HANTOS ELEMÉR DOCTORAL SCHOOL OF BUSINESS, MANAGEMENT AND REGIONAL SCIENCES.

UNIVERSITY OF MISKOLC

Buah Aku-Sika

The Role of Entrepreneurship in Economic Growth and Development; A Comparative Analysis Using Panel Regression Estimation

Ph.D. Theses summary

Academic supervisor: Dr. Habil. Andrea S. Gubik

Head of Doctoral School: Prof. Dr. Sikos T. Tamas

Miskolc
2023

Table of Contents

1. Introduction

The upsurge of large-scale enterprises (also known as industrialization or the industrial revolution) was seen as one of the key drivers of economic growth from the eighteenth century up until the mid-nineteenth century (Burns, 2011). Large-scale businesses profited from economies of scale, which increased their efficiency. They could also produce more at a lower cost, increasing revenue margins and allowing them to employ a huge number of people. As a result, most economies centred their attention on the growth and expansion of large-scale firms and corporations, while very little or no attention was given to micro, small, and medium-sized businesses. However, in recent years, the story has changed and hence, entrepreneurship, micro, small and medium scale enterprises have become a central issue other than industrial revolution. History has it that, series of events like the economic crises, great depression, global competition, and even technological advancement led to the dwindling down of the industrial era, this resulted in a rise in unemployment rate, massive loss of output as well as loss of income (History crunch, 2018). In fact, there is plenty of evidence that economic activity has shifted from large to small businesses. For instance, Carlson (1992) proposes two explanations for the movement toward smallness. First, he considers the essential changes in the global economy since the 1970s. These changes are related to the increase of global competition, the rise in uncertainty, as well as the increase in market fragmentation. He then considers changes in the nature of technological progress as a factor leading to the movement towards smallness. This fundamental change in technological development resulted in massive diseconomies of scale. Audretsch and Thurik (1998) reiterate this notion by stating that the necessity of a shift to a knowledge-based economy is the driving force behind the movement away from large corporations and toward small businesses. Brock and Evans (1989) also stated that increased labour supply, which leads to lower real wages, higher levels of education, changes in consumer tastes, relaxation of (entry) regulations, and the issue of creative destruction also calls for a movement from large to small business operation. Coupled with that, the industrialization period was well noted for poor working conditions, low wages and high level of environmental pollution. As such, most of the advanced or developed countries took the initiative towards smallness. In fact, in the bigger economies like the United States (US) and United Kingdom (UK), under the rule of Ronald Reagan and Margaret Thatcher, their respective governments started to make policies that encouraged the pursuit of micro, small and medium scale businesses (Persson et al, 2006). Since then, other countries have followed suit, and we now see entrepreneurship playing an increasingly important role in economic growth and development.

Consequently, in recent times entrepreneurship has become a central issue. It can be observed that entrepreneurship has been spearheading issues on the political agenda of governments and stakeholders across the universe (WEF, 2009). This entrepreneurial movement is set to carry on in the future. Policymakers for instance have discovered a correlation between new business endeavours and economic growth (Acs & Audretsch, 2010). In addition, entrepreneurship help curb unemployment, improve social welfare (Venkataraman,1997) and of course serve as a means of personal wealth and social cohesion through the aspect of sustainable entrepreneurship (European Commission, 2004). Following from the preceding comments, most economies have learnt to appreciate the importance of entrepreneurship in growth. In fact, most economies have realized that, to achieve greater economic prosperity in a country, there is the need to encourage and unleash people's entrepreneurial abilities. Undeniably, we can boldly state that incorporating entrepreneurship into the affairs of the economy has become the focal point for achieving economic growth and development. This is evident in some famous

and recent works like the works of Thanti and Kalu, (2018); Folarin, (2018); Bruns at al, (2017); Stefanescu, (2016); Fritsch and Wyrwich, (2014). It is apparent in the aforementioned works that entrepreneurship has an essentially important role to play in economic growth and development. Despite this, it is still not clear if this assertion holds true for all types of economies. Authors such as Audretsch and Keilbach (2004), Carree and Thurik (2008), and Acs and Armington (2004), for example, explicitly argue that entrepreneurship does not always promote growth in developing nations. Szerb et al. (2016) used the Global Entrepreneurship Development Index (GEDI) to show that entrepreneurship has varied effects in countries with different economic and institutional settings. This has led to debate among scholars and specialists in this subject about whether entrepreneurship boosts economic growth in both developed and developing countries. This opens an avenue for more research work to be done in this regard and hence this study delves deeper to make a comparison of entrepreneurship-growth nexus across some developed and developing countries.

1.1 Problem Statement

The problem of statement therefore emanates from the evidence gap in the literature. According to Jacob, 2011; Muller-Bloch and Kranz, 2014; Miles, 2017, there is an evidence gap in the literature when the results of individual studies allows for conclusion in their own rights, but are contradictory when compared with other studies or examined from a more abstract perspective. From the empirical evidence, two schools of thought have diverging opinions about the role entrepreneurship plays in economic growth and development. Whiles one school of thought is of the view that entrepreneurship aids growth in developing countries, the other school is also of the view that entrepreneurship does not aid growth in developing countries but only in developed countries. Based on the evidence from the literature authors like Adusei, 2016; Omoruyi et al., 2017; Ogunlana Folarin, 2018 have discovered that there is a positive and significant link between entrepreneurship and growth in emerging or developing countries. On the other hand, Audretsch and Keilbach, 2004; Acs and Armington, 2004; Carree and Thurik, 2008; Stoica et al., 2020 have also discovered that entrepreneurship has a favourable impact on economic growth in some advanced economies, but it has the opposite effect in some emerging countries.

Clearly this mixed result has created an evidence gap in the literature and there is the need to fill this gap in the form of further research. In fact, in the works of, Deakins and Freel (1998); Wennekers and Thurik (1999); Maria and Levesque (2008); Jonsson (2017); Doran et al. (2018), they called for further studies to be carried on the entrepreneurship-growth nexus, taking into account different aspects of entrepreneurship. In addition, most of the results on entrepreneurship and growth pointed out possibilities for further studies as the different features and types of entrepreneurships are found to influence economic growth in a different manner. The different features and types of entrepreneurships associated with developed and developing countries could also be influenced by the entrepreneurial ecosystem. The entrepreneurial ecosystem simply refers to the elements or factors which help or hinder a person's decision to become an entrepreneur, Isenberg (2011), World Economic Forum (WEF, 2013). In order to achieve economic growth and development, the ecosystem must function well for entrepreneurs.

This paper will therefore investigate further into the role entrepreneurship plays in economic growth in some high-income (developed) countries and low-income (developing) countries but with a different twist on the variables of interest, time period as well as the methodology. The goal is not to provide a conclusive solution but try to find the reasons behind the problem and suggest some operational approaches to understanding or tackling it. Most importantly the study seeks to bring a novel perspective into the already existing literature and also try to elucidate the ambiguities in the literature. The aim is to ascertain the impact of entrepreneurship

on economic growth across the selected income groups of countries. Clearly, entrepreneurship has been viewed as a critical tool for economic development; but, would this assertion still hold true for all countries, taking into consideration how countries are geographically dispersed? Most of the previous works on entrepreneurship and growth have identified synergies and generated new questions for further research. To achieve this goal, this write-up intends to extend the data used by previous authors, select different case studies especially on developed and developing countries, adopt a different methodology and generally try to expand on the scope and delimitations of other studies. This study's goal is therefore to dig deeper into this issue and investigate further into this topic.

1.2 Research Objectives

The main objective of the study is to examine the role of entrepreneurship on economic growth and development with focus on some selected high-income countries and low-income countries and making a comparative analysis among them.

Specifically, the research seeks to investigate the following objectives:

1. To analyse and discover the trends and patterns of entrepreneurship and growth across the cluster of high- and low-income countries over time *(Descriptive analysis, visualizations).*
2. To examine the impact of entrepreneurship on growth amongst the selected high- and low-income countries *(System GMM).*
3. To examine the drivers of entrepreneurship amongst the selected high- and low-income countries *(Hausman test – Fixed Effect and Random Effect).*

From the objectives mentioned above, the following research questions were obtained;

Research Question 1: What are the trends and pattern of entrepreneurship and growth across the selected cluster of high- and low-income countries over time?

Research Question 2: To what extent does entrepreneurship influence economic growth amongst the selected cluster of high- and low-income countries?

Research Question 3: What are the key drivers of entrepreneurship across the selected cluster of high- and low-income countries over time?

1.3 Significance of the Study

The motive of every economy is to achieve persistent and sustained economic growth and development. As entrepreneurship has become a central issue in recent times and it is also considered as one of the main drivers of sustained economic growth and development, it is necessary to consider the nexus between these variables. Paulin et al. (1982) stated emphatically that, entrepreneurship as a topic is in its infancy, hence this study will create more awareness about entrepreneurship and its relationship with economic growth. In the quest to achieve this aim, this study will simultaneously revise, refine, and add up to the stock of existing literature by means of extending knowledge in the area under consideration. In addition, the results of the study will serve as a blueprint to formulate strategic and specific policies directed at both developed and developing countries on how to they can use entrepreneurship as a tool to attain sustained economic growth and development.

1.4 Scope and Delimitations of the Study

In the context of this analysis, high-income or developed countries as well as low-income or developing countries are used interchangeably. Countries are selected as part of the high or low-income group of countries based on the availability of data from the respective macroeconomic databases. The study makes use of secondary data from the period of 1999 to 2019 which mostly were extracted from World Bank (WDI) database, International Labour Organization (ILOSTAT) database, International Monetary Fund (IMF) and International Financial Statistics (IFS). As a panel estimation approach was considered, the study also relies heavily on an unbalanced panel data from the period of 1999 to 2019 for the estimation. The restriction of the study to 1999–2019 is as a result of the limited data across the selected cluster of high- and low-income countries and the selected variables of interest. Also, the operationalized or accepted definition of entrepreneurship adopted is consistent with the GEM's definition. In short, the choice of the study period, data to use, the operationalized definition, selection of countries as well as the selection of variables to be used in the study depends on the readily availability of data in the respective macroeconomic databases backed by evidence from literature.

2. Theoretical and Empirical summary

2.1 Summary of analyzed theories

Author	Year	Main source of economic growth	Role of entrepreneurship in growth
Adam Smith	1776	Division of labour/Specialization	Entrepreneurship was not mentioned as a factor which aids economic growth.
Thomas Robert Malthus	1798	Effective demand aids economic growth and development.	Entrepreneurship was not mentioned as a factor which aids economic growth in the theory.
David Ricardo	1821	Increase in factors of production aids growth.	Entrepreneurship does not contribute to economic growth in this theory.
Harrod Roy F. Domar Evsey (H-D Model)	1946	Capital accumulation or savings constitutes a major factor for the growth of an economy.	There was no mention of entrepreneurship in the theory.
Kaldor Nicholas	1957	Technical dynamics and the distribution of income aids economic growth.	Entrepreneurship was not mentioned as a major contributor to growth.
Robert Solow	1956	The technological progress which increases productivity of capital and labour increases economic growth.	Solow does not consider entrepreneurship as a key driver of growth.
Robert E. Lucas	1988	Economic growth depends on human capital formation.	There was no mention of entrepreneurship in this theory.

Joseph A. Schumpeter	1934	Innovation, entrepreneurship and market power are the critical dimensions of economic growth and development.	Entrepreneurship is highly recognized as an element of economic growth.
Frank H. Knight	1942	Through innovation, entrepreneurs earn monopoly profits which leads to growth in the long run.	Entrepreneurship plays a very important role in the economic-growth process.
David C. McClelland	1961	The need for achievement is what mainly drives economic development, thus a society with a generally high level of achievement will produce more energetic entrepreneurs, who in turn produce more rapid economic growth.	Heavily considers entrepreneurship as a major source of growth.
Audretsch and Keilbach	2004	Entrepreneurship capital was included as a new variable into the neoclassical production function.	Entrepreneurship capital has a positive impact on economic performance.
Mishra and Zachary	2014	Economic growth can be achieved once the "two-stage value creation framework" is completed.	Critically analysed the role entrepreneurship plays in economic growth and development.

The major finding after the extant theoretical literature review is that all the growth theories do not deal with entrepreneurship because the prime motive of the growth theories focus on factors which increase output or economic growth. Entrepreneurship however is about development, it focuses more on quality of life and as such in theories of economic development like the Schumpeter's model, Knight's theory, McClelland's theory, etc, the role of entrepreneurship in economic growth and development was critically analysed.

2.2 Summary of empirical review

2.2.1 Operationalized definition

For the purpose of this study the Global Entrepreneurship Monitor's (GEM) definition of entrepreneurship is adopted as the operationalized definition for the research work. The GEM tries to define entrepreneurship in a much more measurable and quantitative way. GEM tries to categorize entrepreneurship from the phase of innovation and opportunity recognition to the phase of obtaining and managing an established business. Thus, according to the GEM, any effort at new business or new venture creation such as, a new business organization, self-employment, or the extension of an existing business, by an individual, a team of individuals, or an established business is entrepreneurship (GEM Reports).

2.2.2 Methodologies used to show the Entrepreneurship – Growth nexus

Author	Year of Publication	Methodology	Major conclusion

Thanti and Kalu	2018	Generalised Method of Moments (GMM).	Institutions and human capital act as catalyst which boost entrepreneurship to aid growth.
Bruns et al	2017	Multilevel growth regression and Latent class analysis.	Multilevel entrepreneurship aids growth.
Salgado-Bando	2005	OLS, TSLS, GMM and Dynamic Panel Data estimator.	Productive entrepreneurship has a positive impact on growth whiles self-employment has a negative impact on growth.
Stark	2012	Granger Causality test	The study finds a two-way causality between entrepreneurship and economic growth.
Dilanchiev	2014	Ordinary Least Square (OLS)	Entrepreneurship has a positive effect on job creation by reducing unemployment.
Folarin	2018	Descriptive and cross-sectional survey	Entrepreneurship plays a significant impact on economic growth.
Marinescu et al.	2013	Theoretical Model	Entrepreneurial education and entrepreneurial tradition are the engines to economic growth.
Fritsc and Wyrwich	2014	Descriptive analysis	High number of successful entrepreneurial role models in a region leads to widespread social acceptance of self-employment.

The empirical literature adopts a systematic approach to carefully review some past works on entrepreneurship and growth. It was found out that, till date there is no specific definition or measurement of entrepreneurship. When it comes to the definition and measurement, many authors and scholars have suggested a broad collection of measures and definitions of entrepreneurship (Van Praaf, 1999; Hebert and Link, 1989). Hence, authors who write on entrepreneurship issues use, different variables to measure entrepreneurship, for instance, self-employment, new businesses, new venture creation, innovation, etc. Since there is no homogeneous measure for entrepreneurship across different studies, there has been mixed results with regards to the entrepreneurship-growth nexus amongst different class of economies. The research gap therefore emanates from the mixed results in the literature. To bridge this gap, this study conducts a comparative study with the help of panel analysis. This research therefore seeks to bring on board a novel perspective into the already existing literature by using different variables, different methodology, different countries, and different time horizon. It also intends to make different suggestions for future empirical research in relation to the status-quo.

3. Methodology

It is extremely important to use appropriate methods and techniques to analyse each research objective. As the chapter unfolds the appropriate methods used in conducting the research will be explained into details.

3.1 Techniques Used in the analysis

For the purpose of this research work, each research question is answered using a different and unique methodology. Descriptive analysis, Scatter plots and Panel unit roots tests were used to analyse the first objective. The system Generalized Methods of Moments and the Hausman tests were used to analyse the second and third objectives respectively.

Table 3.1: Description of Variables

	Variable	**Definition**	**Data Source**
Dependent Variable	Economic Growth (Y)	Gross Domestic Product Per Capita Growth (GDPPCG)	WDI, World Bank
Explanatory Variable	Entrepreneurship (X)	Self-employment (SELF)	ILOSTAT database
Controlled Variables	Domestic Credit to Private Sector (DCPS)	Readily availability of credit to private sector.	IMF
	Inflation (INF)	Increase in prices, as measured by Consumer Price index.	IMF, IFS
	Savings (SAV)	Gross Domestic Savings.	WDI, World Bank
	Labour Force Participation Rate (LFPR)	Percentage of the labour available to work or already working.	ILOSTAT database
	Economic Openness (ECONOPEN)	Sum of imports and exports as a share of GDP	WDI, World Bank
	Unemployment (UNEMP)	Economically active population without work	WDI, World Bank ILOSTAT database
	Corruption Perception Index (CPI)	Public Sector Corruption	Transparency International database

Source: Own construction

3.2 Research Design

To effectively address the research problem, there is the need to have a methodologically sound research design. The research design serves as a framework that guides the researcher. It is the overall method that is used to combine the various components of the study in a clear and

logical manner. It is the blueprint for data collection, measurement, and analysis. Zikmund (2000), indicated that the research design forms a vital part of the whole research activity. The scope of the analysis is determined by the research design and as such it is important to embed the research design into the research activity because it facilitates the smooth sailing of the various research operations. The research design also helps us to know whether the research is carried out for exploratory, descriptive, and explanatory purposes (Sekaran & Bougie, 2010). As the study progresses, we will realize that it will be used for descriptive and explanatory purposes.

3.2.1 Descriptive Analysis

Descriptive analysis is one of the most essential procedures in statistical data analysis. It aids in the constructive description, visualization, and summarization of data points, allowing patterns to develop that satisfy all of the data's conditions. The ultimate goal of the descriptive research is to describe the characteristics of the variables in question. It seeks to find answers to the who, what, when, why and how questions (Cooper and Schindler 2003). According to Bryman and Bell, (2003) for instance, descriptive research is concerned with identifying and counting frequency of a specific population, either at one point in time or at various times for the purpose of comparison. Within the framework of the analysis however, descriptive statistics as well as data visualizations techniques are employed to help us understand the behaviour of the selected variables of interest. Anscombe (1973), proved that descriptive statistics used in analysing data alone is not enough. There is the need to include visualizations which provides more content to understanding the data and the variables of interest in general. And so, we will see as the research unfolds that, descriptive statistics and data visualizations are carried out in the initial stages to describe the variables of interest and also make a comparison among the selected high- and low-income countries.

3.2.2 Generalized Methods of Moments (GMM)

Tackling the entrepreneurship-growth nexus using a cluster of high- and low-income countries can be regarded as a purely panel estimation issue. When it comes to panel data and panel regression estimation the Generalized Methods of Moments (GMM) has been accepted as one of the best estimation techniques. The concept was formalized by Hansen (1982) and has since been popularized by Arellano and Bond (1991); Arellano and Bover (1995); Holtz-Eakin, Newey, and Rosen (1988) and Blundell and Bond (1998). These authors elaborate that GMM estimators are specifically structured for conditions where there is a small “T” (Time period) and large “N” (Number of Panels), i.e. few time periods and many individuals. More often than not, the individual estimators within the panel are likely to have; independent variables that are not strictly exogenous, heteroscedastic and autocorrelated.

In the context of this paper the Arellano–Bover / Blundell–Bond estimator has been adopted to undertake the estimation. The Arellano–Bond estimation is based on Hansen's (1982) generalized method of moments (GMM), also known as difference GMM. It starts by differencing all regressors and then transforming them. The Arellano–Bover / Blundell–Bond estimator, on the other hand, extends the Arellano–Bond estimation by assuming that the first difference of the instrumental variables is unrelated to fixed effects. This enables the use of more instruments, which can result in a significant increase in performance. The Arellano–Bover / Blundell–Bond estimator creates a system of two equations: the initial equation and transformed one. The authors call the augmented version of the difference GMM the system GMM and this estimation is more efficient and more robust to heteroscedasticity and autocorrelation. In the context of this research work however it can be observed from the data

that there is a small T and a large N, and this creates room for problems like heteroscedasticity and autocorrelation hence the system GMM is employed.

3.2.3 Empirical model and Econometric issues

The variations in variables over time across cluster of countries can be accessed using panel data as more degrees of freedom are deduced by adding the time series dimension. Since lagged dependent variable encompasses the effects of the entire time path of the independent variable(s) and also the fact that history matters give rise to dynamic panel data estimation, it is worthwhile to adopt unique panel estimation techniques in undertaking the study. The effort of first differencing to eliminate unobserved heterogeneity also underpins the family of estimators that have been developed for dynamic panel data (DPD) models. These models contain one or more lagged dependent variables, allowing for the modelling of a partial adjustment mechanism.

In that effect, the Generalized Method of Moments (GMM) construct more efficient estimates of the dynamic panel data model. Arellano and Bond argue that consistency, fails to take all of the potential orthogonality conditions into account. Notably, there is the assumption that the necessary instruments are 'internal': that is, based on lagged values of the instrumented variable(s). The estimators allow the inclusion of external instruments as well. Arellano and Bover (1995) and Blundel and Bond (1998) presented a panel data analysis based on a GMM-type estimator called the "system estimator", to answer some of the potential econometric problems that emanates with working with dynamic panel data (DPD). The system GMM approach thus concurrently account for the dynamic effect between the variables of interest.

3.2.4 System GMM-type Estimation

Based on theoretical and empirical literature review, GMM regression takes the form:

$$y_{it} = \theta + \gamma X'_{it} + \varphi_t + u_{it}$$

Correspondingly,

$$y_{it} = \theta + \gamma X'_{it} + \varphi_{it} + u_{it} \qquad i = 1, \dots, N; \quad t = 1, \dots, T \qquad (3.1)$$

Adopting this model, the specification of the model to be used in the study can be written as:

$$GDPPCG_{it} = \theta + \gamma (lnSELF)'_{it} + \varphi (controlVar)_{it \dots nt} + u_{it} \quad (3.2)$$

From equation one, y is the dependent variable (GDP per capita growth as elaborated in equation two), i is a country, t is a period of time, X' represents the set of explanatory variables (Self-employment in this context). φ_{it} is the time-specific effect of the controlled variables and $u_{it} = \mu_i + \nu_{it}$, where μ_i is the unobservable specific effect and ν_{it} is the corresponding error term.

According to Judson and Owen (1999) and Nickell (1981), the presence of individual heterogeneity in panel data models with lagged explained variables would tend to produce inconsistent and biased estimates if the time dimension of the panel is fixed and small creating the need for the GMM-type estimator. More generally, there are usually some problems when considering DPD regression presented in equation (1). That is the lagged explained variable as an independent variable can lead to autocorrelation and also the country-specific effects depicting the intrinsic countries heterogeneous effects. That is, if y_{it} is a function of μ_i, then $y_{i,t-1}$ would be a function of μ_i and therefore, $y_{i,t-1}$ which is an independent variable would

be correlated with the error term. As such leads to inconsistent and biased estimates even if there is no autocorrelation among the residuals.

To tackle some of these issues, the 'system estimator' developed by Arellano and Bover (1995) and Blundell and Bond (1998) is cantered on asymptotic and small sample properties, to diminish any potential biases in finite samples. And this process solves jointly the regression in differences with the regression in levels. It was claimed by Arellano and Bover (1995) that because the instruments in the first step is the lagged levels, in the second step the most recent difference as instrument. An improved estimation is realized since it does not eliminate the cross-country effects or increase the measurement error by introducing the level-form regression. To evaluate the relevance of the GMM estimators, Arellano, and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) postulated two specification tests to be considered. The validity of the assumption that the error terms should be serially uncorrelated, and instruments should be tested. It is interesting to note that the GMM techniques control for unobserved country-specific effects, first-difference non-stationary variables, overcome the endogeneity of the explanatory variables by using instruments and test for the presence of autocorrelation (Saci et al., 2009). To stipulate provision to the GMM estimator, it is important to accept the null hypothesis for both tests. Typically, the Hansen and Sargen tests are used to test the validity of the instruments whiles the autocorrelation tests are used to test for serial correlation of the residuals. The employment of the system GMM estimator in empirical growth research is strongly endorsed by Bond et al. (2001).

It is also worth noting that one of the benefits of panel data estimation is that it allows you to compensate for the effects of unobserved or missing variables by incorporating information about the intertemporal dynamics and individuals. Since it has cross-sectional and time-series dimensions, panel data regression can model both common and individual group behaviours. Panel data has more detail, variability, and efficiency than pure time series or cross-sectional data (less chance of multicollinearity). It can detect and quantify statistical effects that pure time series or cross-sectional data cannot, which helps to reduce measurement biases that can occur when groups are merged into a single time series. The quest to analyse the entrepreneurship-growth nexus across a cluster of 39 high and 22 low-income countries is a very complex one and there is no better way to do this than adopting some panel estimation techniques.

3.2.5 The Hausman Test

A correlation between an explanatory variable and the error term implies that the Ordinary Least Square (OLS) estimator is no longer BLUE (Best Linear Unbiased Estimator). When this happens, the Instrumental Variables (IV) may be used. To test for the existence of a correlation between an explanatory variable and the error term the Hausman test estimation procedure can be adopted. It is fascinating to know that to decide between Fixed Effect (FE) and Random Effect (RE) estimation, there is the need to first conduct the Hausman test. The Hausman test was put forward by Hausman (1978) and it was formulated based on a GMM approach. One unique characteristic about this test is that it is used to evaluate the accuracy of the Generalized Least Square (GLS) estimator in static models using pooled cross-sectional time-series data.

Consider a linear regression model:

$$y_{it} = \beta^0 + \beta i X_{it} + \alpha_{it} + u_{it} \qquad (3.3)$$

Where, y_{it} is the dependent variable, β^0 is the constant, βi is the coefficient of the explanatory variable X_{it}. α_{it} is the unobserved heterogeneity and u_{it} is the error term.

When the Cov(α_{it}, X_{it}) = 0, then the least square estimator (i.e. the Random Effect) as well as the instrumental variables estimator (ie the Fixed Effect) are both consistent. In this case however the Random Effect is more efficient. Alternatively, when the Cov(α_{it}, X_{it}) ≠ 0, then the Fixed Effect is solely consistent.

The equation for the Hausman Test (HT) which helps to decide between the Random Effect (RE) and Fixed Effect (FE) is written as:

$$HT = \frac{(\beta FE* - \beta RE*)^2}{\text{Var}(\beta\text{FE}*) - Var(\beta RE*)} \sim X^2 \qquad (3.4)$$

where $FE*$ & $RE*$ are the estimated value of the parameter β and $Var(\beta FE*)$& $Var(\beta RE*)$ are the variance of the of the Fixed Effect estimator and the Random Effect estimator respectively. It follows a Chi squared (X^2) test statistics / distribution.

Assume the null hypothesis is H₀: Cov(α_{it}, X_{it}) = 0, then if the null hypothesis is accepted, then both RE and FE are consistent but RE is more efficient. Hausman Test proposes that in this circumstance the least square estimator is more efficient, hence, the RE is the best to undertake the estimation. On the other hand if the alternate hypothesis H_1 : Cov(α_{it}, X_{it}) ≠ 0 is accepted it means the FE is solely consistent and more effective. In this instance, Hausman Test proposes that we should use the instrumental variables estimator, which is consistent. FE is the best to undertake the estimation.

In conclusion the Hausman test is conducted to determine the appropriate estimator (fixed effects versus the random effects estimator) to use. The rule of thumb of the null hypothesis which states that there is no association between the individual country effects and explanatory variables is mostly considered. Hence the fixed effects model is the best estimator to use if the null hypothesis is rejected. The random effects model, on the other, is appropriate if the test does not reject the null hypothesis

3.2.5.1 Random Effect (RE)

The Random Effect (RE), also known as the variance component model or the least square estimator is another Panel data estimation technique. The random-effects models are statistical models with random variation in some of the model's systematic components' parameters.

Starting from the basics, we consider a linear regression equation:

$$y_{it} = \beta^0 + \beta i x_{it} + \cdots + \beta n x_{nt} + \alpha_{it} + u_{it} \qquad (3.5)$$

Transforming equation (3.5) using a parameter lambda (λ), we arrive at equation (3.6) as shown below:

$$y_{it} - \lambda\bar{y}_{it} = \beta^{0(1-\lambda)} + \beta_i(x_{it} - \lambda\bar{x}_i) + \cdots + \beta_n(x_{nt} - \lambda\bar{x}_n) + v_{it} - \lambda\bar{v}_i \qquad (3.6)$$

where y_{it} is the dependent variable, β^0 is the constant, βi is the coefficient of the explanatory variable x_{it}. Within the transformed equation, $\bar{y}_i$ is the time mean of the dependent variable, $\bar{x}_i$ is the time mean of the independent variable, $\bar{v}_i$ is the sum of the unobserved or unknown intercept and the error term:

($\bar{v}_i = \alpha_{it} + u_{it}$).

The transforming parameter

$$\lambda = 1 - \left(\frac{\mathfrak{z}u^2}{\mathfrak{z}u^2 + T\mathfrak{z}\alpha^2}\right)^{1/2} \qquad (3.7)$$

$\mathfrak{z}u^2$ is the variance of the idiosyncratic error term; that is when the unobserved variables have an peculiar effect on the dependent variable and $\mathfrak{z}\alpha^2$ is the variance of the unobserved error term. For the Random Effect (RE) to hold lambda must be between zero and one ($0 \leq \lambda \leq 1$). The Random Effects model is justified by the fact that, unlike the fixed effects model, individual variance is considered random and unrelated to the predictor or independent variables in the model. According to Greene (2008) for instance, "the main difference between fixed and random effects is whether the unobserved individual effect that are correlated with the regressors in the model, are stochastic or not".

Time-invariant variables can be used as explanatory variables in random effects models since the entity's error term is not correlated with the predictors. When RE is used, individual characteristics that may or may not affect the predictor variables must be specified. The problem is that certain variables might not be available, resulting in model bias due to omitted variables.

3.2.5.2 Fixed Effect (FE)

The Fixed Effect (FE) is also known as the instrument variable estimator. The Fixed Effect hypothesis assumes that the individual variables can influence or bias the predictor or outcome, and that this must be controlled for. The inference of a correlation between the entity's error term and predictor variables is based on this logic. Thanks to the FE, the net effect of the predictors on the outcome variable can be determined by removing the effect of certain time-invariant characteristics. Once Cov(α_{it}, X_{it}) ≠ 0, it implies there is some sort of endogeneity and one way to solve the problem of endogeneity is through First Differencing or Fixed Effect.

To understand how the FE works, assume a linear regression:

$$y_{it} = \beta^0 + \beta i x_{it} + \cdots + \beta n x_{nt} + \alpha_{it} + u_{it} \qquad (3.8)$$

Equation (8) is transformed by calculating the averages of each unit over time (ie take the sum of all values of the respective variable and divide through by the total number of time period *(T)*). Using the dependent variable as an example, we get;

$$\bar{y} = \frac{1}{T}\sum_{t=1}^{T} y_{it} \qquad (3.9)$$

Doing this to both sides of the equation we arrive at the transformed model as shown below:

$$\bar{y}_{it} = \beta^0 + \beta i \bar{x}_{it} + \cdots + \beta n \bar{x}_{nt} + \alpha_i + \bar{u}_{it} \qquad (3.10)$$

where $\bar{y}$ is the calculated average of the dependent variable, $\bar{x}$ is the calculated average of the independent variables, *T* is the time meaned value of the respective variable and $\bar{u}_i$ is the calculated average of the error term. Since β^0 and α_{it} are the constant and unobserved error term respectively they do not depend on time and hence their averages remain β^0 and α_{it}.

To get the FE estimator subtract equation ten (3.10) from equation nine (3.8) as shown below:

$$(\bar{y}_{it} = \beta^0 + \beta i\bar{x}_{it} + \cdots + \beta n\bar{x}_{nt} + \alpha_i + \bar{u}_{it}) \ldots. 3.10$$

$$(y_{it} = \beta^0 + \beta i x_{it} + \cdots + \beta n x_{nt} + \alpha_{it} + u_{it}) \ldots. 3.8$$

$$\bar{y}_{it} - y_{it} = \beta^0 - \beta^0 + \beta i(x_{it} - \bar{x}_{it}) + \cdots + \beta n(x_{nt} - \bar{x}_{nt}) + \alpha_i - \alpha_i + (u_{it} - \bar{u}_{it}) \quad (3.11)$$

Equation (11) as shown above is referred to as the within transformation and the respective estimators are known as the within estimators. The within estimator's explanatory value is obtained from the co-movements of *y* around its individual-specific mean and with *x* around its individual-specific mean.

Re-writing equation 11 in a much simpler form, we arrive at:

$$\bar{\bar{y}}_{it} = \beta i\bar{\bar{x}}_{it} + \cdots + \beta n\bar{\bar{x}}_{it} + \bar{\bar{u}}_{it} \quad (3.12)$$

$\bar{\bar{y}}_{it}$ is the difference between the average dependent variable and the dependent variable$(\bar{y}_{it} - y_{it})$, $\bar{\bar{x}}_{it}$ is the difference the average independent variables and independent variables $(x_{it} - \bar{x}_{it})$ and $\bar{\bar{u}}_{it}$ is the difference the average error terms and the error terms$(u_{it} - \bar{u}_{it})$. From the Fixed Effect model above, it can clearly be observed that α_i, which is a time-constant variable has been removed. This makes the estimator unbiased and consistent as the explanatory variables are strictly endogenous.

3.3 List of Countries

3.3.1 High-income Group of countries

Austria, Bahamas, Bahrain, Barbados, Belgium, Canada, Chile, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Hong Kong SAR China, Hungary, Iceland, Ireland, Italy, Japan, Korea Republic, Kuwait, Latvia, Luxemburg, Malta, Mauritius, Netherlands, Norway, Panama, Poland, Portugal, Romania, Saudi Arabia, Singapore, Slovak Republic, Sweden, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States.

3.3.2 Low-income Group of countries

Afghanistan, Burkina Faso, Burundi, Central African Republic, Chad, Congo Dem Rep, Gambia, Guinea, Guinea Bissau, Haiti, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Sudan, Tajikistan, Togo, Uganda.

4 Results and Analysis

4.1 Descriptive Analysis

The descriptive analysis helps us to understand the large dataset in a simplified manner but does not show any relation among the variables of interest.

Table 4.1: Descriptive Analysis for High-income countries

Variables	*Mean*	*Std. Dev.*	*Min*	*Max*
GDPPCG	9.98	1.30	6.99	13.40
SELF	15.14	8.01	1.06	46.11
DCPS	90.98	46.38	7.13	308.98
UNEMP	6.63	3.60	0.07	19.9
INF	2.66	3.96	-30.24	47.78
SAV	27.98	10.61	6.17	61.29
LFPR	61.49	7.01	47.72	83.78
ECONOPEN	108.35	54.21	1.23	328.18
CPI	61.02	20.16	6.9	92

Author's own estimation

Table 4.1 shows the results for the descriptive analysis for the selected high-income group of countries.

It can be observed that the average Gross Domestic Product (GDP) per capita growth of the high-income countries is approximately 9.98 per cent. This means that collectively over the period 1999 to 2019, the respective economies have grown at an average rate of 9.98 per cent. As explained in chapter three, entrepreneurship or self-employment as used in the context of this study is a percentage or fraction of total employment who are working on their own account. The result shows that the average self-employment for high-income countries is 15.14. This means that on average about 15.14% of the total number of employed persons work on their own account or have their own work. The labour force participation rate (LFPR) was 61.49. Indicating that on average, the economically active persons who are willing and able to work are about 61.49 %. Average unemployment value for the cluster of high-income countries stood at 6.63. Provision and availability of domestic credit to the private sector has a typical value of 90.98. Average inflation and savings rate were 2.66 and 27.98 respectively and the sum of exports and imports which represents economic openness has an average value of 108.35. Lastly, Corruption Perception Index for the cluster of high income countries stood at 61.02.

Table 4.2: Descriptive Analysis for low-income countries

Variables	*Mean*	*Std. Dev.*	*Min*	*Max*

GDPPCG	3.26	0.37	1.82	4.12
SELF	4.38	0.20	3.36	4.56
DCPS	10.90	7.13	0	41.16
UNEMP	5.38	4.27	0.32	17.47
INF	9.85	32.89	-6.81	513.90
SAV	4.11	0.11	3.86	4.42
LFPR	68.57	11.58	39.68	89.05
ECONOPEN	2.56	0.61	0.06	3.83
CPI	25.80	9.51	6	56

Table 4.2 on the other hand depicts the results for the descriptive analysis for the selected low-income group of countries. It can be observed that the average growth rate for the low-income countries is approximately 3.26 per cent over the same period. The average self-employment for low-income countries is 4.38. This means that on average about 4.38% of the total number of employed persons work on their own account or have their own work. The average values for the labour force participation rate, that is, the section of the economically active population who are either working or actively looking for work is approximately 68.57%. Average unemployment value for the cluster of low-income countries stood at 5.38. Availability of domestic credit to the private sector also hovers around a typical value of 10.90. Average inflation and savings rate are 9.85 and 4.11 respectively and economic openness has a mean value of 2.56. Corruption Perception Index for the cluster of high income countries stood at 25.80.

4.2 Scatter Plot with overlaid linear prediction

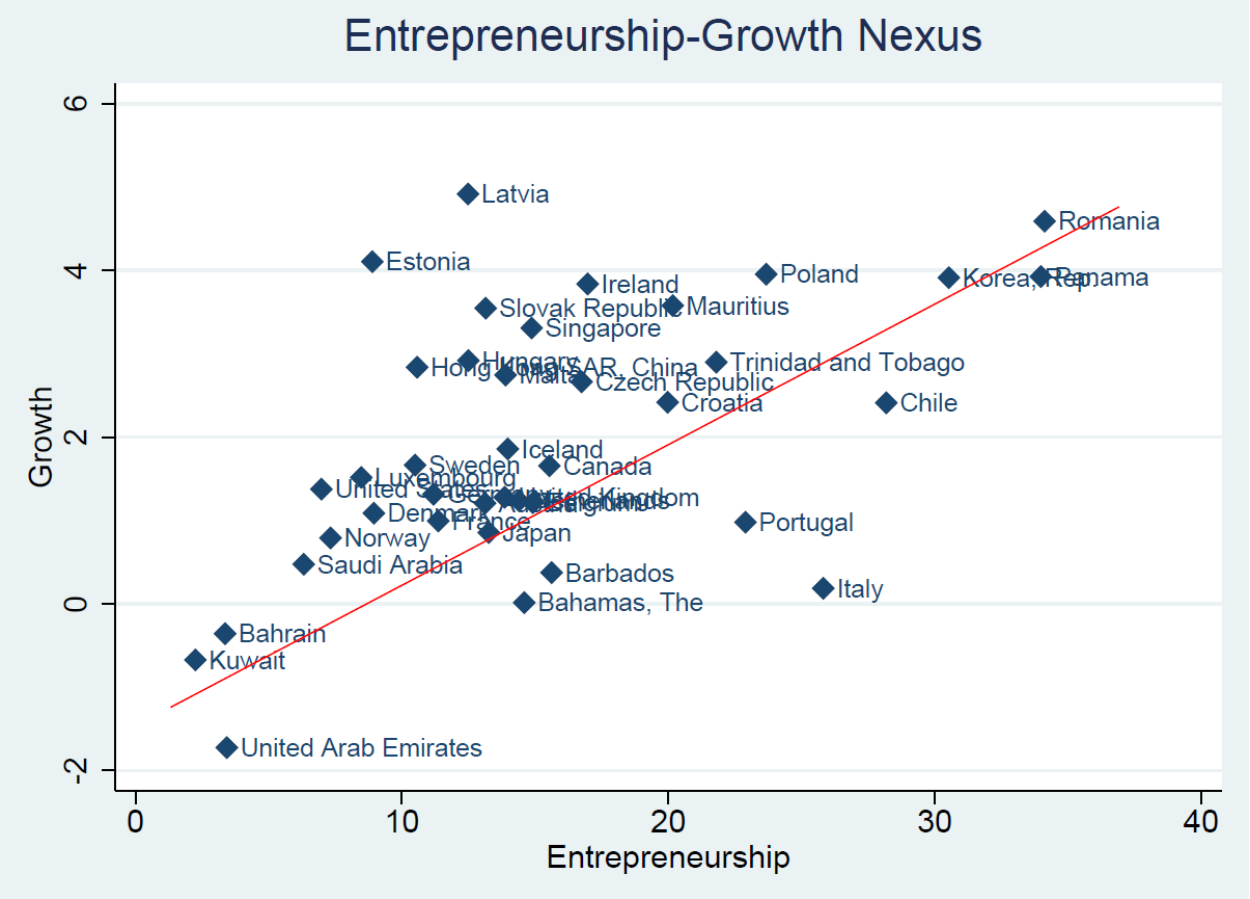

Figure 4.3 Entrepreneurship-Growth Nexus for High-income Countries

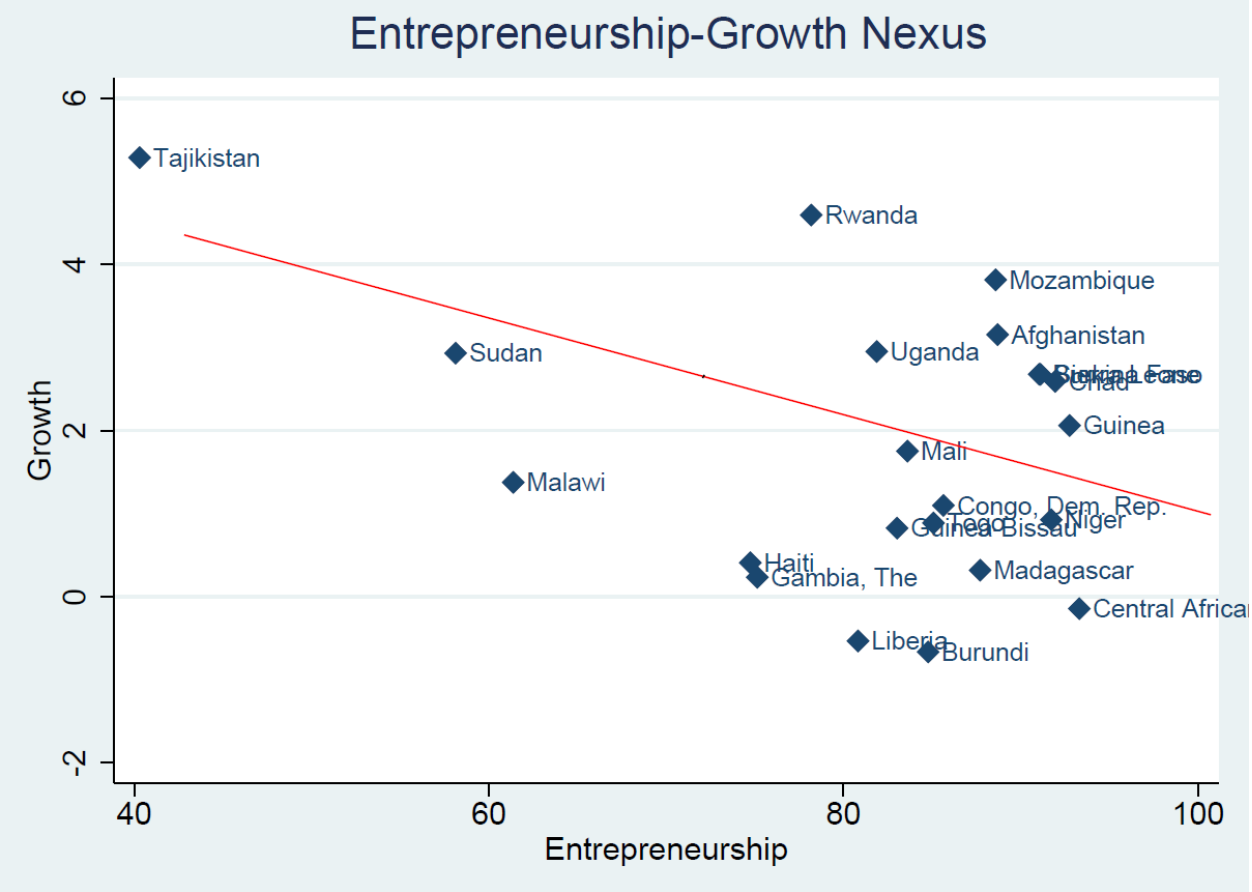

Figure 4.4 Entrepreneurship-Growth Nexus for Low-income Countries

To understand the entrepreneurship-growth nexus among the selected high- and low-income group of countries there is the need to have a general visualization among the two variables. The scatter diagram above reveals an interesting relationship between entrepreneurship and growth among the selected high-income countries and low-income countries. Before illustrating the scatter diagram, some caveats were taken into consideration. First, we consider a pooled OLS estimation where we have a "time series of cross sections," but the observations in each cross section do not necessarily belong to the same unit (Wooldridge, 2010). As it can be observed in the context of this analysis, the observation in each cross section refers to the entrepreneurship-growth nexus for each unique country within the cluster of high- and low-income countries.

In the case of high-income group of countries, it can be deduced that there is a positive correlation between entrepreneurship and growth. Using a cluster of 39 countries, we can boldly conclude that entrepreneurship is contributing towards economic growth and development amongst the selected countries. Each dot represents a single country and from the direction of flow it can be concluded that the correlation of the fitted values is positive. What this means is that, the economically active persons who are working on their own account contributes positively to growth.

In the case of low-income countries however, it can be observed that based on a cluster of 22 countries, collectively there is an inverse relationship between entrepreneurship and growth and most of the countries are scattered away from the mean. In a scatter graph, the correlation

between two variables is said to be stronger or weaker when the data points come to forming a straight or dispersed line when plotted along the mean or fitted values.

Observing the scatter diagram carefully, it can be concluded that collectively, the impact of self-employment on growth amongst the selected high-income countries is relatively stronger compared with the low-income countries. The reason for this sort of relationship can be backed with evidence from the literature. For instance, Boudreaux & Caudill (2019), found similar results and associated it with weak institutions amongst the low-income countries. Baumol (1990) also introduces the concept of productive and unproductive entrepreneurship which tend to have a positive and negative impact on growth respectively. Typically, unproductive entrepreneurship emanates from economies with weak structures where rent-seeking activities, tax evasion and avoidance are dominant. Desai and Acs (2007) delve deeper by introducing the concept of destructive entrepreneurship. They delineate that destructive entrepreneurship has a negative impact on Gross Domestic Product. More often than not destructive entrepreneurship stifles innovation. According to Schumpeter's theory however innovation or creativity drives entrepreneurship which in the long-term results in growth. Hence if innovation is suppressed, then entrepreneurship is discouraged, and growth will not be achieved. Acs (2010) therefore ties the loose ends together and concludes that destructive entrepreneurship is most likely to occur in developing countries where the incentive structures need to be strengthened. Expanding on Rostow's (1960) stages on economic growth, Porter et al (2002), identify three stages on growth namely factor-driven stage; efficiency-driven stage; and innovation-driven stage. Countries found in the factor-driven stage are characterized by agricultural self-employment, low-income and compete through low-cost efficiencies. Within the context of this analysis, low-income countries can be classified among the factor-driven stage. Most economies transition through the efficiency driven stage to the innovation driven stage. The innovation driven stage is characterized by high value-added industries in which entrepreneurial activity is important. Within the context of this analysis, high-income countries can be classified among the innovative-driven stage. Based on the evidence from the literature stated in the fore going it can be concluded that the results from the scatter diagram conform with theory.

The graphical representation provides a simple framework on the type of entrepreneurship that is practiced across selected high- and low-income countries. Again, the graphical representation serves as a framework which directs us to the next research objective. In the subsequent objective, the study will delve deeper into analysing the unit roots as well as the quantitative impact of entrepreneurship on growth across the cluster of high- and low-income countries. The system GMM is used to quantitatively analyse the impact of entrepreneurship on growth.

4.3 Unit Root Test

In investigating the relationship between entrepreneurship and growth across the cluster of high and low income countries there is the need to test for the existence of unit root or otherwise in the series. To ensure that the panel data series are stationary and that the results produced are not spurious, the Im-Pesaran Shin test has been employed. Within the content of the Im-Pesaran Shin, the null hypothesis is the presence of unit root in the panel series (non-stationarity). This is tested against the alternative that some panels stationary. The tables below show the unit root test results for the cluster of high and low income countries.

Table 4.3: Unit Root Test for High Income Countries

Variable	w-t-bar statistic		P-value	
	level	Level & first difference	level	Level & first difference
GDP per capita growth	4.779	-	0.000	-
Self-employment	1.8019	-	0.0358	-
Unemployment	1.9508	-	0.0255	-
Inflation	3.9144	-	0.000	-
LFPR	-0.4438	-5.3234	0.3286	0.000
Savings	1.7157	-9.2384	0.9569	0.000
Domestic credit	-2.5745	-	0.005	-
Economic openness	-16.3673	-	0.000	-
Corruption Perception Index	-1.2335	-7.8258	0.1087	0.000

Author's own estimation

From the table, it can be seen that some of the variables are stationary at the level whiles some only became stationary after taking the first difference. GDP per capita growth, Self-employment, Unemployment, Inflation, Domestic credit and economic openness were all stationary at the level. Statistically, we say these variables are integrated of order zero (I. 0). Labor Force Participation Rate (LFPR), Savings and Corruption Perception Index were not stationary at the level, however after taking the first difference these variables were also stationary. Theses variables are integrated of order one (I. 1). It can therefore be concluded that all the underlying panel series in the study are integrated of order zero and order one [I.0 and I.1]. The presence of unit root in the data has both statistical and economic implications worth noting. Statistically, the presence of unit root in the data has the potential of producing spurious relationships when ordinary least squares methods are applied on the data. It is thus important to know the order of integration of each of the series in the model prior to estimation. The economic implication of unit root is that shock to any of the variables will have a lasting effect (lack of mean reversion). From the results however, some of the variables were not stationary at the levels hence had unit root. Variables that are non-stationary have permanent shock effect. However, to correct a non-stationary series, the differencing approach is used. After differencing the series, the first time, the variables were all stationary. Stationary series have temporary shock effects and as such estimating a regression with stationary variables would help avoid spurious results. Based on the stationarity test results therefore, the study proceeded to use the GMM regression approach to analyse the impact of entrepreneurship and growth.

Table 4.4: Unit Root Test for Low Income Countries

Variable	w-t-bar statistic		P-value	
	level	Level & first difference	level	Level & first difference
GDP per capita growth	-6.5553	-	0.000	-
Self-employment	-7.5099	-	0.000	-
Unemployment	-8.9501	-	0.000	-
Inflation	-17.9746	-	0.000	-
LFPR	-3.0348	-	0.0012	-
Savings	-4.4243	-	0.000	-
Domestic credit	-5.2418	-	0.000	-
Economic openness	-6.5677	-	0.000	-
CPI	-5.4418	-	0.000	-

Author's own estimation

For the low income countries, it can be observed that all the variables were stationary at the level, Self-employment, Unemployment, Inflation, Labour Force Participation Rate, Savings, Domestic credit, economic openness, Corruption Perception Index were all stationary at the level, i.e. integrated of order zero (I. 0). Here again, it can be concluded that all the underlying panel series in the study are integrated of order zero. Since the variables are stationary it can be concluded the results produced are not spurious or biased.

4.4 Impact of entrepreneurship on growth.

The first research objective generally analyses the trends and patterns of entrepreneurship and growth. This gives a broad overview on the behavioural patterns of entrepreneurship and growth across the cluster of high- and low-income countries. To specifically analyse the impact of entrepreneurship on growth and to analyse the degree of responsiveness of entrepreneurship on growth, a more robust estimation technique is required. The system GMM is therefore used to execute the second research objective because, it is an improved version of the difference GMM and as such, it is more efficient and robust to heteroskedasticity and autocorrelation. Also, when there are endogeneity problems among the variables of interest, the system GMM is the best estimator to use. The variables of interest chosen are selected based on evidence from the literature as well as availability of data.
Based on the specified model:

$$lnGDPPCG_{it} = \theta + \gamma(lnSELF)'_{it} + \varphi(controlVar)_{it\ldots nt} + u_{it} \qquad (4.1)$$

The regression results for the system GMM is thus presented below:

Table 4.5: System GMM results for High-income countries

Variables	*Coefficient*	*P value*
SELF	**0.080*** **	**0.000**
UNEMP	-0.069	0.090
INF	**-0.048*** **	**0.009**
LFPR	**0.045** **	**0.011**
SAV	**0.321** **	**0.028**
DCPS	0.0038	0.617
ECONOPEN	**0.015** **	**0.020**
CPI	**0.752*** **	**0.003**
No. of observations	617	

No. of groups	19
Wald chi2(7)	71.89
Prob > chi2	0.0000
Group variable	Country
Time variable	Year

*Note: *****, **, *** represents statistical significance at 1%. 5% and 10% respectively. (Source: Author's own calculation).*

Table 4.5 shows the results for the cluster of high-income group of countries. To ensure that the model does produce any spurious results the unit root test has been conducted. From the results it can be observed that, self-employment as proxied to represent entrepreneurship has a positive and significant effect on growth. Effect of entrepreneurship (*represented with SELF*) on economic growth was observed to be 0.080 at a 1% statistical significance level. This means that for the cluster of high-income countries, the percentage of employed persons who are working on their own account contributes positively to growth, ceteris paribus. In other words, an increase in entrepreneurship seems to have a positive impact on growth. Other significant variables are Inflation, Labor Force Participation Rate, Savings, Economic Openness and Corruption Perception Index. It can be observed that inflation has a negative and significant impact on growth with a coefficient value of 0.048. What this means is that, persistent increase in the general price level does not necessarily aid growth within the cluster of high income countries. Labor Force Participation Rate was also positive and significant with a coefficient value of 0.045. This means that, economically active persons within the cluster of high income countries contribute positively to growth. Savings was also positive and significant with a coefficient value of 0.321. Within the context of this study Gross domestic savings is used as a proxy to represent savings rate. This is simply calculated as Gross Domestic Product (GDP) less final consumption. Hence, an increase in domestic savings will results in growth. Economic openness, which is simply net exports was also positive and significant with a coefficient value of 0.015 and lastly Corruption Perception Index (CPI) was positive and significant. A scale of 0 to 100 is used to calculate the Corruption Perception Index, where 0 is significantly corrupt and 100 is very clean. A positive coefficient value therefore means that higher CPI has a positive impact on growth and the reverse is true. Unemployment and Domestic Credit to Private Sector had a coefficient value of -0.069 and 0.0038 respectively but were not significant.

Table 4.6: System GMM results for Low-income countries

Variables	***Coefficient***	***P value***
Variables	Coefficient	P value
SELF	**-0.057****	**0.034**
UNEMP	-0.140	0.176
INF	**-0.021****	**0.023**
LFPR	**0.285*****	**0.003**
SAV	0.009	0.477
DCPS	-0.039	0.295
ECONOPEN	**0.095*****	**0.000**
CPI	**0.073****	**0.047**
No. of observations	379	
No. of groups	19	
Wald chi2(7)	22.75	
Prob > chi2	0.0068	
Group variable	Country	
Time variable	Year	

*Note: *****, **, *** represents statistical significance at 1%. 5% and 10% respectively. Source: Author's own calculation*

Table 4.6 on the other hand shows the results for the cluster of low-income group of countries. The unit root test was conducted to ensure the model does not produce biased or spurious results. From the results it can be observed that, self-employment as proxied to represent entrepreneurship has an inverse relationship with growth. Effect of entrepreneurship on economic growth was observed to be -0.057 at a 5% statistical significance level. This means that for the cluster of low-income countries, the percentage of employed persons who are working on their own account does not necessarily contributes to growth. Other significant variables which are worth mentioning are Inflation, Labor Force Participation Rate, Economic openness and Corruption Perception Index. With a coefficient value of -0.021 it can be concluded that there is an inverse relationship between inflation and growth. Here again, we can say that persistent increase in the general price level does not necessarily aid growth within the cluster of low income countries. Labor Force Participation Rate was also positive and significant with a coefficient value of 0.285. This means that, economically active persons within the cluster of low income countries contribute positively to growth. Economic Openness was also positive and significant at a 1% significance level. With a coefficient value of 0.954 it can be concluded that positive net export values result in growth of the economy. Corruption Perception Index (CPI) was positive and significant. A positive coefficient value of 0.073 therefore means that higher CPI has a positive impact on growth. A scale of 0 to 100 is used to calculate the Corruption Perception Index, where 0 is significantly corrupt and 100 is very clean. Unemployment, Savings and Domestic Credit to the private sector were however not statistically significant.

The findings from both high- and low-income countries also demonstrate that it is not necessarily about the quantity or number of people who venture into entrepreneurship that is important, but rather the type of entrepreneurship that is practiced should be the primary focus. Comparing the results on GDP per capita growth and self-employment for the high- and low-income countries, we can clearly notice that, for the high-income group of countries, entrepreneurship plays a positive and significant role in economic growth. However, for the low-income group of countries there is an inverse relationship with growth. This could be attributed to the type of entrepreneurship being practiced, evidence from the empirical literature has proven this assertion true. For instance, Valliere and Peterson (2009), using data from the Global Entrepreneurship Monitor (GEM) on 44 countries found out that a major share of economic growth rates in developed countries can be attributed to high-expectation entrepreneurs (entrepreneurs who expect to achieve rapid growth in employment size) who leverage government investments in knowledge creation and regulatory independence. However, this effect does not exist in developing countries. Baumol (1990), also emphasize that, productive entrepreneurship which is backed by innovation leads to growth whiles unproductive entrepreneurship like rent seeking does not aid growth. Acs (2010) is also of the view that the so called opportunity based entrepreneurship aids growth but the necessity based entrepreneurship does not aid growth. Thus far, the novel conclusion drawn is that qualitative entrepreneurship is the necessary condition for growth to occur but not quantitative entrepreneurship.

4.5 Drivers of entrepreneurship (Hausman- FE & RE)

In the previous objective, the system GMM was used to quantitatively analyse the role of entrepreneurship on economic growth. It was observed that entrepreneurship aids growth positively in the high-income group of countries but within the cluster of the low-income group of countries, entrepreneurship does not aid growth. It is therefore important to identify the factors which influence or drive entrepreneurship amongst the different clusters of high- and low-income countries.

Since we have a limited understanding of the factors which specifically influence or drive entrepreneurship itself, it is necessary to draw some motivation from the principles of the entrepreneurial ecosystem to vividly understand what influences entrepreneurship. The entrepreneurial ecosystem plays a very important role in shaping the entrepreneur's intensions to start or not to start up a business. The factors which acts as a catalyst to boost entrepreneurship or the factors which acts as inhibitors to hinder entrepreneurship are therefore worth assessing. To examine the factors which influence entrepreneurship within the context of this paper, the Hausman test is used. In panel analysis, which contains both cross sectional and time series elements, the Hausman test can be used to distinguish between Fixed Effect Model (FEM) and Random Effects Models (REM) and hence the decision to either use fixed or random effect model is determined by the Hausman test. As discussed in chapter three, if the value of Hausman is greater than 5% then the random effect model is more appropriate. If the value of Hausman is less than 5% then the fixed effect is more appropriate. For this research objective, it is important to know which of the models (REM or FEM) provides the best and efficient results. This also gives a heads up about the degree by which the selected variables of interest drive or influence entrepreneurship and also to understand why some cluster of countries are more entrepreneurial than others. In order to extract the true story built in the database the right model needs to be used. This implies that, in other to understand how the selected variables of interest influence entrepreneurship, the best estimation technique should be employed.

Arin et al (2014) in their work, 'Determinants of entrepreneurship' emphatically state that the purpose of their review was not to list all relevant macroeconomic variables but, rather, to analyse well-known, theory-based determinants of aggregate entrepreneurial activity. As a results, drawing on recent literature like the works of Arin et al (2014) and other authors like Garcia (2013); Yu and Stough (2006); Grilo and Thurik (2004) as well as availability of data, the following variables are selected: Unemployment (UNEMP), Inflation (INF), Labour Force Participation Rate (LFPR), Savings (SAV), Domestic Credit to Private Sector (DCPS), Economic openness (ECONOPEN), and Corruption Perception Index (CPI). The goal is to obtain some novel results and compare it with findings in literature. In addition to the evidence from the literature and availability of data, the study draws a lot of motivation from the Isenberg's model on entrepreneurship ecosystem to arrive at the chosen variables. According to the Isenberg model of the entrepreneurial ecosystem, there are six important key dimensions which influence entrepreneurship. "These are: policy (leadership, government); finance (financial capital); culture (success stories, societal norms); supports (infrastructure, support professions); human capital (labour, educational institutions); and markets (early customers, networks)". Within the framework of these six key dimensions, other elements which drive entrepreneurship are also incorporated together (Isenberg, 2011). Linking the Isenberg's model with the variables selected, we can group economic openness and unemployment under the policy dimension. Under finance, domestic credit to private sector can be found. Labour Force Participation Rate can be found under Human capital, inflation can be considered under the market dimension and Corruption Perception Index can be categorized under the cultural dimension. Based on these variables, the results of the Hausman test are presented below:

4.5.1 Hausman Test Estimation

The model for Hausman test estimation takes the:

$$y_{it} = \beta^0 + \beta i X_{it} \ldots\ldots + \beta n X_{it} + \alpha_{it} + u_{it} \qquad \ldots (4.2)$$

This is transformed to suit the context of the analysis as shown below

$$SELF_{it} = \beta^0 + \beta 1 UNEMP_{it} + \beta 2 INF_{it} + \beta 3 LFPR + \beta 4 SAV + \beta 5 DCPS + \beta 6 ECONOPEN_{it} + \beta 7 CPI_{it} + \alpha_{it} + u_{it} \quad \ldots (4.3)$$

Table 4.7 Random and Fixed Effect Estimation for High-income countries

Variable	***RE***		***FE***	
SELF (Dependent)	Coefficient	P-value	Coefficient	P-value
UNEMP	**0.235*** **	**0.008**	**0.264**	**0.005**
INF	**0.408*** **	**0.000**	**0.0456**	**0.000**
LFPR	**-0.0968** **	**0.021**	**-0.103**	**0.016**
SAV	**-0.184*** **	**0.000**	**-0.174**	**0.000**
DCPS	-0.025	0.176	-0.023	0.222
ECONOPEN	0.016	0.344	0.017	0.309
CPI	**-0.973*** **	**0.000**	**-0.101**	**0.000**
constant	30.082	0.000	29.735	0.000
No of Obs	731			731
No. of groups	21			21
R-sq : overall	0.2684			0.2677
Wald chi2(7) / F	265.22			36.34
Prob > chi (2) / Prob> F	0.000			0.000

Source: Author's own calculation

*Note: *****, **, *** represents statistical significance at 1%. 5% and 10% respectively.*

Table 4.7.1 Hausman results for High-income Countries

Variables	**Coefficients**		
	(b)	(B)	(b-B)
SELF (Dependent)	RE	FE	Difference
UNEMP	0.235	0.264	-.029
INF	0.408	0.0456	.362
LFPR	-0.0968	-0.103	.006
SAV	-0.184	-0.174	-.009
DCPS	-0.025	-0.023	-.002
ECONOPEN	0.016	0.017	-.001
CPI	-0.973	-0.101	.004

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficient not systematic
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 4.87
Prob>chi2 = 0.7042
V_b-V_B is not positive definite

To determine which estimator (Random or Fixed Effect) to best apply, we test the hypothesis that the Random Effect is independent of the explanatory variables against the alternative that the Random Effect correlates with the explanatory variables. The rule of thumb for the Hausman test is that, if the P value is statistically significant then we reject the null hypothesis and Fixed Effect is appropriate. On the other hand, if the P value is not statistically significant then we accept the null hypothesis and Random Effect is appropriate. From the Hausman test results, we can boldly conclude that Random Effect is more appropriate. This is because the P value (0.7042) is not statistically significant at a 5% significance level. Hence the coefficient of the Random Effect model is used to explain the drivers of entrepreneurship.

Considering the cluster of high-income countries, it can be observed that the significant variables which influence or drive entrepreneurship are, Unemployment, Inflation, Labor Force Participation Rate, Savings and Corruption Perception Index.

With a coefficient value 0.235 we can say that unemployment drives entrepreneurship positively. This means that people who are unemployed are more likely to venture into entrepreneurship than those who are already employed. Thus far, within the cluster of high income countries, unemployment can be considered as a major driver of entrepreneurship. The results further reveal that inflation significantly drives entrepreneurship. Since one motive of the entrepreneur is to make profit, higher prices in goods and services will be a positive motivator. With a coefficient value 0.408 at a 1% significance level, it can be concluded that inflation drives entrepreneurship within the high income countries. Labor Force Participation Rate, although statistically significant at a 5% significance level has an inverse impact on entrepreneurship. From the results, it can be deduced that within the cluster of high income countries, economically active person who are willing and able to work can easily find jobs to do and hence they do not prefer self-employment but rather prefer to either work in the private or public sectors. Savings was also significant but has an inverse impact on self-employment. Also, Corruption Perception Index was statistically significant but has an inverse impact of entrepreneurship. Based on the results of the analysis Domestic Credit to Private Sector and Economic Openness were not statistically significant. In short, within the cluster of high income countries the significant determinants of entrepreneurship, based on data used are Unemployment, Inflation, Labor Force Participation Rate, Savings and Corruption Perception Index.

Table 4.8 Random and Fixed Effect Estimation for low-income countries

Variable	***RE***		***FE***	
SELF (Dependent)	Coefficient	P-value	Coefficient	P-value
UNEMP	**0.025**	**0.000**	**0.005**	**0.000**
INF	-0.016	0.264	-0.017	0.253
LFPR	0.070	0.261	0.063	0.317
SAV	**0.076**	**0.001**	**0.077**	**0.001**
DCPS	**0.245**	**0.000**	**0.217**	**0.004**
ECONOPEN	**-0.064**	**0.007**	**-0.062**	**0.013**
CPI	**-0.171**	**0.003**	**-0.172**	**0.003**
constant	94.989	0.000	95.088	0.000
No of Obs	413			413
No. of groups	21			21
R-sq : overall	0.4676			0.4673
Wald chi2(7) / F	355.71			46.88

Prob > chi (2) / Prob> F	0.0000	0.0000

*Note: *****, **, *** represents statistical significance at 1%. 5% and 10% respectively. Source: Author's own calculation*

Table 4.8.1 Hausman results for low-income Countries

Variables	**Coefficients**		
	(b)	(B)	(b-B)
SELF (Dependent)	RE	FE	Difference
UNEMP	.0248906	.005109	.0197816
INF	-.0162288	-.017318	.0010892
LFPR	.0698353	.0639683	.005867
SAV	.0767957	.0773109	-.0005152
DCPS	.2446128	.2177404	.0268724
ECONOPEN	-.0646043	-.0617878	-.0028166
CPI	-.1709579	-.1717192	.0007613

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficient not systematic
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.00
Prob>chi2 = 1.0000
V_b-V_B is not positive definite

In view of the results of the cluster of low-income countries the Random Effect model was more appropriate for the estimation. Once more, it was observed that the P value of 1.0000 was not statistically significant at a 5% significance level as such the coefficient of the Random Effect model is suitable to explain the drivers of entrepreneurship. Considering the results from the cluster of low-income countries, we see that Unemployment, Savings, Domestic Credit to Private Sector, Economic openness and Corruption Perception Index have a significant influence on entrepreneurship based on the data used. With a coefficient value of 0.025 we can justify that unemployment drives entrepreneurship in a positive way. This suggests that, unemployed persons within the cluster of low income countries are more likely to venture into entrepreneurship. Savings was also positive and significant with a coefficient value of 0.076. That is to say that, within the cluster of Low Income Countries higher savings rate drives entrepreneurship in a positive manner. In the same vein, it was observed that Domestic Credit to Private Sector drives entrepreneurship positively. With a coefficient value of 0.245 we can conclude that the availability of credit facilities has a positive and significant impact on entrepreneurship. Economic openness and Corruption Perception Index were negative and significant. With a coefficient value of -0.064 we can justify that economic openness has an inverse impact on entrepreneurship. That is to say that, for the low-income group of countries a decrease in non-domestic transactions seems to have a positive impact on entrepreneurship. It therefore implies that, an increase in domestic transactions will rather boost entrepreneurship activities. More foreign firms will kill local start-ups. Consequently, Low-income countries should focus more on strengthening their domestic structures and institutions before progressing to the international level. Also, one of the reasons why economic openness does not aid growth significantly in the low-income countries might be associated with exportation

of goods in the raw state. Refining and adding value to the goods before exporting it is of importance. Also, Corruption Perception Index was statistically significant but has an inverse impact of entrepreneurship. Higher corruption rate means weak institutions and this deters entrepreneurship whiles low corruption rates encourage entrepreneurship. Inflation and Labor Force Participation Rates were however not statistically significant.

The general conclusion that can be drawn after critically observing the results for both high- and low-income countries is that the selected variables of interest drive entrepreneurship differently. With the aid of the Hausman test however, it has been brought to light which factors hinder or aid entrepreneurship across the cluster of high- and low-income countries.

4.6 Diagnostic and Stability test

4.6.1 Breusch-Pagan Lagrangian multiplier Test

Since the Random Effect was considered to be more appropriate after conducting the Hausman test, the Breusch-Pagan Lagrangian multiplier test for random effects is employed to test for the presence or absence of heteroscedasticity. The Breusch-Pagan Lagrangian multiplier tests for the overall significance of the regression. The results for the Breusch-Pagan LM tests for the cluster of high- and low-income countries are shown below:

Table 4.9 Breusch and Pagan Lagrangian multiplier test for random effects - High-income Countries

	Var	sd = sqrt(Var)
Selfemployment	60.67223	7.789238
e	45.67187	6.758097
u	5.84313	2.101518
	chibar2(01) = 72.63	
	Prob > chibar2 = 0.1021	

*Note: *****, **, *** represents statistical significance at 1%. 5% and 10% respectively.*

Source: Author's own calculation

Since the P-value is greater than 0.05, the null hypothesis which states that there is no heteroscedasticity is accepted. Hence the Random Effect regression for the cluster of high-income countries does not suffer from heteroscedasticity.

Table 4.10 Breusch and Pagan Lagrangian multiplier test for random effects - Low-income Countries

	Var	sd = sqrt(Var)
Selfemployment	154.1895	12.41731
e	87.10278	9.332887
u	22.41869	11.82483
	chibar2(01) = 11.82	
	Prob > chibar2 = 0.4413	

*Note: *****, **, *** represents statistical significance at 1%. 5% and 10% respectively.*

Source: Author's own calculation

For the low-income group of countries, it can be observed that the P-value is greater than 0.05, hence the null hypothesis which states that there is no heteroscedasticity is accepted. The Random Effect regression for the cluster of low-income countries does not suffer from heteroscedasticity.

5 Conclusion, Summary and Recommendations

The fundamental conclusions, summary, and policy recommendations are outlined in this chapter. To begin with, the chapter reviews the important findings and conclusions derived from both the theoretical and empirical literature. It then extracts the key conclusions and summary from each study objective, and then recommends specific policies for the cluster of countries. Last but not the least the limitations of the study as well as recommendation for further studies are highlighted.

From the theoretical literature review, the major finding was that all the growth theories do not directly deal with entrepreneurship. This is because the prime motive of the growth theories focusses on factors which increase output or economic growth. Entrepreneurship however is about development; it focuses more on quality of life. As a result, the role of entrepreneurship in economic growth and development has been critically analysed in other theories of economic development such as Schumpeter's model, Knight's theory, McClelland's theory, Audretsch and Keilbach, and others.

Evidence from the empirical literature also reveals that there is currently no widely acknowledged measure of entrepreneurship. This complicates entrepreneurship research since writers employ various operational definitions to measure entrepreneurship. As a result, this study concludes that this could be the reason for the inconsistent results on entrepreneurship issues. To bring some clarity, the study has relied extensively on some panel estimation techniques to critically analyse the role of entrepreneurship in economic growth and development amongst some selected 39 high-income and 22 low-income countries.

Specifically, the study uses descriptive analysis, visualization techniques, system GMM and Random Effect estimations to achieve the research objectives. Based on the results of the first research objective it was concluded that self-employment or entrepreneurship within the low-income countries does not materialize into economic growth compared with the high-income countries. This goes a long way to support the fact that, large corporates rather than individual entities aid economic growth. The principal findings from the second research objective quantitatively confirms this assertion. The results revealed that entrepreneurship has a positive and significant impact on growth in the high-income group of countries but for the low-income group of countries, entrepreneurship has an inverse relationship with growth. Clearly, this can be associated with the type of entrepreneurship that is practiced within the cluster of countries as well as the factors which drive entrepreneurship across the cluster of countries. Consequently, from the third research objective we get to understand even better how some variables influence entrepreneurship across the cluster of high- and low-income countries. Based on the results obtained, specific policy advices are recommended for the cluster of countries.

5.2 Policy Advice

The first policy advice that is recommended after making the comparison is that, a proactive approach rather than a reactive approach towards entrepreneurship should be adopted. Since a greater percentage of the working force within the low-income countries venture into self-employment it can be concluded that low-income countries could be entrepreneurship-driven. As a result, if a proactive approach towards entrepreneurship is adopted it could have a positive impact on growth. A proactive approach towards entrepreneurship simple implies, identifying a problem or an opportunity and converting them into a business. Once this approach is adopted in the cluster of countries (specifically in the low-income countries), entrepreneurship will have

a significant impact on growth. Porter et al (2002) for instance identified a similar relationship between entrepreneurship and economic development, where, at the factor driven stage (mostly dominated by low-income/developing countries) the impact of entrepreneurship on growth is infinitesimal but at the innovation-driven stage (mostly dominated by high-income/advanced countries) the impact of entrepreneurship on growth is relatively high. Acs and Varga (2005) also found out that necessity-based entrepreneurship which is often practiced by developing countries does not materialize into growth but opportunity-based entrepreneurship which is mostly practiced by developed countries often leads to economic growth. Hence, it is recommended for low-income countries to practice and adopt a proactive approach to entrepreneurship thus lowering dependency on reactive or necessity-based entrepreneurship.

A follow up policy advice recommended for the respective cluster of countries, more so, the low-income countries, is that they should embed entrepreneurship into the educational curriculum. Entrepreneurship should be included in the education system such that the active labour force will complete school with the mind-set of creating jobs instead of searching for jobs. The active labour force should be capable of solving problems or identifying new business opportunities and transforming them into profitable ventures. Once entrepreneurship is included in the education curriculum, this can easily be achieved. For example, McClelland (1962) suggested that entrepreneurship should be incorporated into the child-rearing system so that individuals will grow up with a strong desire to succeed, resulting in economic progress. Transferring this knowledge, we can say that, once entrepreneurship is incorporated in the education system the economy will produce citizens who are fully equipped to undertake productive entrepreneurship.

Policies to enhance Innovation, Research and Development (I, R & D) should also be embarked on. Schumpeter (1934), for instance, placed a lot of emphasis on innovation, research and development. He stated in his theory that, to achieve long run growth through entrepreneurship, there is the need to increase innovation. Thus, when there is increase in R&D, entrepreneurs obtain new ideas to enable them to produce a variety of goods, with a variety of goods, consumption will increase, output will increase, and eventually economic growth and development will also increase. As a result, the respective cluster of countries can adopt the so called I, R and D concept in other to achieve sustained growth through innovative entrepreneurship.

It can be observed that most developing or Low Income countries have the inputs; talk of the natural resources, the youthful population, the culture, etc. However, the mechanism through which these inputs will be transformed into output is clearly missing. This mechanism is the entrepreneurial drive and the types and forms of entrepreneurship that is implemented. The study reveals that entrepreneurship serves as a catalyst or a boost to economic growth. Thus the right entrepreneurship, combined with the right inputs will results in economic growth.

In a nutshell, the findings from the study indicate that entrepreneurship is important for economic growth, but its effects vary depending on the level of economic development. Entrepreneurship boosts growth across the cluster of high-income countries but it has a inverse impact on growth in low-income countries. This clearly depends on the type of entrepreneurship practiced, the stage of development of the country, and the metric used to measure entrepreneurship. As a result, the idea that entrepreneurship always promotes economic growth should be considered only in the right context.

5.3 Limitation of the study

One major limitation of studies on entrepreneurship is the metric used to measure entrepreneurship itself. Unlike other studies, where the main dependent variable has a uniformly accepted operational definition, entrepreneurship does not. When it comes to the measures of entrepreneurship many authors have used different matrices and this makes it somewhat challenging to compare results across studies. Within the framework of the analysis, Self-employment was used.

Another limitation is the complexities involved in handling panel data. Although studies which rely on panel data and panel estimation techniques typically provides more information, more variability, and more efficiency than pure time series data, it is quite difficult to obtain the right regression results when the data is not arranged properly. Since data is collected from numerous sources across different countries it becomes very time consuming and very complex to organize. Hence if proper data management techniques are not put in place, it might result in biased estimations.

Disparity in the total number of high- and low-income countries can also be considered as a limitation. In total, 39 high-income countries as against 22 low-income countries were used to make the comparison. This implies that the cluster of high-income countries has 17 countries more, giving the cluster of high-income countries more sample variability compared with the low-income countries. The is associated with the lack of availability of data for most of the low-income countries.

Again, it is important to mention that two extreme cluster of world economies, that is, Low Income Countries (LICs) and High Income Countries (HICs) are considered for the purpose of the study. Hence the conclusions drawn does not cover majority of the world economies found in between LICs and HICs.

5.4 Recommendation for further studies

Based on the research findings as well as the limitations addressed, the following recommendations for future research are made. For instance, other aspects of the topic which were not tackled in the paper should be undertaken in the future. Writing more on sustainable entrepreneurship, the creation of green jobs through sustainable enterprises and green entrepreneurship in general is highly encouraged.

Also, it is recommended that future studies should focus more on developing countries, more specifically, case studies on individual countries with the use of primary data estimation techniques as well as other methodologies can be embarked on. This can reveal the true picture of the entrepreneurship-growth nexus in the individual countries.

Developing a framework on proactive entrepreneurship that can be adopted by the cluster of high- and low-income countries is also encouraged.

Other areas which require further studies and research is the aspect of Minute Businesses. In future research, what the study seeks to achieve is to advocate for the cluster of countries, especially, low-income countries to consider formalizing Minute Businesses (MB). More often than not, we hear of the small and medium scale Enterprises (SMEs) but in most developing economies there exist another category which is mostly predominant in the economy. This is the Minute Businesses (MB) category; this category of business is even smaller than the Small-

Scale Enterprises. Typically, these types of businesses are not captured in the records and database of the Global Entrepreneurship Monitor or World Bank indicators (and this could be another reason for the mixed results in previous studies). In most developing countries where jobs are not readily available, majority of the citizens operate in these kinds of minute businesses and as such formalizing them and creating a database where such activities can be captured is highly recommended.

6. References

Acs, Z. J. & Armington C., 2004. Employment Growth and Entrepreneurial Activity in Cities', Regional Studies. In: 1, ed. *How is entrpreneurship good for economic growth.* s.l.:Innovations, pp. 97-107.

Adusei, M., 2016. Does Entrepreneurship Promote Economic Growth in Africa?. *African Development Review,* 28(2), pp. 201-214.

Anscombe, F. J, 1973. Graphs in Statistical Analysis. *The American Statistician,* February, 27(1), pp. 17-21.

Arellano, M. & Bond, S., 1991. Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. *The Review of Economic Studies,* Volume 58, pp. 277-297.

Arellano, M. & Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics,* Volume 68, p. 29–51.

Audretsch, D. B. & Thurik, A. R., 1998. The Knowledge Spciety, Entrpreneurship and Unemployment. *Research Report.*

Audretsch, D. B. & Keibach, M., 2007. Entrepreneurship Capital and Economic Growth.. *Oxford review of economic policy*, 23(1), pp. 63-78.Brock, W. A. & Evans, D. S., 1989. *Small Business Economics.* 1 ed. s.l.:s.n.

Blundell, R. & Bond S., 1998. Initial conditions and moment restrictions in dynamic panel data models.. *Journal of Econometrics ,* Volume 87, pp. 115-143.

Bond, S., A. Hoeffler, and J. Temple, 2001. GMM Estimation of Empirical Growth Models, *Economics Papers, 2001-W21*, Economics Group, Nuffield College: University of Oxford

Bruns, K., Bosman, N., Sanders, M. & Schramm, M, 2017. Searching for the existence of entrepreneurial ecosystems: a regional cross-section growth regression approach.. *Small Business Economics.*

Bryman, A. & Bell, E. 2003. *Business Research Methods.*. s.l.:Oxford University Press, Oxford..

Burns, P., 2011. *Entrepreneurship and small business: start-up, growth and maturity.* 3rd ed. New York: Palgrave Macmillan.

Carree, M. & Thurik R., 2008. The Lag Structure of the Impact of Business Ownership on Economic Performance in OECD Countries. *Small Business Economics,* Volume 30 .

Carlsson, B., 1992. The Rise of Small Business: Causes andConsequences. In: *Singular Europe,Economy and Policy of the European Community after1992.* s.l.:Ann Arbor, MI: University of Michigan Press, p. 145–169.

Cooper, D. R. & Schindler, P. S., 2003 . *Business Research Methods.* 8 ed. s.l.:McGraw-Hill.

Deakins, D. & Freel. M., 1998. Entrepreneurial learning and the growth process in SMEs. *The Learning Organization,* 5(3).

Dilanchiev, A., 2014. Relationship between Entrepreneurship and Unemployment: The Case of Georgia. *Journal of Social Sciences,* 3(2).

Doran, J., Nóirín, M. & Marie, O., 2018. The role of entrepreneurship in stimulating economic growth, Cogent Economics & Finance. Volume 6, p. 10.

Fritsch, M. & Wyrwich, M., 2014. The long persistence of regional levels of entrepreneurship: Germany 1925 to 2005. *Regional Studies,* Volume 48, p. 955–973.

Greene, H.W., 2008. *Econometric analysis.* 6th ed. s.l.:Upper Saddle River, N.J.: Prentice Hall.

Hansen, L., 1982. Large Sample Properties of Generalized Method of Moments Estimators. *Econometrica,* Volume 50, pp. 1029-1054.

Hausman, J. A., 1978. Specification Tests in Econometrics,. *Econometrica,* Vol. 46(No. 6), pp. 1251-1271.

Hébert, R. F. & Link A. N., 1989. In search of the meaning of entrepreneurship. *Small Business Economics,* Volume 1, pp. pp. 39-49.

History crunch (2018) https://www.historycrunch.com/negatives-of-the-industrial-revolution.html#/

Holtz-Eakin, D., Newey W., &. Rosen, H. S. 1988. Estimating vector autoregressions with panel data. *Econometrica ,* Volume 56, p. 1371–1395

Isenberg, D., 2011. *The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship.* Dublin, Ireland.

Jacobs, R. L. (2011). "Developing a Research Problem and Purpose Statement", in *The Handbook of Scholarly Writing and Publishing*, T. S. Rocco and T. Hatcher (eds.), San Francisco: Jossey-Bass, pp. 125–141.

Jonsson O. P. 2017 On the Term "Entrepreneur" and the Conceptualization of Entrepreneurship in the Literature of Classical Economics; *International Journal of English Linguistics;* Vol. 7, No. 6; ISSN 1923-869X E-ISSN 1923-8703 Published by Canadian Center of Science and Education

Judson A. R. & Owen A. L., 1999. *Estimating dynamic panel data models: a guide for macroeconomists.* Clinton, NY : Hamilton College, 198 College Hill Road, Clinton, NY 13323, USA.

Kaldor N, 1957 *A Model of Economic Growth, The Economic Journal*, Volume 67, Issue 268, 1 December 1957, Pages 591–624,

Knight, F. H., 1942. Profit and Entrepreneurial Functions. *The Journal of Economic History,* Volume 2, pp. 126 - 132.

Lucas, R. E., 1988. On the Mechanics of Economic Development.. *Journal of Monetary Economics,* Volume 22, pp. 3-39.

Miles, D.A. (2017). A Taxonomy of Research Gaps: Identifying and Defining the Seven Research Gaps, Doctoral Student Workshop: Finding Research Gaps - *Research Methods and Strategies, Dallas, Texas, 2017.*

Minniti, M. & Levesque. M., 2008. Recent developments in the economics of entrepreneurship. *Journal of Business Venturing* , November, Volume 23(Issue 6), pp. pp 605-612.

Müller-Bloch, C. & Kranz, J., (2014). A Framework for Rigorously Identifying Research Gaps in Qualitative Literature Reviews, *The Thirty Sixth International Conference on Information Systems, Fort Worth 2015,* pp. 1–19.

Nickell, S., 1981. Biases in Dynamic Models with Fixed Effects.. *Econometrica,* 49(6), pp. 1417-1426

Ogunlana, F., 2018. *The role of Entrepreneurship as a driver of economic growth: A Nigerain Case.* s.l.:Centria University of Applied Sciences .

Omoruyi. E., Olamide, K. S., Gomolemo, G. & Donath O. A., 2017. "Entrepreneurship and Economic Growth: Does Entrepreneurship Bolster Economic Expansion in Africa?. *J Socialomics* , 6(4).

Malthus, T.R., 1820. *Principles of Political economy volume ; History of economic thought and methodology.*

Marinescu P., Sorin. T., & Anna-Maria. G., 2013. *Economic development and entrepreneurship 1st International Conference 'Economic Scientific Research - Theoretical, Empirical and Practical Approaches'.*

McClelland, D., 1962. Business drives and National development. *Harvard Business Review.,* Vol 40(Issue 4), pp. pp 99-140.

Mishra, C. S. & Zachary. R. K., 2014. *The Theory of Entrepreneurship.* New York: New York: Palgrace Macmillan.

Paulin, W. L., Robert, E. C. & Spaulding, M. E., 1982. "Entrepreneurship Research; Methods and Directions,"ed. . In: *The Encyclopedia of Entrepreneurship.* s.l.:Englewood Cliffs, N.J.: Prentice Hall, 352-373.

Persson, O., Cornelius. B. & Landstrom, H., 2006. Entrepreneurial Studies: The Dynamic Research Front of a Developing Social Science,. *Entrepreneurship Theory and Practice,* Volume30 (3), p. 375–398

Ricardo, D., 2016. *The Principles of Political Economy and Taxation..* s.l.:Martino Publishing [[original 1821]..

Saci, K. & Gianluigi, G. &. Ken. H., 2009 . Does financial development affect growth?. *Journal Applied Economics Special Theme: The applied economics of economic growth,* Volume 41(Issue 13).

Salgado-Banda, H., 2005. *Measures and Determinants of Entrepreneurship: An Empirical Analysis." Chapter 3, PhD Thesis, University of London..* s.l.:s.n.

Schumpeter, J. A., 1934. *The Theory of Economic Development.*. Cambridge, MA: Cambridge, MA: Harvard University PresSmith, A., 2007. *An Inquiry into the Nature and Causes of the Wealth of Nations*.. 2 ed. s.l.:MetaLibri

Solow, R., 1956. A Contribution to The Theory of Economic Growth. *Quarterly Journal of Economics*, Volume 70, pp. 65-94.

Stoica, O., Roman, A., & Rusu, V. D. (2020). *The Nexus between Entrepreneurship and Economic Growth: A Comparative Analysis on Groups of Countries. Sustainability, 12(3), 1186.* doi:10.3390/su12031186 10.3390/su12031186

Thanti, M. & Kalu Ojah, 2018. Institutions, human capital and entrepreneurial orientation: implications for growth policy. *Journal of Entrepreneurship and Public Policy.*

Van, P. M., 1999. Some classic views on entrepreneurship. *De Economist*, 147 (3), pp. 311-335.

[WEF], World Economic Forum, 2013. *Educating the next wave of entrepreneurs - unlocking entrepreneurial capabilities to meet the global challenges of the 21st Century*.. Cologny/Geneva: WEF., The travel & tourism competitiveness report . Paper presented at the The World Economic Forum (WEF).

Wennekers, S. & Thurik, R., 1999. Linking Entrepreneurship and Economic Growth.. *Small Business Economics*, Volume 13, p. 27–56.

7. List of Publications

Buah A.S (2022) *Analyzing entrepreneurship-growth nexus across high and low income countries.* Entrepreneurship in the Raw Materials Sector. Proceedings book of the LIMBRA International Scientific Conference. Bartha et al. (Eds) © 2022 Copy right the Author(s), ISBN:978-1-032-19596-4 Open Access: www.taylorfrancis.com, CCBY-NC-ND4.0license

Buah A. S. (2020) *The Effect of Commodity Prices on Exchange rates; Empirical evidence from Ghana.* International Journal of Arts and Sciences; Volume 12, Number 01 pp 287 – 294 ISSN: 1944-6934 / January 2020 (http://www.universitypublications.net/ijas/1201/index.html) - Canada

Buah A.S. and Eshun K.B. (2020) *Analyzing the roles of Entrepreneurship in Economic Growth within the Ghanaian context.* 19th RSEP International Economic, Finance & Business Conference - Prague, Czech Republic – ISBN: 978-605-06961-6-5/December 2020, pp 38-45

Buah A.S. (2020) *Assessment of the Impact of Entrepreneurship on Economic Growth: A Ghanaian Case Study*. FIKUSZ 2020 XV. ISBN 978-963-449-235-1: Proceedings of FIKUSZ 2020, Obuda University, Keleti Faculty of Business and Management, pp 169-182
http://kgk.uni-obuda.hu/fikusz

Buah A.S. (2020) *Analysis of some determinants of entrepreneurship: The Ghanaian context*. PhD Forum 2020 (Doktoranduszok Foruma) – University of Miskolc, 19th November 2020

Buah A.S. (2020) *The Impact of Entrepreneurship on Economic Growth: A Ghanaian Case*
ERENET profile, 2020 Vol. XV No. 4 www.erenet.org ISSN 1789- pp 19 - 27

Buah, A.S and Gubik A.S. (2019) *The Role of Entrepreneurship in Economic Growth: The Picture according to Literature. M*ultiScience - XXXIII. microCAD International Multidisciplinary Scientific Conference. University of Miskolc, May 2019. ISBN 978-963-358-177-3

Buah, A.S. (2019) *The Impact of Overdependence on Primary Export Commodity and its effect on the Local currency: The Ghanaian Case*. SPRING WIND CONFERENCE 2019 INTERNATIONAL MULTIDISCIPLINARY CONFERENCE HANDBOOK (pdf) ISBN 978-615-5586-52-1

Buah A.S. (2018) *Entrepreneurship and Economic growth; Opinions from Literature*
Forum of Doctoral Students, University of Miskolc 2018