consideram a heterogeneidade, a persistência e a dependência transversal. Testes de causalidade em painel são empregados para determinar a natureza da causalidade entre crescimento econômico e empreendedorismo. Os resultados deste estudo oferecem novas evidências de que o crescimento econômico desempenha um papel significativo na determinação da dinâmica do empreendedorismo em economias emergentes,

embora os efeitos de retroalimentação sejam condicionais por natureza.

Palavras-chave: *Crescimento Econômico. Empreendedorismo. Causalidade Reversa. BRICS. Dados em Painel Dinâmico. Economias Emergentes.*

1 INTRODUCTION

Entrepreneurship and economic growth continue to lie at the heart of various debates on the drivers of long-term development. Since Schumpeter's seminal works of 1934, entrepreneurs have been considered as agents of innovation, productivity improvement, and structural change. More recent evidence supporting this view indicates that entrepreneurial ecosystems facilitate faster job creation, technology upgrading, and market dynamism. Meanwhile, an increasing number of studies have underscored the fact that entrepreneurship does not occur in a vacuum; rather, it is embedded in and influenced by general macroeconomic conditions, such as per capita income, financial stability, infrastructural support, and institutional quality. The awareness of this reality has recently generated a surge of scholarly interest in the bidirectional and dynamic relationship between entrepreneurship and economic growth.

Despite this interest, much of the empirical literature has traditionally viewed entrepreneurship as a driver of economic growth, with little consideration for reverse causality. On the other hand, the emerging body of recent studies suggests that it is actually economic growth stimulating entrepreneurial activities, since rising income levels expand market opportunities, boost consumer demand, and alleviate access to such critical resources as finance, technology, and human capital (Mai et al., 2025; Mai, Tran, et al., 2025).The exclusion of such a bidirectional relationship risks endogeneity bias and results in inconsistent estimates which may become misleading once entrepreneurship is treated as an exogenous determinant of growth. More accurately, a feedback mechanism could operate such that economic expansion reshapes financial conditions, institutional capacity, and the incentives for engaging in opportunity-driven entrepreneurship. Theoretically and in light of policy design, the question of whether it is entrepreneurship that causes economic growth or vice versa, or if the two processes of entrepreneurship

and economic growth are self-reinforcing, becomes important (Dutta & Meierrieks, 2021; Urbano et al., 2019).

This question gains importance in the backdrop of the fact that the emerging large economies have experienced a sudden shift in the structure and institutions, thus changing the landscape of entrepreneurs. The BRICS countries of Brazil, Russia, India, China, and South Africa offer a very good empirical background to study this relationship. The economies of the BRICS countries have experienced a tremendous amount of economic growth and change over the last two decades, which have been largely focused on ease of doing business. These reforms include financial-sector liberalization, simplification of regulations, and selective support for small and medium-sized firms, which altogether reshape the environment where entrepreneurial activities take place (Tahir & Burki, 2023; World Bank, 2023).

The period of 2001–2023 also covers two major global disruptions, the 2008 global financial crisis and the COVID-19 pandemic which transmitted heterogeneous shocks to output, labour markets, and entrepreneurial activity across BRICS economies (OECD, 2022). With the institutional structures, stages of development, and crisis-response capacities so diverse among those countries, this provides a particularly rich empirical setting in which to analyze the dynamic feedback between entrepreneurship and economic growth over this period. Such a long-run perspective allows for the identification of both structural shifts and cyclical responses in the entrepreneurship–growth relationship within large emerging economies.

Set against this background, the study addresses the following central question: Does economic growth stimulate entrepreneurship in the BRICS economies, or does entrepreneurship drive subsequent economic growth-or are both causal directions present?

To address this question, the study uses the CS-ARDL model of Chudik and Pesaran (2015). The chosen model is appropriate for macro-panel data with cross-country dependence, structural heterogeneous features, and endogenous relations-all features present in BRICS economies. The CS-ARDL model allows estimating short-run dynamics and the long-run equilibrium relationships in a robust way while directly addressing the reverse causality and cross-sectional spillovers and thus provides more credible inferences about the entrepreneurship-growth nexus.

Focusing explicitly on reverse causality within an emerging economy group, this work makes three contributions to the literature. Firstly, it further develops the theoretical knowledge by placing the entrepreneurship–growth relationship as inherently bidirectional rather than unidirectional. Secondly, the empirical evidence is based on contemporary econometric techniques that address endogeneity and interdependency of cross-country panels arising in earlier studies. Thirdly, nuanced policy implications for the BRICS and other emerging economies are drawn on whether entrepreneurship-driven growth policies, growth-inducing macroeconomic strategies, or integrated approaches are comparatively most viable for sustaining long-term development.

2 LITERATURE REVIEW

2.1 Theoretical foundation

The relationship between economic growth and entrepreneurship is primarily influenced by both traditional and modern growth theories. From the Schumpeterian theory of creative destruction, innovation through new products, methods, and business models shocks the existing market and induces technical progress, making entrepreneurship a vital driver of economic change (Schumpeter, 1934). Apart from the productivity change, this phenomenon also enhances the structural change in the economy. The endogenous growth theory, which is compatible with the Schumpeterian theory, emphasizes innovation, human capital, and knowledge creation as the primary engines of economic growth. According to the theory of Romer (1990), entrepreneurship is very important for the total factor productivity, which is stimulated by technological progress, entrepreneurship, and knowledge spillovers. From modern developments of these theories, entrepreneurship has a vital role in diversity, competitiveness, and economic growth (Aparicio, Urbano, & Audretsch, 2016; Acs et al., 2018). All these theories agree that entrepreneurship is a vital driver of economic growth.

However, theoretical discourses are also increasingly acknowledging the possibility of the existence of causality from economic growth to entrepreneurship too. Structuralism and institutionalism argue that entrepreneurship is affected by macroeconomic variables such as income, financial development, and infrastructure (Acs,

Szerb, & Komlósi, 2020). Economic growth can lead to the availability of resources, the discovery of new markets, and enhanced investor confidence, which may lead to a favorable environment for opportunity-driven entrepreneurship. The above-mentioned dualism of theoretical discourses also reveals that the relationship between entrepreneurship and economic growth is dynamic in nature and may be bidirectional, contrary to the earlier models that were unidirectional.

2.2 Bidirectional dynamics and reverse causality evidence

Although previous studies were more inclined to define entrepreneurship as a driver of economic growth, recent studies have increasingly acknowledged that economic growth can also encourage entrepreneurship by providing better access to resources, improving market opportunities, and increasing consumer demand. Cross-country evidence indicates that economic growth has a strong impact on entrepreneurship, and GDP growth has been identified as a strong macro-driver of entrepreneurship (Mai et al., 2025; Rashid, 2025; Cakiroglu et al., 2025). However, recent evidence shows that macroeconomic expansions have a disproportionately positive effect on opportunity-driven entrepreneurship, which is innovation and growth-oriented and has higher productivity, due to favorable demand conditions and finance opportunities that raise the returns to entrepreneurship. On the other hand, macroeconomic downturns are associated with a shift in entrepreneurial entry to necessity-driven self-employment, which is survival-oriented and makes a lower contribution to growth (Global Entrepreneurship Monitor, 2023; Mai et al., 2025; Urbano et al., 2019).

Though, the results regarding reverse causality have been observed to emerge in recent studies. For example, Mai et al. (2025) show that macroeconomic growth, such as GDP, has a positive effect on the level of entrepreneurship in a country due to increased financial resources, market size, and consumption demand, implying that economic growth is an important factor that affects the dynamics of entrepreneurship. In another research, Rashid (2025) finds that economic growth Granger-causes rates of new business formation in cross-regional data, implying that macroeconomic optimism and economic growth shape entrepreneurial entry. In addition, the findings from the comparative study suggest that economic development is positively causally linked to entrepreneurship

ecosystems, with evidence suggesting that economic activity is linked to the development of environments that are conducive to entrepreneurial activity and development (Sharma et al., 2024). In general, the above studies indicate that economic growth can be both the result of entrepreneurship and the force behind more people participating in entrepreneurship.

Apart from the issue of reverse causality, there is an emerging literature that suggests a symbiotic and co-evolutionary relationship between entrepreneurship and economic growth, where the two phenomena mutually reinforce each other. Some of the early foundational evidence on the bidirectional causality between entrepreneurship and economic growth in the Latin American economies is offered by Aparicio, Urbano, and Audretsch (2016), which suggests that once a certain minimum threshold of institutional and economic development is attained, entrepreneurship not only reacts to economic growth but also becomes an endogenous force behind additional economic growth.

More recent research builds on this co-evolutionary approach by pointing to the spatial and developmental contingencies under which entrepreneurship and growth interact. Based on panel data for Chinese cities, Jin (2025) finds that entrepreneurship and innovation have a significant positive effect on economic growth, and that economic growth has a positive effect on market size, infrastructure quality, and resource endowments, which in turn foster entrepreneurial entry. Crucially, the intensity of these effects differs according to different levels of urban hierarchies, which implies that the relationship between entrepreneurship and growth is context-dependent on regional economic structures and capabilities rather than a universal principle.

Taken together, this literature strand highlights the importance of recognizing that the relationship between entrepreneurship and economic growth is anything but linear and universal. Rather, it is shaped by the stage of development, the degree of institutional development, and the geographical context, thus underlining the importance of empirical approaches that take feedback and heterogeneity into account.

2.3 Gaps in the existing literature

However, despite the increasing awareness of the potential for entrepreneurship and economic growth to be mutually determined, some important research gaps exist,

especially in the context of emerging economies. Firstly, there is a lack of empirical evidence regarding reverse causality, that is, whether economic growth encourages entrepreneurship. Although the environment in developed countries has been extensively studied, there is a lack of macro-panel evidence on the BRICS countries (Brazil, Russia, India, China, and South Africa). This is particularly important, especially in the context of the fact that the BRICS countries have experienced a dramatic structural transformation and growth spells in the last two decades. The literature that currently exists on the BRICS nations is mainly focused on entrepreneurship as a means of growth, and there are very few studies that have explored the idea of whether economic growth Granger-causes entrepreneurship or vice versa (Tahir & Burki, 2023; Dutta & Meierrieks, 2021).

Second, the issue of government support and its significance in the context of the relationship between entrepreneurship and growth has been an unexplored area. Although the role of government support in terms of SME financing schemes, innovation subsidies, financial inclusion, and regulatory reforms is widely acknowledged as a crucial determinant of entrepreneurship, its significance for the process of economic growth influencing entrepreneurship has remained relatively uncharted. This is especially surprising in the BRICS context, where the government has a crucial role to play in market coordination, financial intermediation, and industry policies. Recent research emphasizes the importance of institutional quality and policy efficacy for entrepreneurial performance in emerging markets, but it fails to incorporate government support into the dynamic growth-entrepreneurship nexus (Sendra-Pons, Comeig, & Mas-Tur, 2022; Urbano, Aparicio, & Audretsch, 2024).

Third, some reverse causality studies have failed to consider significant macro-structural variables that might affect the process of economic growth and entrepreneurship. Human capital development, trade openness, financial accessibility, and income inequality are important factors that influence both opportunity recognition and resource mobilization. Recent studies suggest that higher levels of human capital development can encourage opportunity-driven and innovation-led entrepreneurship, while higher trade openness can increase market size and competitive pressures that can encourage entrepreneurial entry, especially in emerging economies (Dutta & Meierrieks, 2021; Global Entrepreneurship Monitor, 2024; UNCTAD, 2023). On the other hand, income inequality may constrain the availability of resources for entrepreneurship and

the inclusiveness of entrepreneurship driven by growth, particularly in emerging economies where the labor and financial markets are segmented (Acs, Estrin, Mickiewicz, & Szerb, 2018).

Finally, a significant part of the literature that currently exists uses econometric methods which do not fully account for the important characteristics of multi-country macro-panel data, such as cross-sectional dependence, slope heterogeneity, and endogeneity. These problems are more evident in the case of BRICS countries, which are interlinked in terms of trade, capital, and global shocks. Standard panel data methods can produce biased estimates. More sophisticated approaches, such as the Cross-Sectionally Augmented ARDL approach and the Dumitrescu & Hurlin panel causality test, are not yet fully exploited in this literature, although they are well suited for modeling dynamic feedback relationships and heterogeneous adjustment processes across countries (Chudik & Pesaran, 2015; Dumitrescu & Hurlin, 2012).

Taken collectively, these gaps point to the need for a thorough re-examination of the entrepreneurship-growth relationship in BRICS economies, one that formally tests reverse causality, accounts for government assistance and macro-structural factors, and uses econometric techniques that are able to capture interdependencies across countries. It is essential that these gaps are addressed in order to advance the literature and inform policy debates on development through entrepreneurship in emerging markets.

2.4 Contribution of the study

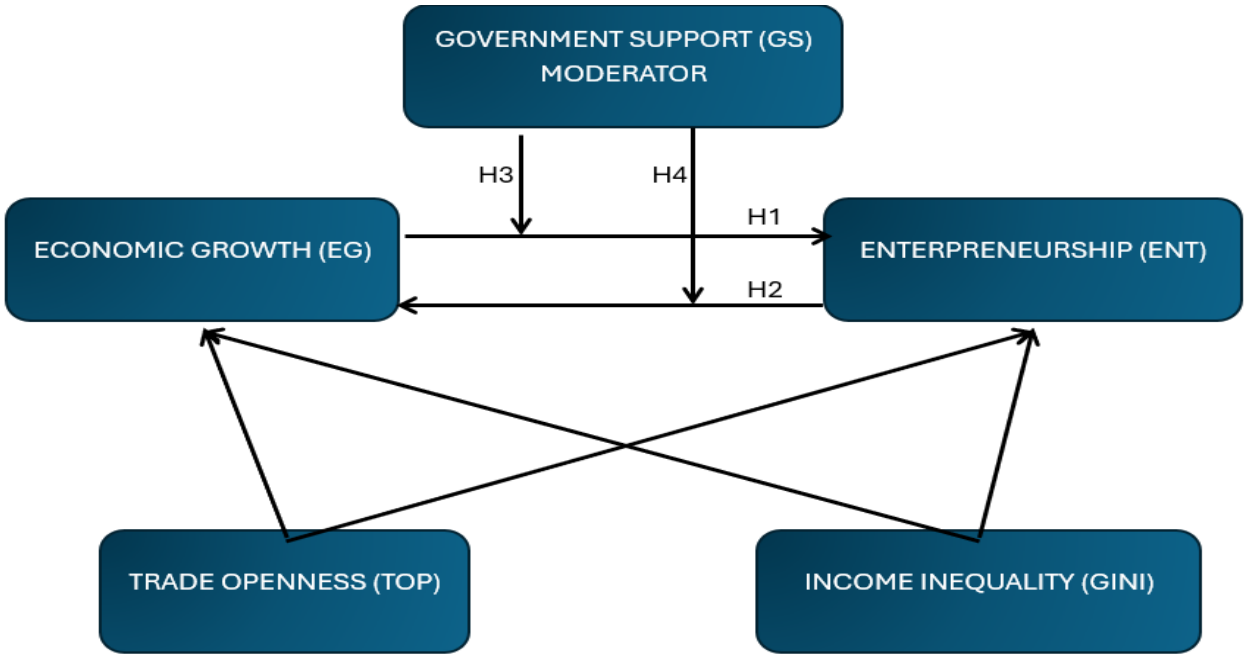
This paper contributes to the literature in three important ways. First, it re-examines the relationship between entrepreneurship and growth by formally testing reverse causality in a large emerging economy bloc, thus filling an important gap in a literature that is largely characterized by entrepreneurship-driven growth stories. Second, by analyzing the BRICS economies from 2001 to 2023, this paper provides long-run evidence at the macro level that captures structural changes and global shocks, which cannot be achieved by panel or country-level analysis. Third, this paper uses dynamic econometric methods that are able to handle heterogeneity, persistence, and cross-sectional dependence, thus improving the robustness of inference in emerging market panels. Taken together, the results of this paper shed new light on the relationship between

entrepreneurship and economic growth in large emerging economies and provide policy guidance on the effectiveness of growth-first versus entrepreneurship-first development strategies.

2.5 Conceptual framework

Figure 1

Conceptual framework



The conceptual framework of this study is grounded in the view that economic growth and entrepreneurship are dynamically interdependent processes rather than sequential or isolated phenomena. Economic growth influences entrepreneurial incentives by shaping labour market conditions, market size, and access to resources, while entrepreneurial activity affects growth through innovation, firm creation, and productivity enhancement. This bidirectional structure motivates the first two hypotheses:

H1: Economic growth is positively related with entrepreneurship.

H2: Entrepreneurship is positively related with economic growth.

The framework further recognises that the strength of these relationships is not uniform across institutional contexts. Government support capturing governance quality,

regulatory effectiveness, and institutional capacity is introduced as a moderating factor that conditions how growth translates into entrepreneurship and how entrepreneurship contributes to growth. A stronger institutional environment is expected to improve opportunity-driven entrepreneurship and the productivity effects of entrepreneurship, while a weaker institutional environment could act as a constraint on these transmission mechanisms. This results in the moderation hypotheses:

H3: Government support moderates the relationship between economic growth and entrepreneurship.

H4: Government support moderates the relationship between entrepreneurship and economic growth.

To ensure that the estimated relationships are capable of capturing the dynamic interactions and not structural confounding, trade openness and income inequality are included as control variables that affect both entrepreneurship and economic growth. Trade openness is utilized to capture the responsiveness to international markets and competitive pressures, while income inequality is utilized to capture the distributional constraints that affect the availability of entrepreneurial opportunities and economic growth. The addition of the variables enables the framework to capture the distinction between the direct and moderated relationships of growth and entrepreneurship in a macroeconomic environment. This conceptual framework therefore offers a coherent structure that integrates bidirectional causality, institutional moderation, and structural controls.

3 METHODOLOGY

3.1 Sample selection

A balanced panel of the BRICS countries, Brazil, Russia, India, China, and South Africa, was observed every year from 2001 to 2023. This period is characterized by major structural changes in the economy after the year 2000, major economic growth, and major changes in entrepreneurship and institutions. The world financial crisis of 2008 and the COVID-19 pandemic had a negative effect on business and entrepreneurship.

The data set yields 115 country-year observations before the problem of missing data is considered. Cross-sectional emphasis is shallow, but temporal emphasis allows dynamic models and relationships to be estimated through time-series variance.

There are several advantages of using panel data. The study considers the unobserved country-specific variables such as culture, geography, and institutions to examine the co-evolution of entrepreneurship and growth. The BRICS nations are highly appropriate for this study because of their high and uncertain growth rates, structural transformation, and growing global trade and finance integration.

Because of these features, the BRICS countries are ideal for testing the bidirectional causality between entrepreneurship and economic growth with respect to government assistance, trade openness, and income inequality.

The BRICS economies require the use of sophisticated econometric techniques owing to the connectivity among the economies, the feedback mechanisms, the cross-sectional dependence, and the unobserved global shocks. At different points, the study employed the baseline panel models (Pooled OLS, Fixed Effects, Random Effects) and the preferred Cross-Sectionally Augmented Autoregressive Distributed Lag (CS-ARDL) model, which was estimated using the DCCE-MG estimator

3.2 Variables and data sources

The following variables are employed to examine the relationship between economic growth and entrepreneurship in BRICS countries:

Economic growth (EG): proxied by real GDP per capita (constant 2015 US$) from the World Bank's World Development Indicators (WDI) then transformed using the natural logarithm to increase interpretability and reduce heteroscedasticity

Entrepreneurship (ENT): assessed by Total Early-stage Entrepreneurial Activity (TEA) from the Global Entrepreneurship Monitor (GEM), which includes persons involved in new company activity (≤42 months). TEA fits emerging economies since it reflects opportunity- and necessity-driven entrepreneurship, including informal dynamics.

Government Support (GS) – Moderator: a composite Government Support Index derived from the Worldwide Governance Indicators (WGI)—Government Effectiveness,

Regulatory Quality, Rule of Law, Control of Corruption, Political Stability/Absence of Violence, and Voice and Accountability aggregated using Principal Component Analysis. Higher values indicate better governance.

Income inequality (GINI): measured through the World Bank inequality dataset Gini coefficient (0-100), which reflects distributional variables that could influence entrepreneurial incentives and growth.

WDI defines Trade Openness (TOP) as (exports + imports)/GDP (%) to capture international integration and competitive/market-expansion effects.

A brief summary of the main variables is provided in Table 1.

Table 1

Description of Variables and Data Sources

Variable	Abbreviation	Measurement / Proxy	Source
Entrepreneurship	ENT	New business density; TEA (GEM) where applicable	GEM
Economic Growth	EG	GDP per capita (constant 2015 US$; log-transformed)	WDI
Government Support	GS	PCA of GE, RQ, ROL, COC, PS, VA	WDI
Trade Openness	TOP	Trade (% of GDP)	WDI
Income Inequality	GINI	Gini Index	WDI

Source: Authors' compilation from WDI, and GEM.

Taken together, these variables encompass the economic, institutional, and structural aspects that are necessary for the understanding of the entrepreneurship-growth relationship in the BRICS countries. The choice of these variables is in line with recent empirical studies on emerging economies (Aparicio et al., 2016; Guru & Yadav, 2019; Acs et al., 2020).

3.3 Econometric justification

Econometrically, panel data estimation in this research faces several econometric issues. First, both economic growth and entrepreneurship are persistent phenomena, which call for a dynamic model specification with lagged dependent variables. Second, the BRICS countries exhibit considerable variation in institutional quality, financial system development, and structural differences, which indicate slope heterogeneity across countries. Third, high integration in trade, capital, and shared shocks (such as commodity price shocks, financial crises, and pandemics) induces cross-sectional

dependence in the error term. Fourth, simultaneity and omitted variable bias introduce endogeneity, especially in light of the bidirectional (or reverse causality) relationship between entrepreneurship and economic growth. Finally, common factors may influence all countries simultaneously, which can distort standard estimators if not properly accounted for.

However, the standard panel estimation techniques, such as pooled OLS, fixed effects, and random effects, are not suited to these characteristics. The pooled OLS method does not account for heterogeneity and dynamics, while the FE/RE models usually employ restrictive assumptions that fail to properly deal with cross-sectional dependence and global unobserved shocks.

To overcome these issues, the paper uses a "cross-sectionally augmented ARDL (CS-ARDL)" model framework, which is estimated with the "Dynamic Common Correlated Effects Mean Group (DCCE-MG)" estimator (Chudik & Pesaran, 2015). The CS-ARDL model framework augments the ARDL model with cross-section averages to represent unobserved common factors, takes into account cross-section dependence, and also allows for heterogeneous slopes and intercepts.

3.4 Empirical strategy and baseline models

The empirical analysis is conducted in several steps. First, the baseline panel estimators OLS, fixed effects (FE), and random effects (RE) are used to provide initial insights into the direction and magnitude of the relationships between entrepreneurship and economic growth. These models are used as benchmarks to show the shortcomings of conventional estimators in the presence of dynamics, heterogeneity, and cross-sectional dependence.

The pooled OLS model ignores country-specific effects, while FE and RE models allow for time-invariant heterogeneity under different assumptions about the correlation between heterogeneity and the regressors. A Hausman specification test is employed to compare FE and RE estimates. The test results, combined with the fact that FE and RE coefficients are very similar and there is evidence of cross-sectional dependence, imply that neither of the estimators is fully suitable for final analysis, and more advanced dynamic methods are required.

3.5 Cross-sectional dependence and model choice

In view of the high level of economic and financial integration among the BRICS countries, cross-sectional dependence (CSD) is formally tested using Pesaran-type CD tests. The existence of common shocks and spillovers further supports the need for estimators that account for global unobserved factors. These arguments form the rationale for using a cross-sectionally augmented modelling approach.

3.6 CS-ARDL and DCCE-MG estimation

The main analysis employs the Cross-Sectionally Augmented Autoregressive Distributed Lag (CS-ARDL) model estimated via the Dynamic Common Correlated Effects Mean Group (DCCE-MG) estimator. This approach augments the ARDL specification with cross-sectional averages to proxy unobserved common factors, allows for heterogeneous slope coefficients across countries, and captures short-run dynamics while permitting long-run inference.

Formally, the dependent variable (economic growth or entrepreneurship) is modelled as a function of its own lags, lagged explanatory variables, and cross-sectional averages. Country-specific coefficients are first estimated and then averaged to obtain mean group estimates.

The general CS-ARDL model can be written as:

$$y_{it} = \alpha_i + \sum_{j=1}^{p} \phi_{ij} y_{i,t-j} + \sum_{k=0}^{q} \beta_{ik} x_{i,t-k} + \theta_i \bar{z}_t + \epsilon_{it} \qquad (1)$$

y_{it} is the dependent variable (EG or ENT)

- $x_{i,t-k}$ is a vector of lagged explanatory variables,
- $\bar{z}_t$ are cross-sectional averages of the dependent and key independent variables, included to approximate unobserved common factors, and
- parameters ϕ_{ij}, β_{ik}, and θ_i are allowed to differ across countries.

The DCCE-MG estimator:

- accounts for cross-sectional dependence via cross-sectional averages,
- allows for heterogeneous slope coefficients across countries, and
- estimates mean group coefficients by averaging country-specific estimates.

3.7 Reverse causality and moderation

To capture the bidirectional relationship between entrepreneurship and economic growth, two dynamic CS-ARDL specifications are estimated. In the first, economic growth is modelled as a function of lagged entrepreneurship, government support, trade openness, and income inequality. In the second, entrepreneurship is modelled as a function of lagged economic growth, with government support included as a moderating variable through interaction terms.

Together, these specifications allow the analysis to identify short-run feedback effects, dynamic adjustments, and the conditional role of government support in shaping the entrepreneurship–growth nexus.

Model A: Economic Growth Equation

$$EG_{it} = \alpha_i + \sum_{j=1}^{2} \phi_{ij}^{(EG)} EG_{i,t-j} + \sum_{k=0}^{2} \beta_{ik}^{(ENT)} ENT_{i,t-k} + \gamma_i GS_{it} + \delta_i TOP_{it} + \eta_i GINI_{it} + u_{it} \quad (2)$$

This model examines how current and lagged entrepreneurship, government support, trade openness, and income inequality affect economic growth, while controlling for growth persistence.

Model B: Entrepreneurship Equation

$$ENT_{it} = \alpha_i + \sum_{j=1}^{2} \phi_{ij}^{(ENT)} ENT_{i,t-j} + \sum_{k=0}^{2} \beta_{ik}^{(EG)} EG_{i,t-k} + \rho_i (EG \times GS)_{it} + \delta_i TOP_{it} + \eta_i GINI_{it} + u_{it} \quad (3)$$

This specification assesses how current and lagged economic growth, together with government support and its interaction with growth, trade openness, and inequality,

shape entrepreneurial activity. It specifically incorporates the moderating effect of government support through the interaction term $(EG \times GS)_{it}$.

Together, Models A and B capture:

- ❖ short-run causality in both directions,
- ❖ dynamic adjustments in EG and ENT,
- ❖ the moderating role of government support, and
- ❖ the influence of structural controls (TOP and GINI).

3.8 Diagnostics and robustness

Post-estimation diagnostics are conducted to assess model adequacy. Residual-based CD tests show that cross-sectional dependence is properly addressed by the CCE augmentation. Further tests for serial correlation and heteroskedasticity reveal no issues that could render invalid inference, as the DCCE-MG estimator uses robust standard errors. Other lag specifications are investigated to stabilize coefficients.

Where possible, robustness is then tested further using different metrics and sensitivity analysis, for example, by excluding countries.

4 RESULTS AND DISCUSSION

4.1 Descriptive statistics

The descriptive statistics of all the variables employed in the empirical analysis for the BRICS countries over the period 2001-2023 are presented in Table 2. The table is intended to illustrate the reverse causality approach employed in this study, whereby the positions of the dependent and independent variables are swapped alternatively between economic growth (EG) and entrepreneurship (ENT) in Model A and Model B.

The economic growth variable has a low dispersion of values with a mean of 10.92 and a standard deviation of 5.01. This means that the economic growth of BRICS countries has been stable over the years. On the other hand, entrepreneurship has a high degree of variability, with a mean of 8.53 and a standard deviation of 0.75. This indicates

that there is a high degree of heterogeneity in the level of entrepreneurship across countries and years.

The government support measure has a mean close to zero with a large degree of dispersion, which again emphasizes the heterogeneity in the quality of governance and the effectiveness of policies in the BRICS nations. The trade openness and income inequality variables also have large ranges, which again emphasizes the structural differences in the external integration and income distribution structures of the nations.

Table 2

Descriptive Statistics of Variables (BRICS Countries)

Variable	Model A	Model B	Obs	Mean	Std. Dev.	Min	Max
Economic Growth (EG)	Dependent	Independent	115	10.922	5.012	2.470	24.010
Entrepreneurship (ENT)	Independent	Dependent	115	8.528	0.746	6.657	9.407
Government Support (GS)	Moderator	Moderator	115	0.016	1.011	−2.841	2.751
Trade Openness (TOP)	Control	Control	115	44.599	11.452	22.106	65.975
Income Inequality (GINI)	Control	Control	115	44.748	9.442	32.800	64.800

Notes: *EG stands for economic growth, ENT stands for entrepreneurship, GS represents government support, TOP measures trade openness, and GINI captures income inequality.*

4.2 Correlation analysis

The pairwise correlation matrix for the core variables is reported in Table 3. The contemporaneous correlation between economic growth and entrepreneurship is weak and negative (-0.049), indicating that static linear relationships are not an appropriate way of modelling the relationship between these two variables. This result further supports the motivation for using a dynamic modelling approach.

The correlation between government support and economic growth is weakly positive, and the correlation between government support and entrepreneurship is weakly negative, indicating that the effect of government support may not be direct but rather dependent on the context. Trade openness has a moderate negative correlation with entrepreneurship, which may be due to the competitive pressures exerted by international markets that limit entry in the BRICS economies. Income inequality is positively correlated with economic growth and government support.

Notably, none of the correlations are above the conventional threshold levels that could indicate multicollinearity, and thus multicollinearity is not likely to affect the multivariate estimates. The low correlation values also support the application of a CS-ARDL approach.

Table 3

Pairwise Correlation Matrix

Variables	EG	ENT	GS	TOP	GINI
EG	1.000				
ENT	−0.049	1.000			
GS	−0.052	0.097	1.000		
TOP	−0.467	−0.120	0.051	1.000	
GINI	0.129	0.481	0.467	−0.061	1.000

Notes: EG and ENT serve alternately as dependent and independent variables in Models A and B. Observations = 115

4.3 Baseline panel estimations

Tables 4 and 5 present the baseline pooled OLS, fixed effects (FE), and random effects (RE) estimates for economic growth and entrepreneurship, respectively.

When economic growth is treated as the dependent variable (Table 4), entrepreneurship enters negatively and significantly under OLS and RE, but becomes statistically insignificant under FE. This implies that the negative relationship is mainly accounted for by cross-country differences rather than within-country relationships. Government support and income inequality are significant in the pooled models but less so in FE.

In the reverse specification with entrepreneurship as the dependent variable (Table 5), economic growth is negative and significant in OLS and RE, but insignificant in FE. Trade openness and government support have sign reversals across the estimators, which again emphasizes the instability of static panel estimates. The low values of within-R^2 in the FE models indicate that the models lack explanatory power after accounting for country-specific effects.

Overall, the baseline results provide some useful key preliminary findings but clearly demonstrate the limitations of static estimators in capturing the complex, dynamic,

and possibly bi-directional relationship between entrepreneurship and economic growth in BRICS economies.

Table 4

Baseline Models: Dependent Variable = Economic Growth (EG)

Variable	Model 1 OLS	Model 2 FE	Model 3 RE
ENT	-0.032*** (0.011)	-0.012 (0.008)	-0.032** (0.014)
GS	-0.131** (0.054)	-0.148*** (0.414)	-0.131* (0.067)
TOP	-0.011** (0.005)	0.010** (0.004)	-0.011* (0.006)
GINI	0.046*** (0.007)	-0.004 (0.005)	0.046** (0.007)
Constant	7.337*** (0.518)	9.296** (0.260)	7.337** (0.475)
Observation	115.000	115.000	115.000
R-squared	0.294	0.0079	0.2941

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5

Baseline Models: Dependent Variable = Entrepreneurship (ENT)

Variable	Model 1 OLS	Model 2 FE	Model 3 RE
EG	-1.492*** (0.418)	-1.508 (1.098)	-1.492** (0.634)
GS	-0.658* (0.389)	-0.986* (0.519)	-0.658 (0.464)
TOP	-0.206*** (0.037)	0.085* (0.046)	-0.206*** (0.036)
GINI	0.143*** (0.043)	-0.054 (0.059)	0.143** (0.056)
Constant	26.446*** (3.981)	22.432** (10.495)	26.446*** (5.184)
Observation	115.000	115.000	115.000
R-squared	0.272	0.079	

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.4 CS-ARDL (DCCE-MG) results

4.4.1 Economic growth equation

Table 6 reports the CS-ARDL estimates with economic growth as the dependent variable. The first lag of economic growth is positive and highly significant, confirming strong growth persistence and path dependence in BRICS economies.

Entrepreneurship does not exert a statistically significant positive effect on growth. The contemporaneous effect is insignificant, and the first lag enters weakly negative, indicating that necessity-driven or low-productivity entrepreneurship does not spur growth. The government support and trade openness variables are statistically insignificant, while the income inequality variable enters with a weak negative lag effect, indicating that income inequality hurts growth in the medium term.

In general, the above results indicate that the economic development of BRICS is mainly self-reinforcing, and there is no significant contribution from entrepreneurship in the short run.

Table 6

CS-ARDL (DCCE-MG) Results: Economic Growth (EG) as Dependent Variable

Independent Variable	Coefficient	t-statistics	p-value
L.EG	0.752***	3.55	0.000
(0.212)			
L2.EG	0.129	0.60	0.547
(0.215)			
ENT	0.0018	0.67	0.503
(0.0028)			
L.ENT	−0.0022*	−1.85	0.064
(0.0012)			
L2.ENT	0.0004	0.16	0.870
(0.0022)			
GS	0.0144	1.24	0.216
(0.0117)			
L.GS	−0.0080	-0.46	0.648
(0.0174)			
L2.GS	0.0188	0.64	0.524
(0.0296)			
TOP	0.0022	1.19	0.234
(0.0018)			
L.TOP −	0.0043	-1.54	0.123
(0.0028)			
L2.TOP	0.0004	0.3	0.719

(0.0012)			
GINI	0.0046	1.31	0.819
(0.0035)			
L.GINI	−0.0025**	-2.30	0.021
(0.0011)			
L2.GINI	−0.0076	-1.17	0.244
(0.0065)			

4.4.2 Entrepreneurship equation

Table 7 reports the CS-ARDL results with entrepreneurship as the dependent variable. The lagged entrepreneurship variable is negative and highly significant, suggesting that there is strong mean reversion and volatility in entrepreneurial activity.

Economic growth has a time-dependent effect. On the one hand, the effect of contemporaneous economic growth is insignificant, but the first lag of economic growth has a negative effect on entrepreneurship, which is consistent with an employment pull effect that offsets necessity-driven entrepreneurship. The second lag of economic growth is positive and weakly significant.

Government support and its interaction with economic growth are statistically insignificant for all lag structures, which implies that government support mechanisms do not uniformly condition the growth-entrepreneurship relationship at the aggregate BRICS level.

Table 7

CS-ARDL (DCCE-MG) Results: Entrepreneurship (ENT) as Dependent Variable

Independent Variable	**Coefficient**	t**-statistic**	**p-value**
L.ENT	−0.6659***	−4.34	0.000
	(0.1534)		
L2.ENT	−0.1249	−0.63	0.526
	(0.1972)		
EG	0.7131	0.03	0.979
	(27.3148)		
L.EG	−33.6891**	−2.37	0.018
	(14.1925)		
L2.EG	32.4828*	1.65	0.099
	(19.7041)		
GS	122.1564	1.10	0.272
	(111.2786)		
L.GS	−161.4632	−1.18	0.239
	(136.9955)		
L2.GS	−10.9544	−0.11	0.912
	(98.8027)		

GS×EG (gs_eg)	−13.0503 (12.7452)	−1.02	0.306
L.GS×EG	19.4559 (15.6748)	1.24	0.215
L2.GS×EG	1.3701 (11.2743)	0.12	0.903
TOP	0.0288 (0.2314)	0.12	0.901
L.TOP	−0.0017 (0.2350)	−0.01	0.994
L2.TOP	−0.0964 (0.1530)	−0.63	0.529
GINI	−0.3301 (0.2956)	−1.12	0.264
L.GINI	0.4495 (0.3610)	1.25	0.213
L2.GINI	0.5513 (0.4877)	1.13	0.258

4.4.3 Model diagnostics and overall fit

The results of model diagnostics confirm the appropriateness of the CS-ARDL model specification as estimated by DCCE-MG. The estimator is appropriate for the small-N, large-T panel of BRICS countries and is able to capture cross-sectional dependence and heterogeneity. The average R-squared value is remarkably high, and the low Root Mean Squared Error value also confirms the high predictive ability of the model. The joint significance of the regressors, as indicated by the highly significant F-statistic, also confirms the validity of the model. Although the Pesaran CD test confirms the mild cross-sectional dependence of residuals, this is also expected due to the economic integration of the BRICS nations.

Table 8

Diagnostic table

Overall Model Evaluation and Goodness-of-Fit Diagnostics (CS-ARDL via DCCE-MG)

Criterion	Reported Value	Benchmark / Interpretation	Model Assessment
Estimator	CS-ARDL via DCCE-MG	Appropriate for dynamic panels with CSD and heterogeneity	**Excellent choice**
Countries (N)	5 (BRICS)	Small N, heterogeneous economies	**Appropriate for MG estimator**
Time Period (T)	2001–2023 (T = 23)	Long T required for CS-ARDL	**Excellent**
Observations	105	Adequate for dynamic MG estimation	**Sufficient**
Mean Group R^2	**0.99**	Values > 0.50 indicate strong explanatory power	**Excellent fit**

Root MSE	**0.02**	Lower RMSE indicates better predictive accuracy	**Excellent precision**
F-Statistic	**149.51 (p < 0.01)**	Joint significance of regressors	**Highly significant**
Pesaran CD Statistic	**2.23 (p = 0.026)**	Tests residual cross-sectional dependence	**Mild residual CSD**

4.5 Moderating role of government support in the growth–entrepreneurship nexus

Figure 1 presents the moderation plot derived from the CS-ARDL (DCCE-MG) estimates in which entrepreneurship is the dependent variable, illustrating predicted entrepreneurial activity across levels of economic growth under low, mean, and high government support. The three trajectories are largely parallel and closely aligned, indicating that variations in government support do not materially alter the marginal effect of economic growth on entrepreneurship at the aggregate BRICS level. This visual evidence is consistent with the regression results, where the interaction term between economic growth and government support (EG × GS), together with its dynamic lags, remains statistically insignificant across specifications. The figure therefore suggests that government support affects the level of entrepreneurship only marginally, without strengthening the responsiveness of entrepreneurial activity to changes in economic growth.

The absence of slope divergence in Figure 1 implies that institutional support does not condition the growth–entrepreneurship relationship in a systematic way across BRICS economies. Although higher government support is associated with slightly higher predicted levels of entrepreneurship, it does not modify how entrepreneurship reacts to economic growth. This outcome points to limitations in the effectiveness of public support mechanisms, reflecting well-documented challenges in emerging economies such as weak institutional capacity, fragmented policy implementation, and limited alignment between public programmes and entrepreneurial needs (Acs et al., 2014; Pradhan et al., 2020).

Dynamic estimates further reveal that the effect of economic growth on entrepreneurship is nonlinear and time-dependent. Contemporaneous growth does not exert a positive influence on entrepreneurial activity and is weakly negative in the short run. This is consistent with the employment substitution mechanism, where the initial stages of economic growth provide job opportunities that offset the incentives for

necessity entrepreneurship. As the conditions in the labor market improve, people leave low-productivity entrepreneurship and move to employment, thereby offsetting entrepreneurial entry in the short run.

However, the lagged effects suggest a reversal. The economic growth will ultimately have a positive effect on entrepreneurship, implying that economic growth makes a positive contribution to market size, financial access, and opportunity recognition, hence promoting opportunity-driven entrepreneurship. The pattern of effects suggests that economic growth affects entrepreneurship after a certain lag period, thus offering partial support for the hypothesis that economic growth stimulates entrepreneurship.

Figure 2 adds to this evidence by showing country-specific patterns of economic growth, entrepreneurship, and government support. The figure shows that there is significant variation in the BRICS economies that is not apparent in the pooled results. In the Indian and Chinese cases, the non-supporting periods are characterized by a negative correlation between growth and entrepreneurship, which is driven by the prevalence of wage employment in the early stages of growth. With higher government support, the correlation becomes positive, indicating that better institutions and quality of regulation improve opportunity entrepreneurship that is driven by growth. The Brazilian experience offers a mirror reflection, where growth is accompanied by a higher level of entrepreneurship despite lower levels of government support, which is in line with necessity entrepreneurship, while improved governance is linked to more differentiated entrepreneurship and lower informality. In Russia, there is no link between entrepreneurship and growth irrespective of the level of governance, which is because of rigidities and market concentration. In South Africa, there is a weak positive link between growth and entrepreneurship despite higher levels of government support, although this link is still weakened by rigidities and inequality in the labor market.

Collectively, Figures 2 and 3 illustrate that entrepreneurship in BRICS economies is a function of economic growth in a lagged and conditional manner. Economic growth affects entrepreneurship in an adjustment process rather than an immediate relationship, and government support does not appear as a statistically significant moderator in the aggregate analysis, but rather conditional on countries and the stage of development of the entrepreneurial ecosystem.

Figure 2

Moderating effect of government support on the economic growth–entrepreneurship relationship in BRICS countries.

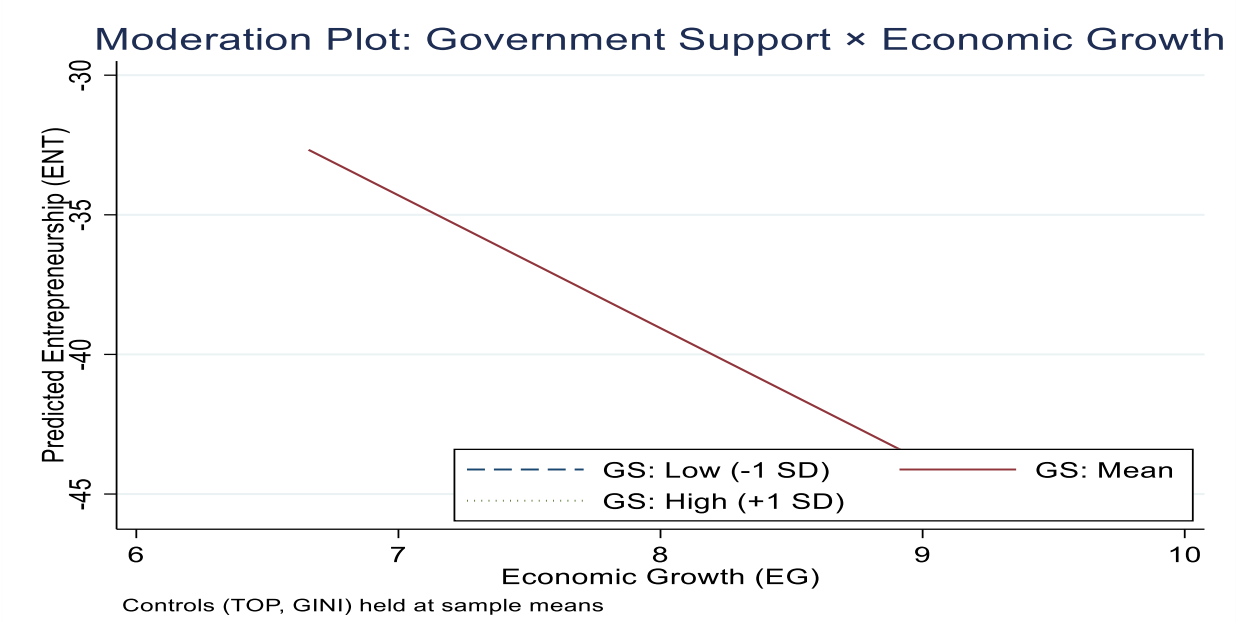


Figure 3

Country-specific trends in economic growth (EG), entrepreneurship (ENT), and government support (GS) in BRICS economies, 2001–2023.

The estimated models allow direct assessment of the study's hypotheses while accounting for dynamic persistence, cross-sectional dependence, and slope heterogeneity across BRICS economies.

With respect to the effect of economic growth on entrepreneurship, the CS-ARDL estimates indicate no statistically significant contemporaneous impact. However, the lagged coefficients reveal a negative effect in the short run and a positive effect in the longer run. This implies that economic growth has a lagged effect on entrepreneurship, as opposed to an immediate effect. Hence, the hypothesis that economic growth has a positive effect on entrepreneurship is partially confirmed.

Moving on to the other relationship, entrepreneurship does not have a statistically significant positive impact on economic growth in either the base or CS-ARDL models. After accounting for the persistence of economic growth and common shocks, the

coefficients are still weak and statistically insignificant. The hypothesis that entrepreneurship has a positive impact on economic growth is thus not supported by the empirical findings.

The moderating effect of government support is tested using interaction terms that represent the combination of economic growth and government support. In all the model specifications, the interaction terms are statistically insignificant. This implies that government support does not have a moderating effect on the relationship between economic growth and entrepreneurship, as well as the reverse relationship between entrepreneurship and economic growth. Therefore, the hypotheses on the moderating effect of government support are rejected.

Overall, the hypothesis evaluation reveals an asymmetric structure in the entrepreneurship–growth nexus within BRICS economies, with evidence supporting a dynamic influence of economic growth on entrepreneurship, but not the reverse, and no systematic moderation by government support.

Meanwhile, the findings of this study are in line with the rising trend in the literature that questions the universality of the role of entrepreneurship as a direct contributor to economic growth in emerging economies. There is a rising macro-level of evidence that suggests that if necessity entrepreneurship or low-productivity entrepreneurship is true, then the role of entrepreneurship in economic growth is weak or non-existent (Urbano, Aparicio, & Audretsch, 2019; Estrin, Korosteleva, & Mickiewicz, 2022). This supports the view that it is the quality of entrepreneurship and not the quantity that matters most to economic development, especially when it is driven by opportunity and innovation (Ács, Szerb, & Lloyd, 2018; Global Entrepreneurship Monitor, 2023).

On the other hand, evidence clearly supports reverse causality, whereby economic growth serves as a motivation for entrepreneurship. This is supported by recent literature that has found opportunities for entrepreneurship to thrive in emerging markets where higher levels of income, infrastructure, market size, and finance have been established as favorable conditions for opportunity-based entrepreneurship (Dutta & Meierrieks, 2021; Nguyen & Phan, 2024). In this regard, entrepreneurship is seen to be reacting to economic growth, as opposed to economic growth being driven by entrepreneurship.

Finally, the limited role of government support that has been found in this study is consistent with the evidence that public policy interventions have been found to

positively influence entrepreneurship only when they are located in a credible institutional framework and efficient financial systems. Until the quality of governance and the ability to implement policies is in question, government support will not lead to the development of entrepreneurial dynamism (Estrin et al., 2022; OECD, 2022). In any case, the results have confirmed that the growth-entrepreneurship relationship in the BRICS economies is context-dependent, nonlinear, and development-contingent.

5 CONCLUSION

This study examined the two-way relationship between entrepreneurship and economic growth in the BRICS nations during the period 2001-2023 using the CS-ARDL approach and the DCCE-MG approach to account for cross-sectional dependence, heterogeneity, and dynamic adjustment. This study moves beyond the conventional static panel data approach to provide a more plausible assessment of the relationship between entrepreneurship and economic growth in large emerging economies that are prone to structural change, institutional heterogeneity, and global shocks.

Three significant findings can be made. Firstly, entrepreneurship does not produce a statistically significant positive effect on economic growth in the short run. This finding goes against the classical Schumpeterian theory that a positive relationship between entrepreneurship and economic growth always exists. This finding indicates that the relationship between entrepreneurship and economic growth in the BRICS countries is still driven by necessity entrepreneurship and low-productivity entrepreneurship, which does not contribute much to economic growth.

Second, the evidence strongly supports reverse and nonlinear causality from economic growth to entrepreneurship. Economic growth first negatively affects entrepreneurship through an employment pull effect, as the expansion of the formal labor market decreases the incentives for self-employment. Later on, economic growth positively affects entrepreneurship by increasing the size of the market, improving the financial environment, enhancing infrastructure, and boosting innovation capabilities. This clearly reveals that entrepreneurship in emerging economies is endogenous to macroeconomic conditions and is not an exogenous source of economic growth.

Third, the government support does not have a direct or conditioning effect on the relationship between growth and entrepreneurship at the macro level. Although the BRICS governments have designed and implemented a wide range of initiatives related to entrepreneurship and SMEs, the results show that these have not yet resulted in any macro-level outcomes in terms of the effect of government support on entrepreneurship. Cumulatively, the findings indicate that there is a significant asymmetry between the BRICS countries, whereby economic growth stimulates entrepreneurship, but entrepreneurship is not yet a significant factor in economic growth. The asymmetry can be utilized to explain the conflicting findings in the existing literature, and it also underscores the importance of entrepreneurial quality, development stages, and dynamics. Theoretical contribution to the literature is achieved by indicating that the relationship between entrepreneurship and economic growth in emerging economies is not universal and static. From a policy perspective, the findings indicate that entrepreneurship development should not be viewed as a standalone growth tool. The increase in the number of entrepreneurs without improving the productivity, scalability, and innovation drivers of entrepreneurship is not likely to contribute to growth outcomes. Instead, policies should aim at the development of entrepreneurship from a necessity-driven survival function to an opportunity-driven and innovation-driven function through inclusive financial systems, institutions, and human capital development. In the BRICS countries, economic growth remains a prerequisite for the development of entrepreneurial ecosystems.

6 POLICY RECOMMENDATIONS

The results of this study indicate that the policy of entrepreneurship in the emerging economies needs to modify its focus from enhancing the level of participation in entrepreneurship to enhancing the quality and productivity of entrepreneurial endeavors. The lack of direct short-run effects of entrepreneurship on economic growth in the BRICS economies indicates that self-employment and necessity entrepreneurship are not adequate for macroeconomic performance.

The findings also emphasize the significance of sequencing and timing in policies. Economic growth is an early discouraging factor for entrepreneurial entry and acts as a

stimulator for opportunity-driven entrepreneurship at a later stage. This emphasizes the significance of having a long-term vision in policies and not judging the performance of entrepreneurship policies in the short term. Entrepreneurship policy needs to be sequenced in terms of overall stages of economic growth and not in terms of economic growth in the short term.

The limited role of government support that has been observed in the analysis indicates that there are issues of effectiveness and not the presence of policies. Institutional reforms and policies of support are not always relevant in shaping entrepreneurship. It is important to simplify the processes, minimize the administrative costs, and improve the delivery of financial instruments for SMEs.

Finally, the fact that there is a certain degree of heterogeneity among the BRICS economies indicates that a homogeneous approach to entrepreneurship policies may not be appropriate. This is because the differences in financial systems, labor markets, and institutional development of the different countries may be obscured by a homogeneous approach to entrepreneurship policies. The findings of this study confirm that entrepreneurship in emerging economies is still largely dependent on macroeconomic performance and institutional development.

7 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The aim of this study is to provide macro-level results on the relationship between entrepreneurship and economic growth in the BRICS nations. In this regard, the variable of entrepreneurship is measured by aggregate indicators that are very appropriate for cross-country and long-term analysis. Although this method allows the identification of systemic patterns, future studies could refine the growth-entrepreneurship mechanism by using firm-level or survey data to distinguish between necessity-driven and opportunity-driven entrepreneurship.

By the same token, public support is measured at the institutional level to capture the overall governance context in which entrepreneurship and growth are embedded. Future research could extend this approach by focusing on the role of particular policy tools, such as credit guarantees, innovation subsidies, or start-up tax breaks, to shed more light on micro-level transmission channels. Finally, although the CS-ARDL approach

allows for the modeling of short- and medium-term dynamics in the presence of cross-sectional dependence, further research could benefit from the use of nonlinear or structural models to analyze long-term regime changes. These approaches would reinforce, rather than challenge, the key findings of this research.

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DATA AVAILABILITY STATEMENT

The data used in this study are compiled from publicly available secondary sources. Due to data aggregation, and harmonization procedures, the datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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AUTHOR CONTRIBUTIONS

Lamin Dampha (First Author) carried out data collection from secondary sources, data analysis, and manuscript preparation.

Talat Afza (Second Author) helped with conceptualization and study design and supervised the work during the research process.

Muhammad Akram Naseem (Third Author) helped in statistical analysis and drafted the methodology part of the manuscript.

REFERENCES

Acs, Z. J., Autio, E., & Szerb, L. (2014). National systems of entrepreneurship: Measurement issues and policy implications. *Research policy*, *43*(3), 476-494.

Ács, Z. J., Szerb, L., Lafuente, E., & Lloyd, A. (2018). The entrepreneurial ecosystem. In *Global entrepreneurship and development index 2018* (pp. 1-9). Cham: Springer International Publishing.

Acs, Z. J., & Szerb, L. (2007). Entrepreneurship, economic growth and public policy. *Small business economics*, *28*(2), 109-122.

Acs, Z. J., Szerb, L., Song, A., Komlosi, E., & Lafuente, E. (2020). The digital platform economy index 2020. *Barcelona: The Global Entrepreneurship and Development Institute*.

Aparicio, S., Urbano, D., & Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship and economic growth: Panel data evidence. *Technological forecasting and social change*, *102*, 45-61.

Audretsch, D. B., Aparicio, S., Hughes, M., & Urbano, D. (2024). Linking entrepreneurship and society: solutions for today and tomorrow. *International Journal of Entrepreneurial Behavior & Research*.

Cakiroglu, K. I., Yildirim, K., Haciimamoglu, T., & Erkan, C. (2025). From Entrepreneurship to Sustainable Futures: Investigating the Nexus Between New Business Density, Economic Growth, and Carbon Emissions. *Sustainability*, *17*(12), 5615.

Chudik, A., & Pesaran, M. H. (2015). Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors. *Journal of econometrics*, *188*(2), 393-420.

Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic modelling*, *29*(4), 1450-1460.

Dutta, N., & Meierrieks, D. (2021). Financial development and entrepreneurship. *International Review of Economics & Finance*, *73*, 114-126.

Estrin, S., Korosteleva, J., & Mickiewicz, T. (2022). Schumpeterian entry: Innovation, exporting, and growth aspirations of entrepreneurs. *Entrepreneurship Theory and Practice*, *46*(2), 269-296.

Global Entrepreneurship Monitor (GEM). (2024). Global Entrepreneurship Monitor 2023/2024 Global Report: 25 Years and Growing. Global Entrepreneurship Research Association.

Guru, B. K., & Yadav, I. S. (2019). Financial development and economic growth: panel evidence from BRICS. Journal of Economics, Finance and Administrative Science, 24(47), 113-126.

Jin, Z. (2025). Unleashing local growth: The role of regional innovation and entrepreneurship in China. *Journal of Accounting, Business and Finance Research*, *20*(1), 1-15.

Mai, T. L., Tran, V. T., Phan, T. T., Nguyen, K. N., & Nguyen, Q. T. T. (2025). Impact of macro factors on country-level entrepreneurship: evidence from an empirical panel data study. *Humanities and Social Sciences Communications*, *12*(1), 1-16.

Nguyen, T. T., & Phan, H. T. T. (2024). Entrepreneurship environments and entrepreneurial intention-the role of self efficacy and role model. *International Journal of Engineering Business Management*, *16*, 18479790241275925.

OECD. (2022). *OECD Economic Outlook, Volume 2022 Issue 2: Confronting the Crisis*. OECD Publishing. https://doi.org/10.1787/f6da2159-en

Pradhan, R. P., Arvin, M. B., Nair, M., & Bennett, S. E. (2020). Sustainable economic growth in the European Union: The role of ICT, venture capital, and innovation. *Review of Financial Economics*, *38*(1), 34-62.

Rashid, M., Anser, M. K., Shah, S. T. H., Nabi, A. A., Ahmad, I., & Zaman, K. (2025). Fostering entrepreneurship: analyzing the influence of access to finance, innovation investment, educational attainment, infrastructure development, and regulatory environment. *Future Business Journal*, *11*(1), 140.

Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy*, *98*(5, Part 2), S71-S102.

Schumpeter, J. A. (1934). *The Theory of Economic Development... by Joseph A. Schumpeter, Translated from the German by Redvers Opie...* Harvard University Press.

Sendra-Pons, P., Mas-Tur, A., & Garzon, D. (2024). Anchor investors and equity crowdfunding for entrepreneurs. *European journal of management and business economics*, *33*(1), 20-36.

Sharma, A., Das, N., Singh, S. P., & Vishwakarma, A. K. (2024). Association Between Entrepreneurship Ecosystem and Entrepreneurial Behavior & Attitudes. *Journal of Global Information Management (JGIM)*, *32*(1), 1-26.

Tahir, M., & Burki, U. (2023). Entrepreneurship and economic growth: Evidence from the emerging BRICS economies. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(2), 100088.

Urbano, D., Aparicio, S., & Audretsch, D. (2019). Twenty-five years of research on institutions, entrepreneurship, and economic growth: what has been learned? *Small business economics*, *53*(1), 21-49.

United Nations Conference on Trade and Development (UNCTAD). (2023). World Investment Report 2023: Investing in Sustainable Development Goals: A Framework for Action. United Nations. https://unctad.org/publication/world-investment-report-2023

World Bank. (2022). World development report 2022: finance for an equitable recovery. World Bank Publications.

Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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