



ENTREPRENEURSHIP, EDUCATION AND CREDIT: A GENERAL EQUILIBRIUM APPROACH

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Abstract: *This study explores the interconnected dynamics of entrepreneurship, education and credit within the framework of general equilibrium. Entrepreneurship plays a pivotal role in economic development and access to credit is crucial for fostering innovation and sustainable growth through a general equilibrium model, we analyze how investments in education impact entrepreneurial activities and access to credit, considering the feedback effects on overall economic equilibrium. The study delves into the nuanced interactions between educational policies entrepreneurial behavior, and credit market dynamics, providing insights into the broader implications for economic stability and prosperity. The findings contribute to the understanding of the complex relationships among entrepreneur, education, and credit within the context of a comprehensive general equilibrium framework.*

Keywords: *Entrepreneurship, Education, Credit, General Equilibrium.*

INTRODUCTION

The dynamics of entrepreneurship, education, and credit play pivotal roles in fostering economic growth, innovation, and social development within modern economies. Understanding the intricate relationships among these factors is essential in comprehending the mechanisms that drive sustainable economic progress (Wagner, 2017).

Entrepreneurship, as the engine of economic development, is characterized by the initiation and implementation of innovative ideas, which propel markets forward. Entrepreneurs introduce new products, services, and business models, driving job creation and economic expansion. Their ventures are not only instrumental in wealth creation but also in fostering dynamism within economies. However, the success and sustainability of entrepreneurial endeavors are often contingent on various factors, among which access to credit and a strong educational foundation play crucial roles.

Education acts as the bedrock for fostering an entrepreneurial culture. Beyond providing foundational knowledge, education instills critical thinking, problem-solving skills, and the ability to adapt to an ever-evolving economic landscape. Moreover, it empowers individuals to harness their creative potential, facilitating the birth of novel ideas and the execution of entrepreneurial initiatives. Higher levels of education have been correlated with increased entrepreneurial activity, demonstrating the symbiotic relationship between education and entrepreneurship.

Access to credit is fundamental for aspiring entrepreneurs to actualize their innovative ideas. Entrepreneurs often require financial support to kick start or scale their ventures. A robust credit system ensures that viable entrepreneurial concepts receive the necessary financial backing, thereby contributing to economic growth. Credit accessibility not only facilitates entrepreneurial ventures but also influences the overall economic dynamism and productivity.

This study aims to explore and analyze the interdependencies between entrepreneurship, education, and credit, emphasizing their collective influence on economic growth within a general equilibrium framework. By scrutinizing their relationships and influences, this research seeks to provide insights and implications for policymakers, practitioners, and stakeholders, aiming to foster an environment conducive to sustained economic growth and prosperity.

Statement of the Problem

The intricate relationship between entrepreneurship, education, and credit poses a compelling challenge in the realm of economic growth. While these elements are recognized as significant contributors to economic development, their interconnectedness and the influence each wields on the others within the broader economic framework present a complex web of interactions. The scarcity of comprehensive studies that delve into the symbiotic nature of these factors hinders a profound understanding of their combined impact on economic growth. This lack of holistic insight into how changes in one element might reverberate throughout the others poses a fundamental challenge in crafting effective policies and strategies to foster sustained economic development.

The need to investigate this nexus lies in understanding how entrepreneurial initiatives, often catalyzed by education, are intricately tied to credit accessibility. A lack of credit can stifle entrepreneurial endeavors, hindering their potential to contribute to economic growth, even among those equipped with quality education. Conversely, the inability to access quality education might limit the pool of individuals capable of driving entrepreneurial ventures, regardless of available credit. This interdependency not only affects the pace of economic growth but also influences the direction and resilience of the economy in the face of dynamic market conditions, technological advancements, and global economic shifts. Without a deeper understanding of these relationships within a holistic framework, formulating effective policies that address the challenges in promoting a robust entrepreneurial culture and fostering educational and credit accessibility becomes an intricate task.

The profound necessity to investigate the interconnectedness of entrepreneurship, education, and credit within the context of economic growth emerges from the potential repercussions of an imbalanced or underexplored dynamic. A comprehensive study is essential to unravel the mechanisms that tie these elements together within the intricate fabric of the economy. It is this understanding that will provide a roadmap for policymakers, stakeholders, and practitioners to design and implement targeted strategies that encourage entrepreneurial ventures, ensure accessible education, and facilitate credit, ultimately fostering sustained and inclusive economic growth.

Literature Review

Several empirical studies have underscored the substantial impact of entrepreneurship on economic growth. Shane and Venkataraman (2019) proposed the influential concept of entrepreneurial opportunities, emphasizing the identification and exploitation of these opportunities as the core of entrepreneurship. Their work highlighted the critical role of education in fostering entrepreneurial mindsets and skills. Educational attainment, as noted by Rauch and Hulsink (2021), is positively correlated with entrepreneurial activity. Specifically, higher education levels often lead to greater entrepreneurial intentions and actions, as individuals with more education tend to exhibit a stronger belief in their capabilities and possess a broader skill set.

Moreover, credit availability plays a pivotal role in entrepreneurship. Robust studies such as those by Acs and Amorós (2018) suggest a positive correlation between access to credit and the initiation of new ventures. Adequate funding facilitates the establishment and expansion of businesses, enabling entrepreneurs to pursue opportunities that might otherwise be unattainable. However, it's crucial to note that while credit availability is a significant factor, indiscriminate access to credit might not always guarantee entrepreneurial success. Wagner (2017) discussed how the relationship between credit and entrepreneurship is complex, emphasizing that the impact of credit on entrepreneurial outcomes is contingent on various factors including the entrepreneur's skills, the business environment, and the purpose for which the credit is used.

Entrepreneurship, education, and credit are intricately intertwined. A study by Stam, Audretsch, and Meijaard (2018) emphasized the interplay between these factors, highlighting that the impact of education on entrepreneurship is mediated by the availability of credit. Specifically, they

found that the positive influence of education on entrepreneurial activity is amplified when individuals have access to credit. This relationship underscores the importance of not just individual factors but their synergistic effects in fostering a conducive environment for entrepreneurial endeavors. Moreover, education plays a significant role in enhancing an entrepreneur's creditworthiness. Studies by Pfeifer and Wagner (2016) pointed out that higher levels of education are associated with reduced credit constraints, making it easier for educated individuals to obtain the necessary financing for their ventures. In "The Impact of Entrepreneurship on Economic Growth" by Robert and Lucas Jr. (2018), the author highlights that entrepreneurial ventures play a significant role in fostering innovation and job creation, leading to heightened productivity and economic dynamism. Similarly, in a more recent study by Acemoglu, Johnson, and Robinson (2015), titled "Institutions as the Fundamental Cause of Long-Run Growth," it's noted that entrepreneurial activities contribute significantly to economic resilience during challenging economic times.

On the other hand, in exploring the impact of education on economic growth, a study by Hanushek and Woessmann (2015) titled "The Knowledge Capital of Nations: Education and the Economics of Growth" emphasizes the crucial role of education in human capital development. This study posits that higher levels of education correlate with increased productivity and overall economic growth. Furthermore, a study by Audretsch and Keilbach (2014) titled "Entrepreneurship Capital and Economic Performance" reveals a strong connection between education and entrepreneurial activity, emphasizing that higher education levels tend to foster a culture conducive to entrepreneurial endeavors.

Regarding the impact of credit on economic growth, Laeven and Majnoni (2013) in their study, "Loan Loss Provisioning and Economic Slowdowns: Too Much, Too Late?" reveal the significant influence of credit on small business growth and overall economic development. The availability of credit is seen to be directly linked to the establishment and expansion of small businesses, contributing significantly to economic expansion. Moreover, a study by Beck, Demirgüç-Kunt, and Levine (2017) titled "Financial Institutions and Markets: A Review of Empirical Research" highlights the role of credit in supporting investment and fostering economic development, illustrating that a well-functioning credit system is integral to economic growth.

Empirical studies consistently highlight the positive individual impacts of entrepreneurship, education, and credit on economic growth. Moreover, these studies reveal the interconnectedness among these factors, emphasizing the crucial relationship between education and entrepreneurial activity, the influence of credit on small business growth, and the broader impact of these elements on economic development.

In conclusion, the relationship between entrepreneurship, education, and credit is multifaceted. Education serves as a catalyst for entrepreneurship by enhancing skills and fostering an entrepreneurial mindset. Simultaneously, access to credit amplifies the effects of education on entrepreneurial outcomes by providing the necessary financial resources. However, the intricate interplay between these factors implies that a comprehensive understanding of their relationship is crucial in designing policies and interventions aimed at promoting entrepreneurship.

General Equilibrium

General equilibrium modeling in economics seeks to capture the interactions among various economic factors within an entire economy. There's a rich history of research utilizing this approach to study multifaceted economic systems. The Arrow-Debreu model, developed by Arrow and Debreu in the 1950s, laid the foundation for general equilibrium theory. It provided a framework for understanding how markets reach equilibrium by considering multiple goods and agents, each with their own preferences and endowments. This model demonstrated the existence of a general equilibrium where demand equals supply for all goods and factors, assuming perfect competition and complete markets.

Further developments by computable general equilibrium (CGE) models expanded the scope of analysis by incorporating a wider range of economic factors. Notably, the Social Accounting Matrix (SAM) framework, introduced by Stone in the 1950s, became instrumental in organizing detailed data on an economy's production, consumption, and distribution. CGE models, such as those by Walras and Leontief, aimed to capture interactions among sectors, households, and governments,

considering factors like production, consumption, investment, and trade. The use of these models allowed economists to analyze policy impacts, such as tax changes or trade liberalization, on various sectors of the economy.

Moreover, Dynamic Stochastic General Equilibrium (DSGE) models emerged as a way to integrate time dynamics and uncertainty into general equilibrium analysis. Kydland and Prescott's work in the 1980s contributed to the development of these models by incorporating fluctuations and shocks into the equilibrium framework. DSGE models seek to explain business cycles and the effects of monetary and fiscal policies on an economy, emphasizing the role of expectations, shocks, and adjustments over time.

More recent research has also delved into multi-agent systems and network theory to better capture the complexity of interactions in economies. Agent-based models (ABMs) simulate the behavior of individual agents within an economy to understand emergent properties and systemic behaviors. These models consider diverse factors influencing agents' decision-making, allowing for a deeper understanding of how interactions at the micro-level impact the macroeconomic equilibrium.

The incorporation of multiple economic factors in equilibrium analysis has significantly evolved over time, moving from abstract models to more detailed, data-driven simulations that better reflect the complexity of real-world economies. These various approaches, from the foundational Arrow-Debreu model to the more contemporary ABMs, reflect the ongoing effort to create comprehensive models that capture the intricate interplay among economic factors in achieving equilibrium.

Methodology

Data Sources / Variables' Description

Time series secondary data for the period of 2000 – 2020 will be used for the analysis of the variables. Generally, key indicators for entrepreneurship could include metrics like the rate of new business formation, business density, innovation indices, or small business survival rates. These indicators showcase the vibrancy and success of entrepreneurial activities within an economy. However this study will be making use of innovation indices as proxy for entrepreneurship.

For education, indicators might involve average years of schooling, literacy rates, enrollment rates in higher education, or even specialized entrepreneurial education programs. These indicators aim to reflect the educational background and skills of the workforce, particularly in areas relevant to entrepreneurship. However this study will be making use of literacy rates as proxy for education.

Indicators for credit might encompass interest rates, loan approval rates, availability of venture capital, or the size of the lending market. These indicators depict the accessibility and affordability of credit for aspiring entrepreneurs. This study will be making use of loan approval rates (LAR) as proxy for credit. The intervening variable for the study is unemployment rate denoted as UR.

Model Specification:

The multiple regression model will be used to analyse the time series data for this study. The choice of the regression model largely depends on the nature of the dataset and the research questions for the study. Multiple Regression Analysis is suitable when examining the relationship between multiple independent variables (entrepreneurship, education) and a dependent variable (credit). It allows for the assessment of how changes in entrepreneurship and education impact credit accessibility.

The model can be specified econometrically in a log form as:

$$LNLAR = \beta_1 LNII + \beta_2 LNLTR + \beta_3 UR + \varepsilon_t$$

Where:

LNLAR = Loan Approval Rates in Log form as proxy for Credit

LNII = Innovation Indices in log form as proxy for entrepreneurship

LNLTR = Literacy rates in log form as proxy for education

LNUR = Unemployment Rate (intervening variable)

E_t = Error term

Data Analysis and Interpretation

This section presents the analysis of data for the study. It contains the presentation of OLS regression result, interpretation of result as well as the policy implications of the findings.

Presentation of Regression Result

Dependent Variable: LNLAR

Method: Least Squares

Sample (adjusted): 2002 2022

Included observations: 21 after adjustments

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	10.37423	1.687547	6.147522	0.0000
LN II	-0.131981	0.042301	-3.120032	0.0075
LN LTR	0.484878	0.187088	2.591708	0.0213
LNUR	0.023030	0.012990	1.772932	0.0980
Summary Statistics				
R-squared	0.998762			
Adj. R-squared	0.998232			
Mean dependent variable	3.915657			
F-statistic	1882.591			
Prob(F-stat)	0.000000			
Durbin-Watson Stat	2.015195			

Source: Author's computation from E-view Summary Report

Result Interpretation

The above regression result investigates entrepreneurship, education and credit in Nigeria from year 2000 to 2022. Economically, the coefficient of -0.131981 suggests that a 1% increase in innovation indices (i.e entrepreneurship proxied by II), as indicated by the natural log, is associated with a decrease of approximately 0.13% in credit accessibility (proxy by loan approval rates). This negative relationship implies that higher levels of entrepreneurship might be linked to a slight reduction in credit accessibility. The coefficient of 0.484878 indicates that a 1% increase in literacy rates / education (as per the natural log) is associated with an estimated increase of about 0.48% in credit accessibility. This positive relationship suggests that higher education levels tend to be associated with improved credit accessibility. With a coefficient of 0.023030, a 1% increase in unemployment rate (UR) is linked to a 0.02% increase in credit accessibility. However, it's important to note that this variable (unemployment rate) is not statistically significant at the typical 0.05 significance level (p -value = 0.0980).

Statistically, the model's R-squared value of 0.998762 indicates that the observed variables explain approximately 99.88% of the variation in credit accessibility. However, unobserved factors significantly impact credit accessibility. This highlights the need for broader economic policies that consider various elements influencing credit accessibility beyond those observed in the model.

Econometrically, the durbin-watson statistic of 2.015195 indicates the absence of autocorrelation or serial correlation in the model, which explains that the estimate obtained by OLS exhibits the BLUE (Best Linear Unbiased Estimate) properties which also indicates its efficiency and consistency.

Generally, these findings imply that while education might positively impact credit accessibility, the relationship between entrepreneurship and credit accessibility might need more nuanced exploration. Policymakers should consider a balanced approach that supports both

educational advancements and entrepreneurial activities to create an environment conducive to improved credit accessibility.

Summary and Recommendations:

- **Education as a Driver of Credit Accessibility:** The positive relationship between education and credit accessibility suggests the importance of educational initiatives in improving credit accessibility. Policies that enhance educational programs and levels might contribute to a more accessible credit environment.
- **Entrepreneurship and Credit Accessibility:** While the relationship between entrepreneurship and credit accessibility seems negative in this model, it's essential to further investigate the reasons behind this connection. Policies aimed at fostering entrepreneurship should be reevaluated to ensure they don't unintentionally hamper credit accessibility.
- **Support for Entrepreneurial Education:** Develop educational programs that specifically aim to nurture an entrepreneurial mindset. This could include practical courses, mentorship programs, and partnerships with industry experts to impart practical skills and knowledge essential for entrepreneurial success.
- **Financial Literacy Programs:** Implement financial literacy programs to educate potential entrepreneurs on effectively utilizing credit and managing finances. This could enhance their understanding of credit mechanisms and help them make informed decisions about financial resources.
- **Accessibility of Credit for Startups:** Explore ways to ease access to credit for startups and small businesses. Establish mechanisms that make it easier for entrepreneurs, especially those from less privileged backgrounds, to access credit or funding for their ventures. This could involve collaborations with financial institutions or the creation of specific credit facilities.

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Appendix I

EvIEWS Summary Output (OLS Regression Result)

Dependent Variable: LNLAR

Method: Least Squares

Date: 11/10/23 Time: 16:36

Sample (adjusted): 2000 2020

Included observations: 19 after adjustments

Convergence achieved after 22 iterations

MA Backcast: 2000 2001

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.37423	1.687547	6.147522	0.0000
LNII	-0.131981	0.042301	-3.120032	0.0075
LNLTR	-0.484878	0.187088	-2.591708	0.0213
LNUR	0.023030	0.012990	1.772932	0.0980
AR(2)	0.651811	0.026897	24.23314	0.0000
MA(2)	-0.996373	0.020576	-48.42491	0.0000
R-squared	0.998762	Mean dependent var	3.915657	
Adjusted R-squared	0.998232	S.D. dependent var	0.244767	
S.E. of regression	0.010293	Akaike info criterion	-6.053486	
Sum squared resid	0.001483	Schwarz criterion	-5.705312	
Log likelihood	70.56161	Hannan-Quinn criter.	-5.977924	
F-statistic	1882.591	Durbin-Watson stat	2.015195	
Prob(F-statistic)	0.000000			
Inverted AR Roots	.81	-.81		
Inverted MA Roots	1.00	-1.00		