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

UNIVERSITY OF MISKOLC

THESIS TOPIC: THE ROLE OF ENTREPRENEURSHIP IN ECONOMIC GROWTH AND DEVELOPMENT; A COMPARATIVE ANALYSIS USING PANEL REGRESSION ESTIMATION

A DISSERTATION SUBMITTED TO THE UNIVERSITY OF MISKOLC IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF PH.D. IN ECONOMICS

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2023

Declaration

I, Buah Aku-Sika confirm that this dissertation submitted for Ph.D. in Economics is my work and is also expressed by my own words. Any uses made within it of the works of other authors in any form (e.g., equations, figures, ideas, tables, and text) are duly acknowledged and a full list of the references employed has been included. I further declare that this dissertation has not been submitted before for any degree or examination in this or any other Higher Education Institution. All errors and omissions are, of course, mine.

Signed: Buah Aku-Sika

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Miskolc, 2023

Acknowledgements

I would like to thank the Almighty God for giving me the strength, knowledge and wisdom to successfully complete the PhD journey.

Also I would like to thank my supervisor Dr. Habil. Andrea S. Gubik for her guidance and friendship throughout the journey. Not only did she play the role of an academic supervisor, but even beyond the borders of academia she mentored and advised me, to help me grow as a person. I acknowledge all the efforts she put in right from the start of this journey to where we are now. Allow me to express my profound gratitude in several dialects to you Dr. Gubik (as I call you); *köszönöm szépen, danke schön, merci beaucoup, medaase bebree, thank you.*

Further, I would thank Professors, Dr. Bartha Zoltan, Dr. Szilágyi Roland, Erika Horváthné Csolák and all the colleagues at the INSTITUTE OF ECONOMIC THEORY AND METHODOLOGY for their teachings and guidance. I am grateful for the time you put aside in your busy schedules to assist me. I hope you will be proud of this work.

Also, I would like to thank my parent Mr. and Mrs. Buah and the entire Buah family, my son, Eshun Kojo Panfo and all my lovely siblings and family members who encouraged and motivated me throughout this journey. I could not have completed this work without your support, diligence and endurance. To my son especially, I am sorry for what I put you through, but it is done now. I hope from now on we can live a normal life as a family; *you can have all the time you need with your mummy*.

Finally, I would like to thank the Hungarian and Ghanaian government for giving me this platform and financial support for my doctoral study at the University of Miskolc.

Dissertation Title: The role of entrepreneurship in economic growth and development; a comparative analysis using panel regression estimation.

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Executive Summary

While common sense would normally suggest that entrepreneurship and economic growth are positively linked, it is uncertain if entrepreneurship is a fundamental predictor of economic growth from both a theoretical and empirical viewpoint. Within the context of this analysis, it has been brought to light the actual role entrepreneurship plays in economic growth by comparing two separate cluster of countries: High-income countries and low-income countries. The discussion starts by comparing and contrasting the variables of interest using basic descriptive statistics. With the aid of visualization techniques, the study then proceeded to give a pictorial view of the selected group of high- and low-income countries' entrepreneurship-growth nexus. Here it was observed that over the 20-year period (1999-2019) average self-employment was higher in the low-income countries than the high-income countries. That is to say that greater percentage of the working force inside the cluster of low-income countries venture into self-employment compared with the high-income countries. It was further observed with the aid of the scatter diagram that, across the group of high-income group of countries, entrepreneurship and economic growth are positively correlated but across the cluster of low-income countries, entrepreneurship and economic growth are negatively correlated. A straightforward framework on the relationship between entrepreneurship and growth is provided by the graphical representation, which leads us to the second goal, which is to quantitatively examine the nexus between entrepreneurship and growth in more detail. The study discovers that, for the high-income group of nations, entrepreneurship plays a positive and important influence in economic growth using a system GMM technique that simultaneously accounts for the dynamic effect of entrepreneurship-economic growth nexus. There is, however, a negative correlation between entrepreneurship and growth for the low-income category of nations. To understand why entrepreneurship influences growth differently across the cluster of high- and low-income countries, the study uses some variables as drivers of entrepreneurship and specifically analyses how each unique variable influence entrepreneurship. Through this we are able to understand the determinants of the causal relationship. With the aid of the Hausman test the drivers of entrepreneurship were brought to light. Panel data on 22 low-income countries and 39 high-income countries from the years 1999 to 2019 were taken into account to produce the results for the stated research aims.

After comparing the results for the cluster of high- and low-income countries, it was generally concluded that low-income countries have majority of the economically active populace working for themselves on their own account (entrepreneurs) but their activities do not influence growth positively. Instead entrepreneurship has a positive and significant impact on growth across the cluster of high-income countries where lesser percentage of the economically active people do not necessarily work for themselves on their own account.

All in all, evidence from this research does not only confirm the findings of some previous studies, but it also reveals previously unknown findings. It was concluded that entrepreneurship promotes economic growth in the high-income countries but not in the low-income countries.

In addition, our evidence finds that qualitative entrepreneurship is a necessary condition for growth but not quantitative entrepreneurship. In short, the role of entrepreneurship in economic growth is not the same amongst high- and low-income countries and as such this paper makes a significant contribution to the field of macroeconomics research and it also suggest some important policy recommendations.

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1 Introduction

1.1 Background of the study

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, Carlsson (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.

Additionally, the industrialization era was characterized by a high level of environmental pollution, bad working conditions, and low wages. As a result, the majority of industrialized or advanced nations started moving in the direction of diminution. In reality, under the leadership of Ronald Reagan and Margaret Thatcher, the governments of the larger economies, including the United States (US) and the United Kingdom (UK), began to implement policies that favored the pursuit of micro, small, and medium-sized firms (Persson et al., 2006). Since then, other nations have adopted a similar strategy, and entrepreneurship is now seen as having a significant impact on 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); Ogunlana, (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.

History of entrepreneurship however dates as far back as the 18th century when John Baptiste Say was known to have coined the term from the French word "entrepreneur" which means "undertaken of a business", (Say, 1803). From the literature, it was also discovered that, other authors suggested that the expression was first used by Richard Cantillon, for instance in the write ups of authors like (Baumol, 2010; Murphy 2010; Peneder 2009). The point here is not to argue about who first made mention of the term entrepreneurship, but to understand the concept and also analyse its impact on growth across developed and developing countries. Entrepreneurship itself was made popular by Joseph Schumpeter in his book "History of Economic Analysis", (Schumpeter, 1954). He stated emphatically that the dynamisms in innovation play an essential role in entrepreneurship. For entrepreneurship to lead to economic growth that element of innovation is very crucial. After he made this statement, a lot of authors like Baumol (2010), Peneder (2009) and other proponent writers have also argued in that same direction. This shows how influential Schumpeter has been when issues of entrepreneurship are being discussed. It is not surprising that Schumpeter has most often been regarded as a classic writer of the subject (Casson, 2014). In fact, it was Schumpeter who first theorized the linkage between entrepreneurship and economic growth through the use of innovation and Research and Development (R&D). Since then, a lot of articles on entrepreneurship and growth have emerged, and mention can be made of works like, Wennekers and Thurik (1999); Audretch et al. (2004); Acs (2010); Stam (2008); Minniti (2010); Marinescu et al. (2013), to mention but a few. All in the name of establishing a linkage between entrepreneurship and economic growth.

It is necessary to have knowledge about growth as well because we are attempting to connect entrepreneurship with growth. For instance, Haller (2012) underlines that an increase in a country's per capita income is a sign of economic progress. Increases in Gross Domestic Product (GDP), Gross National Product (GNP), and National Income (NI) are examples of more quantitative measures of economic growth. According to Haller (2012)'s claim, economic growth is the process of expanding the sizes of national economies, particularly the GDP per capita, making it a well studied macroeconomic phenomenon. Economic development on the other hand does not generate quantitative changes alone but also it captures some qualitative changes as well. It considers other factors like human development, wealth, education, infrastructure and all other qualitative factors which causes the national economy to robustly and cumulatively increase its real national product. The notion that economic growth and entrepreneurship activity are positively and closely linked has unquestionably found its way into the world of the social and behavioural sciences and with most economists, sociologist, policy analysist and even government officials paying so much attention to entrepreneurship,

there is the need to probe further into this status quo. The big question however remains that, does this assertion hold for all countries?

Another important issue which cannot be left out is the issue of persistent and sustained economic growth and development. More recently, the aspect of sustainable entrepreneurship is receiving massive attention as well. The Sustainable Development Goals (SGD's), an assemblage of seventeen (17) universal goals, set up to be a blueprint to achieve better and sustained growth make mention of entrepreneurship as well. It is interesting to note that, the Sustainable Development Goal eight (SDG-8), specifically talks about entrepreneurship and economic growth. The SDG 8, which is "Decent Work and Economic growth" calls for societies to create an environment which allows people to have quality jobs. According to the United Nations Development Program (UNDP) report 2015, the SDG 8 targets entrepreneurship, innovation and creativity and it advices that countries should formalize and grow micro, small and medium sized enterprises. This means, inculcating entrepreneurship into the economy by means of creating decent jobs goes a long way to help the economy attain sustained economic growth through sustainable entrepreneurship. Thus far, it is very important to deliberate more on the issues of entrepreneurship and economic growth, most especially, throwing more light on its impact on the high- and low-income economies and also understanding whether the general notion that entrepreneurship always drives economic growth positively holds for all manner of countries is true or not.

1.2 Statement of the Problem

From the outset, it is clear that entrepreneurship is a crucial tool for economic development. But one factor that needs to be considered is if the impact of entrepreneurship on growth is the same across nations. More specifically, is entrepreneurship always a positive and significant factor in the advancement of economies, whether they be high-income (developed) or low-income (developing) nations? Despite the fact that there are more studies and research projects on entrepreneurship and growth, there is still the need to assess the impact of entrepreneurship on economic growth specifically on developed and developing countries. Past research works on entrepreneurship have demonstrated that entrepreneurship is essential for economic growth, however, the impact of entrepreneurship on growth may vary across countries with diverse degree of developments, which is mostly as a result of the differences in the macroeconomic environments, differences in socio-cultural backgrounds, differences in the political and institutional context and so on. Therefore, it is valuable to compare the nexus between entrepreneurship and growth in other nations.

Therefore, the evidence gap in the literature is the source of the statement problem. According to Jacob (2011), Muller-Bloch and Kranz (2014), and Miles (2017), there is a gap in the evidence in the literature when the findings of a single study permit a conclusion in and of itself but are incongruent when compared to those of other research or viewed from a more abstract angle. According to the actual data, two schools of thought hold opposing views on the contribution of entrepreneurship to economic growth and development. While one school of thought contends that entrepreneurship promotes progress in underdeveloped nations, a second school contends that this is not the case and that only industrialized nations benefit from entrepreneurship. Authors like Adusei (2016), Omoruyi et al. (2017), and Ogunlana (2018) have found that there is a positive and significant relationship between entrepreneurship and growth in emerging nations based on data from the literature. However, it has also been found by Audretsch and Keilbach (2004), Acs and Armington (2004), Carree and Thurik (2008), and Stoica et al. (2020) that while entrepreneurship favorably affects economic growth in some advanced economies, it has the reverse influence in some emerging economies.

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); Minniti 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, 2009). 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 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? The majority of earlier studies on entrepreneurship and growth have found synergies and created fresh research topics. This article aims to accomplish this goal by extending the data utilized by earlier authors, choosing other case studies, particularly those pertaining to industrialized and developing nations, using a different technique, and overall attempting to broaden the scope and limitations of past studies. Therefore, the objective of this study is to go more deeply into this problem and do additional research.

1.3 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?

1.4 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.

Governments, policy makers and policy analysts will get their share of the cake as the outcomes from the research work can be used to implement policies. More specifically, 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. With the panel estimation approach which has been adopted policies will not only be useful at the country level, but it can also be used at the international level or even for the purpose of federal regulations. As the study is focused on the so-called high-income (developed) and low-income (less developed) countries, the policy implication can be directed at both developed and developing countries. Concurrently, the study will provide stakeholders with in-depth knowledge on issues of entrepreneurship and growth. Thus far, the results from the study may also influence scholarly research, theory, practice, educational interventions, and policies in general.

As stated in the introduction section, in fulfilment of the Sustainable Development Goal (SDG 8), this study will go a long way to make some relevant contributions on the verge to attain sustained economic growth and development through sustainable entrepreneurship and a well-structured entrepreneurial ecosystem as well.

1.5 Scope and Delimitations of the Study

Even though entrepreneurship is gaining attention and it is also playing a magnificent role in economic growth and development, it is not possible for this study to cover every aspect of the topic. Certain factors will be missed due to data limits, proper technique, time constraints, and resource limitations. For the purposes of this study, a few chosen high-income nations (designated as developed nations by proxy) and chosen low-income nations (designated as developing nations by proxy) will be taken into consideration. To ensure that our goal is reached the selection and grouping of countries is done based on World Bank's classification of countries into income groups. The World Bank categorizes the world's economies into four income groups: high, upper-middle, lower-middle, and low-income groups. The focus here is however on the extremes (low- and high-income nations). For the purposes of this investigation, the developed countries are those countries which fall in the category of high-income groups whereas the developing countries are those countries which fall in the category of low-income groups. 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). The time period chosen (1999-2019), although not the most current one, is of vital importance as it captures very important events under the scope of macroeconomics. This time period was full of significant economic and social structural changes. For instance, the dotcom crisis in 2000-1, the financial crisis in 2008-9, the Eurozone crises in 2009 - late 2010, the asylum crises 2015-2016, and even the start of the Covid-19 world pandemic in 2019.
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 Global Entrepreneurship Monitor's (GEM) 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.

1.6 Organization of the Study

The research work is grouped into five main chapters. The first chapter contains the introduction, which consist of background of the study, statement of the problem, objectives of the study, research questions, significance, and the scope of the study. The second chapter consists of two main sub sections, the first is the theoretical literature review section, which talks about past growth theories as well as theories in relation to entrepreneurship. The second, is the meta-analysis which makes up the empirical literature review section, it engulfs the concepts and various definitions of the term entrepreneurship, the operationalized definition adopted in the study, previous methodologies used, entrepreneurship in developed and developing countries, the aspect of sustained entrepreneurship as well as other aspects of entrepreneurship. The third chapter vividly introduces and explains the various methodologies to be used in the research work. More specifically, the use of visualizations and descriptive analysis, the use of the Hausman test and the use of the System GMM. Chapter four brings out the main results of the study which were obtained after analysing the data. Last but not the least, chapter five interprets the results, draws the summary, recommendations, and conclusion of the study. As the research unfolds, it will become evident that the various chapters and components of the write up are coordinated holistically.

2 Literature Review

2.1 Introduction

The main idea behind this chapter is to assess the theoretical and empirical works in relation to the topic. The chapter is grouped into two main parts: the theoretical literature review and the empirical literature review. The former takes into account some of the classical, neoclassical and endogenous growth theories as well as theories specially tailored to entrepreneurship. As we will see, entrepreneurship does not appear in most of the traditional growth theories. Endogenous growth theories, however, implicitly make mention of entrepreneurship (through human capital development, technological development, innovation and research and development). Other theories tailored to suit entrepreneurship of course make mention of it. The latter, which is the empirical literature review uses a meta-analysis approach to examine previous works which have been done in relation to the topic. Specifically, various definitions,

methodologies, data sources, time period, case studies and other aspects of entrepreneurship are considered.

2.2 Theories of Growth (Classical, Neoclassical and Endogenous Growth Theories)

When we consider most of the theories of economic growth, we realize that economists have used different economic factors to explain how economic growth and development take place. As a result, we go back in time to examine some previous growth theories and study them to determine if entrepreneurship was likely viewed as one of the aspects that aid economic growth and development.

From the days of classical economists like Adam Smith (in his renowned book, "Wealth of Nation") to Robert Solow's Neoclassical and Exogenous ideas, economic growth theories have evolved over time. These growth theories must be examined since they are thought to be required for economic growth to occur. Growth theories, for example, propose two probable reasons for growth, according to Friedman (1998). The first, puts emphasis on inventions, which primarily consist of supply of productive ideas. The second idea emphasizes incentives; growth could only start if persistent work and entrepreneurial endeavours were free from social stigma, hefty taxes, and other forms of governmental and shareholder participation. The second school of thought also embraces and recognizes entrepreneurship as a major component that promotes economic growth and development since these incentives are put in place to motivate people and corporate entities to start up commercial activities. Again, within the setting of the second school of thought, the so-called entrepreneurship ecosystem which considers the factors that promotes or retards the individuals' decision to become an entrepreneur plays an important role. The first branch of the theory is well developed because the majority of earlier growth theories concentrated on maintaining the status quo; however, economists face a big challenge in explaining not only growth but also how the growth of political, cultural, and religious institutions encourages entrepreneurship in economic growth. Economists have been studying the reasons for the economic expansion that began with the Industrial Revolution and how it may be sustained and enhanced. As a result, the theories that follow will go through in depth such growth ideas as those that link economic growth to entrepreneurship and others that do not.

To begin with, let's turn back the hands of time into the 18^{th} century where several authors began to comment about the economy. For instance, let's consider the classical theories of Adam Smith, Thomas Robert Malthus and David Ricardo and analyse if somehow entrepreneurship was mentioned in these theories.

The "Wealth of Nations" by Adam Smith (1776) is commonly taken to mark the beginning of classical economics. The classical economist's main message is that trade is the source of a nation's wealth or the reason of its economic prosperity. They see commerce as the main engine of economic development and growth. The classical economist basically believes that if two parties freely agree to engage in the action of buying and selling products and services because they both perceive that by doing so, they will gain profit and increase overall wealth, then economic growth and development will eventually occur (Reid 1989). The division of labor was expressly attributed to economic growth by Adam Smith (1776, 2007). He claims that people become more skilled, the amount of time spent switching between activities is reduced, and everyone is more motivated to create their own activities. Specialization is feasible thanks to the division of labor, which boosts production and output. When economies' productivity rises and more products and services are created, they may engage in trade, which leads to economic expansion.

Malthus's contribution to economic growth is immense. In reality, he is most well-known for his renowned theory of population, which postulates that although food increases at an arithmetic pace, population increases at an exponential rate, Malthus (1820). But with regards to economic growth, he is well acknowledged for his "theory of effective demand". It's important to note that in some respects he predicted later economists like Keynes, and in other ways his explanation of economic growth differs from the fundamental classical theory (Choi, 2014). According to Malthus, the challenge of development is comprehending the differences between real gross national product (current wealth) and prospective gross national product (capacity to produce riches). As a result, he illustrates how to make use of a nation's potential for economic development. Increased output and more fair distribution can be used to achieve this. Malthus argued that economic growth is not an innate process but rather involves conscious, intentional effort. Malthus, for example, shows that an increase in population alone will not result in economic expansion unless there is an increase in effective demand (Ayesha, 2005). It is obvious that Malthus did not discuss entrepreneurship in his theory, but rather attributed nation-building to effective demand, which he defined as consumers' willingness and ability to acquire commodities at varied prices. They buy a different amount of a thing at different costs. The Malthus hypothesis simply states that the total number of products given by a producer may be determined by demand. Malthus uses the price and quantity demanded relationship to describe how economic expansion occurs. The model's significance, however, is that effective demand dictates the level of employment, which leads to long-term economic growth. Clearly, this theory, like all other classical theories, does not focus on entrepreneurship.

David Ricardo is credited with developing yet another classical growth theory. He scientifically explains the theory of Adam Smith in his book "The Principles of Political Economy and Taxation" by throwing more light on the function of agriculture and diminishing returns to labour on economic growth (Ricardo, 1911). According to Ricardo, for economic growth to occur, there is the need to growth factor input (like labour and land). However, unlike labour, land is fixed and as labour increases on a fixed land, diminishing returns in occurs. When this happens, food prices increases which result in rise of wages of workers which squeeze profits and ultimately lands the economy into stationary state. Ricardo therefore claimed that this stationarity can be checked by improvement in technological and the specialization brought by trade and only then can growth be attained. Clearly, Ricardo did not attribute economic growth to entrepreneurship.

Although the majority of classical economists did not recognize the importance of entrepreneurship in economic progress, there was one exception. It's worth noting that the guy who created the term "entrepreneurship" is also a classical economist. Jean Baptiste Say coined the term "entrepreneur," emphasizing the entrepreneur's innovative and crucial functions in society. He also recognized that active entrepreneurs must have higher levels of determination and leadership (Say, 1834). Say examined Adam Smith's book "Wealth of Nations" and discovered that, while he agreed with most of Smith's views, the omission of innovative business was a severe error. As a result, he stated in his own writing that it was entrepreneurs that uncovered underutilized resources and relocated them to more productive, higher-yielding locations. This means that entrepreneurs take risks and look for profit prospects, and as a result, they create new markets and opportunities, which leads to long-term economic growth and development. In Say's writings, the entrepreneur is viewed as an economic agent whose job it is to bring about change in the economy (Lancaster, 2012). It is worth noting that, while Jean Baptiste Say did not provide a growth theory with entrepreneurship at its core, he is credited with being one of the first economists to acknowledge entrepreneurship.

Indeed, Richard Cantillon has also gained a lot of attention in the literature of entrepreneurship. Harold et al. (2006), stated categorically that, "Cantillon has been termed as the original thinker of entrepreneurship". Though the starting point of the term "entrepreneur" was initially attributed to Jean-Baptiste Say, it was Cantillon who first made use of the term in a theory form (Hamilton and Harper, 1994; Formaini, 2001; Ebner, 2006). Cantillon's theory of entrepreneurship simply states that, "the entrepreneur operates by taking risk in the midst of uncertainty, through purchasing goods at a low price and selling it at a higher price" (Hébert and Link, 1989). In the days of Cantillon, "entrepreneurs" will purchase a product at a low priced in a village and transport it to bigger cities to sell it at a price which is slightly higher than original price. According to Cantillon anyone who invests with the prime motive of selling goods in the future at an uncertain price is an entrepreneur. From his theory, it can be summed up that, entrepreneurs play a vital role in the supply-side of the economy. They do this by acting on the prospects of arbitrage which is essential for economic growth in the long run.

Economic theory has shifted its emphasis since the 1970s to how to employ limited resources as effectively as possible in order to achieve economic growth. The works of writers like Keynes and neoclassical economists thus rose to prominence at that time. Based on their theoretical underpinnings, theories dealing with industrialized nations and based on abstract models can be divided into two groups. The Neoclassical growth models and the Keynesian framework (Mátyás, 1996)

In John Maynard Keynes' famous work "The General Theory of Employment, Interest and Money" the basis of the Keynesian growth theory is denoted (Keynes, 1936). The main point in the Keynesian model is that, for economic growth and development to take place, there is the need to increase the demand of goods and services. The Keynesian model departs a bit from the traditional classical growth theories. As already mentioned, the basic principle is that for economic growth to take place, there is the need to increase demand. Once demand increases, output increases. An increase in output generates two things; increase in income and a rise in employment. Increase in these two variables are necessary for growth to occur. Keynes motive was to find what can actually cause demand to increase and he concluded that for demand to increase there is the need for an external force, that is the government to step in. According to John Keynes, there is need for government to intervene in an economy through the implementation of fiscal policies such as tax cuts or increases in government spending so as to boost economic growth. Once government increases spending, generally demand for goods and services will also increase and economic growth will be achieved. Keynes propounded this theory based on economic values such as consumption, national income, savings and investments, and the theory was designed to describe why there are changes in the level of economic activity and clearly entrepreneurship was not implicitly considered in the theory.

One model which cannot be left out when issues of growth are being discussed is the Harrod-Domar model. It is interesting to note that two distinct economists; Roy F. Harrod in 1939 and Domar Evsey in 1946, worked individually of one another to create this growth model. Although the details of the Harrod Model and Domar Model may differ, the ideas they convey are so similar that the two models have often been combined and are more usually given as the Harrod-Domar Model (HDM). Its theoretical roots are Keynesian and in the Harrod-Domar model, the importance of saving and investing in an economy is emphasized. First, Harrod tries to show how steady or equilibrium growth may occur in an economy. He introduces the terms "warranted growth," "natural growth," and "actual growth" and argues that the growth rate at which all savings are converted into investments is the warranted growth rate and at this point steady growth may occur. Domar on the other hand argues that investment increases productive capacity on the one hand while increasing total demand on the other. Only when there is a

similar demand for the items produced can productive capacity be used to its full potential. In other words, for the economy to be in a steady state, the total supply (or productive capacity) must equal the total demand (or income). Hence one growth rate is the foundation of the Domar model, however, Harrod, employs three different growth rates: the actual rate, the warranted rate and the natural rate. Again, Domar draws a forward connection between investment and income growth, while Harrod is mostly concerned with the manner in which the investment is linked to the rate of income growth. This investment may enhance the amount of products and services produced by an economy, leading to higher growth (Mankiw et al., 1992). Scarfe & Ryuzo (1977) state that the Harrod-Domar model is predicated on a few presumptions. First, the capital-output ratio is a constant in the model. This only indicates that there is no change in the relationship between capital and production; as a result, national output, which is equivalent to national revenue, is directly proportionate to capital stock. The model also presupposes that real growth rates are equal, savings-to-income ratios are stable, and investments and savings should, when necessary, be equal. Again, the entire idea attributed economic growth to saving, capital accumulation, or investment rather than mentioning entrepreneurship at all.

Based on the Harrod-Domar and Keynesian methods of analysis, Kaldor (1957) created an economic growth model. Savings and capital accumulation do not significantly contribute to economic growth and development, but Kaldor claims that they are tied to technical processes. According to him, income distribution relations impact the degree of saving and, as a result, the level of investment and economic growth (Arrows, 1962). Hence, he believes that technical dynamics and income distribution play a more active role in economic growth and development than savings.

Neoclassical economists, the other theoretical foundation for growth theories, asserted that the shortcomings of the Harrod-Domar model, specifically its irrational assumptions and unstable solutions, compelled them to create new models, which resulted in the creation of the Solow-Swan model, also known as the Solow model, in the late 1950s.

Within the context of neoclassical economics, the Solow Model has been described as a simple model of long-run economic growth. It is the starting point for practically all growth analysis, and even models that are fundamentally different from Solow's are frequently best understood by comparing them to the Solow model (Romer, 1993). It attempts to explain economic growth by taking into account capital accumulation, productivity advances, and population growth, all of which are largely due to "technological advancement." The Solow model states that as the capital output ratio to labor rises, increasing capital investment only raises growth rate in the short term. On the other hand, the marginal product of additional capital units may decline, and an economy may return to a long-term development path with real GDP growing at the same pace as the labor force. The fundamental premise is that increased labor availability and higher labor and capital productivity are necessary to increase the trend of growth. It is asserted that variations in the pace of technological progress between nations account for many of the variances in growth rates. The Solow model utilizes the Cobb-Douglas production function, the most common neoclassical production function, and the growth equation is:

$$Y = aK^bL^c \qquad (2.1)$$

Where Y is output or economic growth, *K* is capital, *L* is labour, *a* is a multifactor productivity (Technological progress) and *b* and *c* represents the diminishing or constant return to scale *(a + b = 1)*. It is clear from the equation that a rise in output or economic growth is dependent on three key variables: an increase in labor (L), an increase in capital stock (K), and an improvement in multifactor productivity (Technological development). The model is

predicated on the following premises: population growth is constant; all consumers save a constant percentage of their income and spend the remainder; all businesses in the economy utilize the same production technology, which uses labor and capital as inputs; and finally, capital depreciation and capital investment are all connected through capital accumulation or savings. Also absent from the Solow growth model was any discussion of entrepreneurship.

It is crucial to note that, despite the flow of technology, major variations in economic development of countries exist, prompting some economists to emphasize the relevance of human capital. Robert E Lucas was one of them. He proposed a growth theory in 1988 that was based on the Solow growth model. This theory, however, was constructed on the work of a Japanese economist named Uzawa (1965). What distinguishes his theory is that he emphasizes the role of human capital in economic growth and has expanded "the AK model with a two-sector setup (in which human capital as well as physical capital are produced by diverse technology)". According to Lucas' argument, endogenous growth is generated by human capital formation. Lucas assumed that agents spent their time in one of two ways: "to contribute to current production or to accumulate human capital (Novales et al, 2009)". According to him, economic growth is caused by the way we divide our time between the two options. For example, if the time spent creating things is reduced, current output will decrease; nevertheless, the building of human capital is accelerated, and hence output grows. According to the hypothesis, as human capital accumulates, each member of society becomes more productive. Lucas represents this ideology in a production function as shown below:

$$Y = AK^{a}(uhL)^{1-a}h^{*} \qquad (2.2)$$

From equation 2.2, we can explain the variables as follows; Y is the output which represent economic growth, *uhL* is the efficient human capital, which is simply a product of the total number of labour, *L*, the actual time spent working, *u*, and the labour efficiency, *h.* AK is the physical capital and term *h** represent an externality. However, for society as a whole, the build-up of human capital boosts output both directly and indirectly, that is, through externality.

2.3 Development Theories

It is worth mentioning that the aforementioned principles prioritized economic growth rather than economic development. The majority of these classical and neoclassical views concentrated on the ingredients and procedures that lead to long-run improvements in output, GDP values, and economic growth. However, there are other theories that deal with development challenges, and it is worthwhile to investigate them to determine if entrepreneurship issues are addressed in them.

The Schumpeter's model, proposed by a well-known scholar named Joseph Schumpeter, is one such hypothesis. He was without a doubt the first researcher to offer an entrepreneurial theory, and his concept is likely the most well-known entrepreneurship theory (Schumpeter, 1934). Schumpeter viewed innovation as a vital component of economic growth and development, arguing that economic transformation is centered on invention, entrepreneurial activities, and market power (Michaelides, 2009). His main goal was to demonstrate that by incorporating innovation into the market, we might get greater results in terms of economic growth than the so-called invisible hand, capital accumulation, and price competition, as earlier theories proposed. The Schumpeterian model arose from the notion of contemporary industrial organization, and this theory simply placed enterprises and entrepreneurs at the center of the growth process. According to Allen (1991), the concept is based on three key ideas. The first one talks about the long-run growth and innovation, the second one talks about innovation and

Research and Development (R & D) and the third one talk about creative destruction. Putting all these three ideas together, Schumpeter basically stated that, long-run growth relies on innovation, which in turn relies on Research and Development (R & D). However, if care is not taken we will end up in a big problem known as creative destruction. The problem of creative destruction simply means that new innovations tend to make old innovations, old technologies, old skills, become outdated. Usually, in course of creating something new through innovation, Research and Development, what exited previously is considered as not useful anymore.

The Schumpeterian model can be represented in a simple regression equation as:

$$Yt = Ct + Xt + Rt \qquad (2.3)$$

The Schumpeterian growth model with discrete time and persons and enterprises living for one period is described by the above equation. *Yt* is a one-of-a-kind final good in the economy. Ct denotes consumption, *Xt* denotes intermediate good production, while *Rt* denotes Research and Development (R&D). As a result, these are the economy's resource constraints. In light of this, Schumpeter explains the aforementioned equation by asserting that output, or economic growth, consumption, production, and innovation—all of which are fueled by research and development—are all directly related. The entrepreneur acquires fresh ideas as a result of the increased R&D, enabling him to produce a greater variety of goods. A broader selection of items leads to increased output and consumption, which promotes economic growth.

Knights (1942) also established a hypothesis that is similar to Joseph Schumpeter's theory. Knight's theory, popularly known as the "Theory of Profit and Entrepreneurial Action," addressed the concerns levied at his prior theory, which described entrepreneurial action (Knight, 1921). He finally clears the airwaves by stating in his theory of profit and entrepreneurial action that, the entrepreneur plays three major roles: as the initiator of innovation, accepting the innovation of others and bearing risks and uncertainties. Knight clarifies that bearing risks and uncertainties does not necessarily define the functions of an entrepreneur, however, what outlines the incentive of entrepreneurial action is the introduction of innovation and adaptation of innovation, research, and development. According to Knight, the ability of an entrepreneur to introduce innovation and also embrace innovation of others is a very important element of the theory. He states categorically that, “the entrepreneur introducing innovation is able to act as a monopolist and earn monopoly profits and those who adopt rapidly to the new innovation also earn profits” (Knight, 1942). Once adequate number of entrepreneurs penetrate through the market with new innovations, profit margins will rise leading to economic growth and development. There is an undoubtable fact that, the basis of Knight’s theory is risk, uncertainty and profit which are all characteristics of the entrepreneur. It is only when he attempts to reply to his critics that he specifically defines the entrepreneur as an innovator. Either way, Knights acknowledges the entrepreneur as someone who owns a firm in the midst of risk and uncertainty with the aim of making profit, which eventually lead to economic growth.

David McClelland, a Harvard psychologist, amended Abraham Maslow's Theory of Needs and published "The Achieving Society" in the early 1960s. He illustrated in this book how entrepreneurship fosters economic progress. According to McClelland, the desire for achievement is the primary driver of economic development, therefore a society with a high degree of achievement will produce more energetic entrepreneurs, who will generate faster economic growth (McClelland, 1962). McClelland defined entrepreneurship as being someone who exercises control over production that isn't solely for his or her own use, rather than in the sense of capitalist ownership. The entrepreneur, according to McClelland, has three distinct

characteristics: the drive to accept personal responsibility for decisions, the preference for actions containing a moderate degree of risk, and the desire to have solid understanding of the outcomes of decisions (Yasin, 1996). These three distinct characteristics, according to McClelland, should be contained in the child-rearing system so that individuals grow up with a strong desire to succeed and, as a result, economic progress occurs. McClelland also attempted to explain why some communities are more prosperous than others. To respond, he asserted unequivocally that individual entrepreneurial behavior was critical to the development of all economies (McClelland and Burnham, 1977). Despite his significant contribution to the entrepreneurship-economic growth debate, McClelland's work was strongly attacked by some renowned academics. Schatz (1965), for example, noted four years after the publication of his book that "the indicators of economic progress in McClelland's research were not representative, and his data did not support his theory." Also Mazur & Rosa, (1977), used McClelland's data for the years 1950 to 1971 to conduct a regression analysis to find out if there was some sort of correlation between the achievement motivation of nations and their economic development. With the aid of advanced methods, they found no correlation between the selected variables of interest. However, in spite of all these criticisms, it is important to note that McClelland was one of the few people who threw more light on entrepreneurship's involvement in the expansion and development of the economy.

One work in particular that should not be overlooked is the work of Audretsch and Keilbach (2004). In their work they argue extensively that an important feature that is missing in the neoclassical production function is entrepreneurship capital. Solow (1956) used the neoclassical model of the production function to construct the neoclassical model of growth, which linked labour and capital to output. Romer (1986) and others have recently modified the model to include knowledge capital measurements. However, the early writers failed to include entrepreneurship capital as a key variable within the framework of the neoclassical production function. Hence in their work, Audretsch and Keilbach (2004) proposes a new factor, entrepreneurial capital, and tie it to output. They discuss what entrepreneurship capital is and why it matters for economic productivity within some selected German regions. They define entrepreneurship capital as a region's endowment with elements favourable to the establishment of new businesses. It includes the presence of a regional environment that encourages start-up activities, such as an innovative environment, the existence of formal and informal networks, as well as a general social acceptance of entrepreneurial activity. In conclusion using 327 West German regions as case studies the authors come out with a hypothesis that entrepreneurship capital has a positive impact on the region's economic output.

Mishra and Zachary (2014), in more recent times, have proposed an insightful theory on entrepreneurship termed as "The theory of entrepreneurship". To begin, Mishra and Zachary (2014) operationally describe entrepreneurship as the process of creating value in an unpredictable environment. According to them, the entrepreneurial process consists of two major stages: the first is the entrepreneurial intention stage, and the second is the resource acquisition stage. The first stage is identifying an opportunity and connecting the available resources to that opportunity. The key motivation here is the desire to start a business in order to receive a reward (usually in the form of profit). The second stage requires acquiring external resources, such as financial aid, money, labour, or even a strategic alliance, in order to achieve growth. This contributes to the sustainability of entrepreneurial value generation and, in the long run, growth. This simple diagram is used by the authors to describe their ideology.

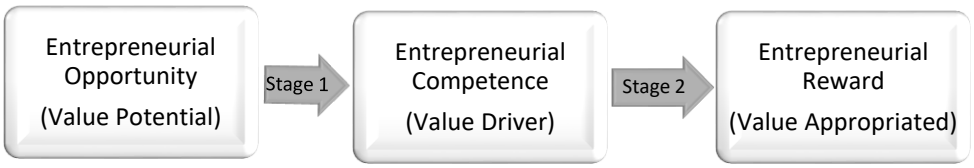

Figure 2.1: Theory of Entrepreneurship (Source: Mishra and Zachary 2014)

First, the entrepreneur perceives or recognizes an opportunity with the resources available at the time. The entrepreneur then organizes the resources and adds value to them in order to create entrepreneurial skills. This is the initial stage of the entrepreneurial value creation process, and it is essential to repeat this process until a genuine marketable opportunity is discovered in order to proceed to the next stage. When the first stage is completed successfully, the entrepreneur advances to the second stage, which entails developing a business model in order to gain external resources in order to sustain value creation. Only then will the entrepreneur be able to collect his compensation. This means, the entrepreneur channels resources into productive use and by so doing obtain some benefits which accumulatively leads to economic growth.

2.4 Key Findings from Theoretical Review

The study's key finding is that none of the growth theories address entrepreneurship because their main objective is to identify characteristics that boost output or economic growth. However, because entrepreneurship is about development and places a greater emphasis on quality of life, it has been critically examined in theories of economic development such as the Schumpeter's model, Knight's theory, McClelland's theory, etc.

The theories' emphasis on the significance of technology development for economic growth is another significant conclusion. For instance, the Solow model found that the main force behind economic expansion is technological progress. However, financial commitments to education and research and development (R&D) are necessary to accomplish technological advancement. On the other side, the Schumpeter model is founded on research and development. According to Schumpeter, when R&D spending is higher, business owners become more creative and come up with new ideas that allow them to produce a wider range of products and services. Variety encourages consumption and output, which promotes economic growth and development.

Table 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)	1939 1946	Capital accumulation, investement 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	Economic development is primarily driven by the need for achievement, so a society with a typically high level of achievement would produce more enthusiastic entrepreneurs, who in turn lead to faster 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.	Critical analysis has been done on how entrepreneurship affects economic growth and development.

The study draws the conclusion that neither the classical nor the neoclassical growth models specifically discuss entrepreneurship. By placing a strong emphasis on technological advancement (innovation and R&D), endogenous growth theories indirectly address knowledge transfer between businesses and their producers, which are corporations. The explanatory power of models is increased and the role of education is incorporated into the framework of the analysis in literature that highlights the importance of human resources, but entrepreneurial action is no longer highlighted. These ideas attributed growth to other elements like capital accumulation, effective demand, higher labor and capital productivity, and technical advancement.

Scholars like Schumpeter, Knight, McClelland, and others have contributed to our understanding of the role entrepreneurship plays in economic growth and development. The latter, however, are development theories rather than growth theories. In other words, they deal with a broader category of rise rather than just the GDP growth. In summary, the theoretical foundations for entrepreneurship and growth are strengthened, and there is a need to explore the connection between entrepreneurship and growth empirically.

2.5 Empirical Literature Review (A Meta-Analysis Approach)

The objective of this section of the thesis is to offer more empirical support for the relationship between entrepreneurship and economic growth that has long been known to exist. In order to do this, we examine significant works on entrepreneurship and growth that have previously been completed, synthesize the information from all of these works, and make an effort to produce something original that has not been discussed by other authors. Although there is a sizable body of literature in the topic of entrepreneurship, it has to be distilled into various parts. The various methodologies that have been used to demonstrate the link between entrepreneurship and growth, the various data sources that were used to conduct the research, the definition of entrepreneurship, its significance, and the authors' most significant findings on the entrepreneurship-growth discourse are all discussed. This will improve our comprehension of problems and broaden our knowledge of other entrepreneurship-related topics.

2.5.1 Definitions of Entrepreneurship

From the vast body of literature, it has come to realization that entrepreneurship does not have a uniquely accepted definition. In fact, Acs and Szerb (2011) prove this point in their paper "The Global Entrepreneurship and Development Index for the Netherlands." In their work, they state that till date there has been no accepted dominant variable or index to measure entrepreneurship. Hence, the modern thinking of entrepreneurship proposes numerous ways in which entrepreneurship can be defined. In fact, this makes it somewhat challenging to compare results across studies and as such there is the need to find an operationalized definition for the purpose of this research work. But before selecting an operationalized definition for the purpose of this study there is the need to consider the wide range of definition and then select the one which best fits the context of the write up. This variation in the meaning of the term throughout the universe of studies on the topic has undoubtedly made entrepreneurship research perplexing. Despite this, various attempts have been made to give entrepreneurship a clear and unbiased definition. Various authors have characterized entrepreneurship in a variety of ways, and based on the extensive literature, all of these definitions may be grouped into three categories: innovation, opportunity, and start-ups. It is important to understand that entrepreneurship is a multidimensional conception, hence the conceptual and operationalized definition is chosen based on the focus of the research that is being undertaken.

2.5.1.1 Entrepreneurship as Innovation

Joseph Schumpeter an Austrian economist attempts to define entrepreneurship as he made a significant contribution to growth theory in his work in the 1950's (Lavrov - Kapoguzov, 2006). According to Schumpeter entrepreneurship is simply innovation and he explains by stating that entrepreneurship is the how we make good use of available resources in an innovative way so as to create new products and services in the markets (Schumpeter, 1934). According to Schumpeter, a successful entrepreneur is the one who is able and willing to transform a novel idea into a successful innovation. Hence when we take Schumpeter's definition into consideration, we realize that the main theme of entrepreneurship is innovation. Following Joseph Schumpeter other authors have also defined entrepreneurship using innovation as the basis of their definition. The similar topic is used by Miller (1983), who claims that "entrepreneurship is a combination of some factors like innovation, proactivity, and risk-taking in the development of new products and technologies." Lumpkin and Dess (1996) expanded on this description by including more elements to the repertoire of entrepreneurial behaviors, such as competitive aggressiveness and autonomy. Following in the footsteps of his forebears, Hornaday (1992) makes it very obvious that entrepreneurship is founded on innovation, creating a new organization, and the pursuit of profit. Entrepreneurship, according to Casson (2003), is "the taking of judgmental decisions about the management of scarce resources and using creative ideas to transform these scarce resources into a business." Casson also used innovation as the basis for his definition. Kauffman (2008) and Bilic & Vidovic (2011) are two other authors who define entrepreneurship using innovation as the basis of their definition. They contend that the best way to comprehend entrepreneurship is when we think of it as a process of change that typically starts with an original idea and progresses to or from an enterprise to the creation of value.

2.5.1.2 Entrepreneurship as Opportunity

Most academics emphasize the idea of "opportunity" as the primary subject for defining entrepreneurship in addition to using "innovation" as the basis. Israel Meir Kirzner is one academic who is well known for accepting the idea that opportunity is the key component of entrepreneurship. Contrary to Schumpeter's philosophy, Kirzner emphasizes opportunity finding as entrepreneurship. An entrepreneur is someone who can identify lucrative business prospects that have gone undiscovered in the market up to that point, according to Kirzner (1997). An entrepreneur can be identified by how eagerly they welcome and seize possibilities in the market, like pricing variations between marketplaces. Authors like Drucker, Stevenson and Jarillo, Shane and Venkataraman, among others, define entrepreneurship in a similar manner by using opportunity as the benchmark. For instance, Drucker (2007) defines entrepreneurship as a behavior in which a person continually seeks change, reacts to it, and seizes the opportunity it presents. Entrepreneurship, according to Stevenson and Jarillo (1990), is the process through which people look for possibilities, whether on their own or as a part of an organization, regardless of the resources available to them at the moment. Entrepreneurship is also described by Shane and Venkataraman (2000) as the process of spotting, assessing, and seizing lucrative opportunities. According to these scholars, the primary characteristic that distinguishes agents as entrepreneurs is their propensity to act on chances. They view entrepreneurship as the discovery and utilization of commercial opportunities within the individual-opportunity nexus.

2.5.1.3 Entrepreneurship as defined as “Start-Ups” - Global Entrepreneurship Monitor (GEM)

Despite these several definitions, the notion refers to the common discourse in the literature, and it is clear that the descriptions presented above only provide a partial overview of the extensive body of literature that is already in existence. As a result, in addition to "innovation" and "opportunity," some scholars have emphasized the establishment of a new enterprise as a key component of entrepreneurship. They attempt to define entrepreneurship in a way that is far more quantifiable and measurable. The Global Entrepreneurship Monitor's (GEM) definition of entrepreneurship serves as an illustration of this. From the phases of innovation and opportunity recognition to the phases of acquiring and managing an established organization, GEM makes an effort to categorize entrepreneurship. 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). Undoubtable, GEM may see entrepreneurship rather narrowly as a new business activity however particular attention is paid to what makes up this new business activity. “The new business activity as a measure of entrepreneurship is the proportion of individuals in the nation (ages 18 to 64) that are actively engaged in starting or managing a new business (GEM Reports)”. This help them to obtain an index of Total Entrepreneurship Activity (TEA) for each country. The index is divided into ‘necessity-based’ and ‘opportunity-based’ entrepreneurship. The former reflects ‘entrepreneurs’ who had no better choices for work whereas the latter reflects voluntary nature of participation. Recently, most authors who write on issues of entrepreneurship and economic growth have used the Global Entrepreneurship Monitor’s definition and data as a basis to understand the concept. It is important to take note of the fact that the GEM provides the most reliable and homogenous definitions that applies across nations, which makes comparability somewhat easier.

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. This is because the aim of this paper is also to improve our understanding of entrepreneurship. The GEM's concept of entrepreneurship combines elements of all the other concepts by encapsulating titbits of all the other definitions. To start a new venture or business, one must first find or identify a venture or business opportunity. Even after identifying the opportunity, you need to be innovative enough to transform that opportunity into a business. Hence, GEM’s definition is the best fit in the context of this paper.

Table 2.2: Summary of conceptualized definitions of Entrepreneurship

Authors	Interpretation of Entrepreneurship
Schumpeter, Miller, Lumpkin, Dees, Hornaday, Kaufman, Bilic et al.	The key to define entrepreneurship is innovation.
Kirzner, Drucker, Stevenson, Jarillo, Shane and Venkataraman	These authors use opportunity as the basis to define entrepreneurship.
Global Entrepreneurship Monitor (GEM)	GEM defines entrepreneurship in a more measurable and quantitative way.

From the above discussion, it can be concluded that although entrepreneurship is considered to be a complex structure which does not have a confirmed definition yet, from the vast body of literature we can categorize the various definitions into, Innovation, Opportunity and Start-ups.

2.6 Significance of Entrepreneurship

Awlaqi and Altheeb (2019) assert that entrepreneurs have a long-term impact on growth since they not only make money from their companies but also employ others in the community. Therefore, businesspeople are vital to their particular societies and the economy as a whole. The results of Awlaqi and Altheeb show that areas with higher levels of entrepreneurship have higher output and productivity, while those with lower levels of entrepreneurship have lower output and productivity. It is essential to look at some of the significance of entrepreneurship while discussing its role in economic growth and development with a focus on established and emerging nations. The empirical literature in this section delves further into some of the significance of entrepreneurship. Entrepreneurship is the primary means by which small enterprises contribute to employment creation and have a long-term impact on economic growth and development (Cieślik, 2014). This is because entrepreneurship results in the creation of new goods and services, which leads to the creation of new jobs. Businesses are stimulated by the motivation to generate new goods and services, which leads to economic growth and development. However, the formation of new firms results in the creation of new money, as entrepreneurial initiatives literally create new wealth. Already existing firms may remain limited to the scope of existing markets and may reach its income ceiling, above which not much extra income may be generated (Deodat, 2009). However, new, and improved goods and services, products or technologies from entrepreneurs aid new markets to be developed and new wealth created.

Apart from the creation of new businesses to individuals within the society, entrepreneurship also offers experienced labour to larger firms and industries. Entrepreneurship firms contribute a large share of new employment by providing entry-level jobs which is necessary for training or gaining practical know-how for unskilled workers. By so doing, they prepare and supply experience labour to larger firms and industries.

Entrepreneurship is regarded as the incubator of all innovations; it extends beyond discovery to include the execution and commercialization of new ideas (Morris et al, 2010). In this context, innovation simply refers to the ability to think creatively, to have new imaginations, or to come up with new ideas, and it is critical for any organization's long-term success. Entrepreneurship is vital because it fosters innovation, which results in new enterprises, new goods and services, new technology, new markets, and so on, all of which contribute to economic progress and a higher standard of life.

There is an undoubtable fact that, entrepreneurship has a large impact on community development. Entrepreneurship provides a broad and diverse employment base among many small entrepreneurial firms, and this makes the community better off. Through entrepreneurship, there is a high level of homeownership within the community, abundant retail facilities, less slums, improved sanitation standards and higher disbursements on education.

To add to the above, entrepreneurship contributes to societal transformation by introducing new items and services to the market. Entrepreneurs use this method to break away from traditional, outdated, and obsolete processes and technologies and adopt new ones in order to improve people's quality of life (Hjorth, 2013). Smartphones and their smart apps, for example, have changed work and play around the world in recent years. “As China's smartphone market and

industry demonstrate, technological entrepreneurship will have far-reaching, long-term effects on the entire human species" (Badziska 2016).

From the look of things entrepreneurship seem all glamorous, however there are some instances where entrepreneurship does not necessarily favour economic growth. In the write ups of proponents like (Thanti and Kalu, 2018; Acs, 2010; Acs & Varga, 2005; Van-Stel, 2004, etc.) it can clearly be observed that entrepreneurship has a positive and significant impact on growth in developed countries but the same cannot be said for developing countries. Thus, the subsequent section takes a look at the linkage between entrepreneurship and growth with much focus on the methodologies that were used to undertake the research.

2.7 Methodologies for Linking Entrepreneurship with Growth.

Many authors have used different methodologies to illustrate a well-established relationship between entrepreneurship and growth. Ostroff and Harrison (1999) stated clearly that the best way to study the levels of analysis of an original empirical study is to conduct a meta-analysis. As a result, this section focuses on the original methods used by authors to show the linkage between entrepreneurship and growth.

The Generalised Method of Moments (GMM) is a technique used by Thanti and Kalu (2018) to show how institutions and human capital encourage entrepreneurship, which in turn encourages economic growth and development. Thanti and Kalu (2018) start by providing solid support for the well-known assertion made by Adam Smith and Joseph Schumpeter that for the economy to expand over the long term, institutions and human capital must be built. They provide the Entrepreneurship Orientation (EO), which is based on the Generalized Method of Moments and includes innovativeness, risk-taking, and proactiveness. Using the Generalized Method of Moments (GMM) and a sample of 93 nations from 1980 to 2008, they evaluate institutions and human capital as potential determinants of so-called Schumpeterian entrepreneurship. Thanti and Kalu's (2018) research has found that institutions and human capital are viewed as catalysts that encourage entrepreneurship and, as a result, support growth. According to the larger body of knowledge, institutional factors and human capital play important roles in determining growth (Barro, 2000; King and Levine, 1993; Acemoglu et al., 2001). From the work of these authors, we may deduce that institutional growth is the first step in the growth of human capital, and that entrepreneurship, which boosts productivity, comes after. These academics contend that once this pattern is seen, economic progress is being made gradually. According to the GMM, the quality of institutions, as evidenced by the decline in corrupt practices and the growth of the banking industry, enhances Entrepreneurship Orientation (EO) in a sample of 98 countries. On the other hand, human capital has a strong positive correlation with EO and is robust when institutional quality is taken into account, leading to economic expansion.

Bruns et al. (2017) built on Stam's (2015) study by evaluating the notion that the entrepreneurial ecosystem is multileveled. The major purpose was to see if the entrepreneurial ecosystem had an effect on regional and national economic growth. These authors use the Multilevel Growth Regression and Latent Class methodological technique to accomplish this. The phrase "entrepreneurial ecosystem" was used to describe the elements in an entrepreneurial setting that are suited for success or failure in their efforts to build a new enterprise. Although the parallel to biological and natural ecosystems may appear to be a bit off (Holling 2001), the concept is particularly effective in demonstrating that certain components are critical in the entrepreneurial value chain (Spigel 2015; Adner and Kapoor, 2010). Bruns et al. (2017), for example, employ Multilevel growth regression and Latent class analysis to show that if ecosystem quality varies

between places, we should be able to uncover the existence and significance of entrepreneurial ecosystems, as well as their repercussions on economic growth. Multilevel modelling is preferred in this situation since it provides a method for dealing with clustered or grouped data (Browne & Rasbash, 2004). The major goal is to understand how entrepreneurship affects growth, but there are other elements that affect entrepreneurship within the entrepreneurial ecosystem as well. Since explanatory variables can be supplied at any level, this methodology is suitable for clustered or grouped data. Pinheiro and Bates (2000) contend that multilevel group regression or multilevel modeling is preferable to simple multiple regression because: it allows us to generalize to a larger population, requiring fewer parameters, and information can be shared among groups; and when we have a complicated model but only a limited amount of data. For example, when conducting a comparative study between developed and developing countries (as in the case of our topic), results from a sample of developed countries can be used to draw general conclusions for all developed countries, and similarly, results from a sample of developing countries can be used to draw general conclusions for all developing countries (Raudensbush and Bryk 2002). On the other hand, latent class analysis connects a collection of observable multivariate variables to a set of latent variables. For example, in the entrepreneurial ecosystem, there may be some elements that influence entrepreneurship, which in turn influences growth, and this methodology takes that into account. The latent class analysis is an effective method for discovering latent variables that may have an indirect effect on the dependent variable in the model (Bacher, 2004). Bruns et al., 2017 concluded, however, that using a sample of 107 European regions from 16 EU member states, they accept the hypothesis that multileveled entrepreneurship promotes regional growth.

Salgado-Banda (2005) investigates the impact of entrepreneurship on economic growth using data on self-employment and productive entrepreneurship as the two key indicators. Using data from 22 OECD countries, the author finds that while productive entrepreneurship has a positive link with economic growth, self-employment has a negative relationship with it. According to Salgado-Banda (2005), self-employment is the act of starting or owning a new business, whereas productive entrepreneurship is just the entrepreneur's level of innovation as defined by Baumol (1990). Because of the nature of his research questions, he employs several tactics to achieve each distinct goal. For instance, he uses the Generalized Method of Moments (GMM), Two-Stage Least Square (TSLS), and Ordinary Least Square (OLS) to undertake a cross-sectional analysis using data from 22 OECD countries between 1980 and 1995. First, the OLS is used to assess how self-employment and successful entrepreneurship, affect growth. Self-employment was shown to be negative and statistically insignificant, whereas productive entrepreneurship was found to be positive and statistically significant. This finding backs up the Global Entrepreneurship Monitor's (GEM) proposition that entrepreneurship is divided into two categories; necessity-based' and 'opportunity-based' entrepreneurship, where the former shows entrepreneurs who are forced to start a firm because they have no other options for work, while the latter depicts the nature of participation. In this aspect, the OLS was used because it is considered to be the best linear unbiased estimator. There is a need to lessen the tendency to overstate the convergence rate due to temporal measurements error in GDP because GDP per capita (which is used as a substitute for growth in this context) is an instrumental variable, as noted by Barro and Sala-i-Martin (1999). As a result, the same outcomes were obtained when the Two Stage Least Square (TSLS) approach was used to reexamine the effects of productive entrepreneurship and self-employment on growth. The Generalized Method of Moments (GMM), a more reliable estimator, was also used to look at how the two main measures discussed above affected growth, even though the TSLS makes it simple to combine multiple instrumental variables and include control variables. In order to investigate financial development and growth, authors like Porta et al. (2010) and Levine (2000) have also employed

some form of panel estimate technique. They assert that this method also solves the issue of heteroscedasticity. Using estimates from Dynamic Panel Data, Salgado-Banda (2005) investigated the effects of productive entrepreneurship and self-employment on growth. Making the most of every single data point is made easy with this approach. Using panel data makes it easier to evaluate how factors change over time in the chosen sample and how that affects economic growth.

Another outstanding paper on the link between entrepreneurship and growth is Stark's (2012) examination of the causal relationship between entrepreneurship and economic growth in Alabama using the Granger causality methodology. To do this, he first clarifies what economic growth and entrepreneurship are. In his research, sole proprietorship and patent activity were utilized as indicators of entrepreneurial activity, while job growth was used as a stand-in for economic growth. In contrast to the latter, which is creating something new and converting it into a business with the legal right to keep that property, the former may be the owner of an existing business entity without a legal title to that property. Using information from the Bureau of Economic Analysis from 1990 to 2008, Stark (2012) investigates the relationship between entrepreneurship and growth. He initially assesses the degree of stationarity of his variables before using the Granger causality test to look into the relationship between entrepreneurship and growth. Entrepreneurship (patent activity and single proprietorship) and economic growth (employment growth) are the variables of interest, and the author takes into consideration their temporal dynamics using the Augmented Dickey-Fuller (ADF) technique. This is done because the variables must be tested for stationarity before the Granger causality test can be performed (Dickey and Fuller, 1981). Since the ADF test indicates that Employment Growth, Patent, and Sole Proprietorship are all integrated to the order zero I(0) at a 5% significance level, this means that all variables are stationary at the level and the Granger causality methodology may be utilized. The study finds a two-way causation between entrepreneurship and economic growth using the causality test approach developed by Granger (1969) and Sims (1972). In such cases, Granger causality is usually favoured since it allows the researcher to determine directional influences on the variables of interest without having to make any assumptions beforehand.

In his article "Relationship between entrepreneurship and unemployment," Dilanchiev (2014) employed regression analysis to examine the effect of entrepreneurship on unemployment using Georgia as a case study. The relationship between entrepreneurship and employment is receiving a lot of attention, even if the connection between it and economic growth has received much of the focus in recent years. This presumption led researchers to focus on the Schumpeter impact and the refugee effect when examining the relationship between entrepreneurship and unemployment (Audretsch, 2007; Varheul et al., 2006). The Schumpeter effect contends that there is a negative relationship between entrepreneurship and unemployment, whereas the refugee effect contends that unemployment encourages entrepreneurship. Advocates of the refugee effect contend that a high unemployment rate hinders people's capacity to make a good living and diminishes their chances of landing a job, which "pushes" them to start their own business (Tervo, 2006). The Schumpeter effect, on the other hand, makes the assumption that the growth of entrepreneurship and new start-ups will result in employment opportunities and, in turn, have an impact on the creation of employment in other established businesses. To establish a connection between these crucial variables, Dilanchiev (2014) does a straightforward Ordinary Least Square (OLS) regression analysis using data from 2003 to 2013. In contrast to the second hypothesis, which holds that greater unemployment rates encourage more people to start their own enterprises, the first hypothesis states that a higher rate of entrepreneurship lowers unemployment. The first hypothesis was statistically significant, while the second hypothesis was not, according to the results of the OLS regression. The OLS

estimator is typically regarded as the best method to use for a straightforward analysis involving a limited number of variables, such as Dilanchiev's (2014) work. This is because, with respect to reasonable assumptions, the OLS estimator is widely regarded as the most effective linear regression estimator. Low variance and minimization of the sum of squared errors characterize it.

To illustrate a strong link between entrepreneurship and economic growth, the research described above have relied heavily on secondary data and quantitative approaches. However, it was also observed in the extant body of literature that other authors used qualitative approaches as well as a both quantitative and qualitative approaches to establish a link between entrepreneurship and growth. For instance, using a combination of quantitative and qualitative research techniques, Ogunlana (2018) in his work "The role of entrepreneurship as a driver of economic growth", examines how entrepreneurship can aid growth, using Nigeria as a case study. Nigeria depended heavily on crude oil to generate revenue into the economy and so when the global price of crude oil fell, they turn to entrepreneurship as the alternative source revenue generation. In fact, according to data from Global Entrepreneurship Monitor (GEM; 2012), Nigeria is one of the most entrepreneurial countries in the world with thirty-five (35) out of each hundred Nigerians engaging in entrepreneurial activities. Ogunlana (2018) discovers that entrepreneurship plays a substantial impact in economic growth and development using a descriptive statistic and a cross-sectional survey design. To give questionnaires to the selected population, the stratified random selection approach was used. Seventy percent (70%) of the respondents came to the conclusion that entrepreneurship reduces the high rate of unemployment, which leads to an increase in GDP, which leads to economic growth and development. The stratified random sampling technique was used for this study because it allows the researcher to get a sample population that most closely resembles the overall population. As a result, the final end products are completely unbiased.

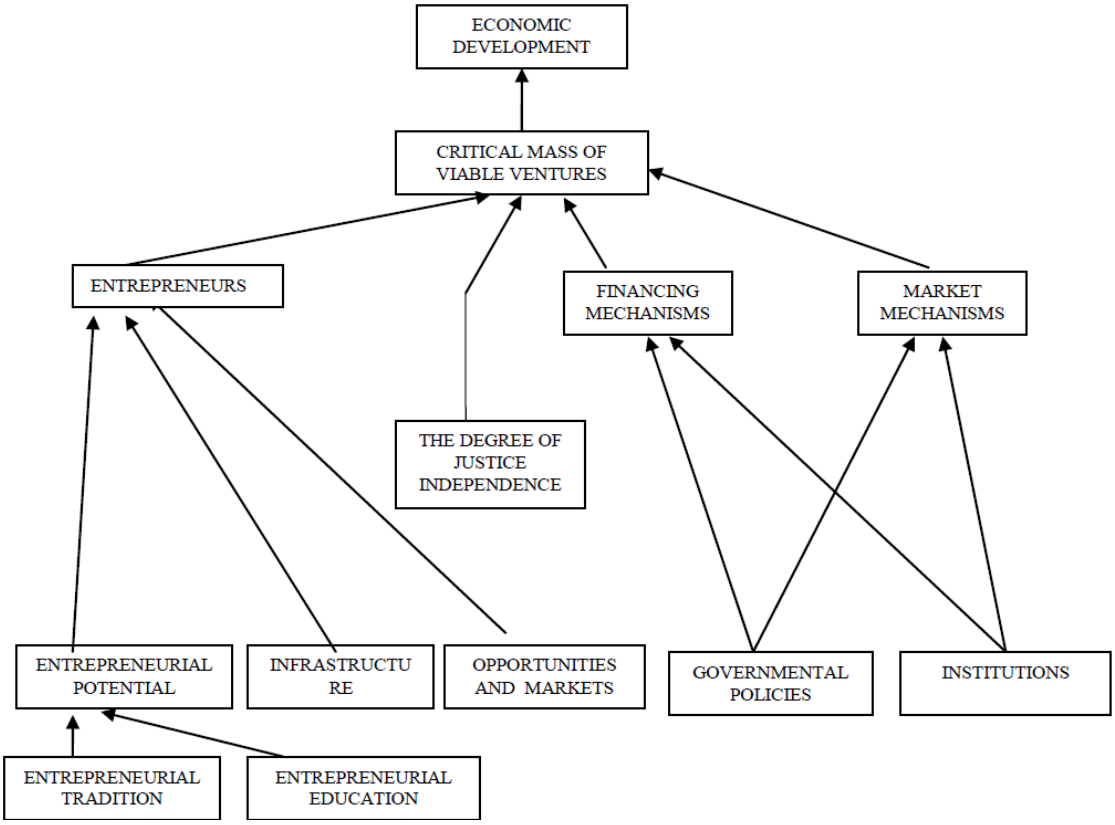

Figure 2.2: Entrepreneurship-Growth Nexus

Source: Marinescu t al (2013)

Most prior authors used robust statistical and mathematical approaches, as well as descriptive and quantitative techniques, to establish a correlation between entrepreneurship and economic growth. Marinescu et al (2013), on the other hand, developed a theoretical model to emphasize the key aspects in the relationship between entrepreneurship and economic development. These writers suggest that while entrepreneurial education and traditions are important elements in determining entrepreneurial potential, other factors such as government policies, institutions, and the legal environment can either stimulate or discourage entrepreneurial activity.

The fundamental point here is that newness through start-ups and innovation is required for economic development to occur through entrepreneurship, and this can only be done through entrepreneurial education and tradition. Only then will entrepreneurship be able to directly contribute to economic growth. Furthermore, good institutions and government policies can act as catalysts for entrepreneurship.

Fritsch and Wyrwich (2014) investigate the relationship between entrepreneurship and growth at a regional level. They primarily analyze various aspects that influence entrepreneurship at the regional level, and they discover that the so-called "Entrepreneurial culture" is one of the reasons for entrepreneurship's persistence in particular areas. (Brownson, 2013) defines entrepreneurial culture as "a society that enhances the exhibition of the traits, values, beliefs, and behaviors that are associated to entrepreneurs". This type of culture may emerge as a result of a self-endurance process in which previous entrepreneurial acts promote future start-up activity. Demonstration and the peer effects of successful founders who act as role models are critical components of this sort of self-perpetuation (Fornahl 2003; Minniti 2005; Andersson

and Koster 2011). The primary notion is that witnessing entrepreneurial role models in society shapes an individual's perspective and beliefs about entrepreneurship. The presence of these role models in society, usually among one's peers, helps aspiring entrepreneurs gain entrepreneurial skills and information (Bosma et al. 2012). Observing successful entrepreneurs offers "would-be" entrepreneurs with models of how to manage their resources and activities, as well as increasing self-confidence in the sense that "if they can do it, so can I." (Sorenson and Audia 2000, Nanda and Sorenson 2010). In reality, a large number of entrepreneurial role models in a region is likely to contribute to widespread social acceptability of self-employment among the local people (Kibler et al. 2014).

The diagram below depicts the self-perpetuation of entrepreneurship through demonstration and peer effects, as well as social acceptance of entrepreneurship.

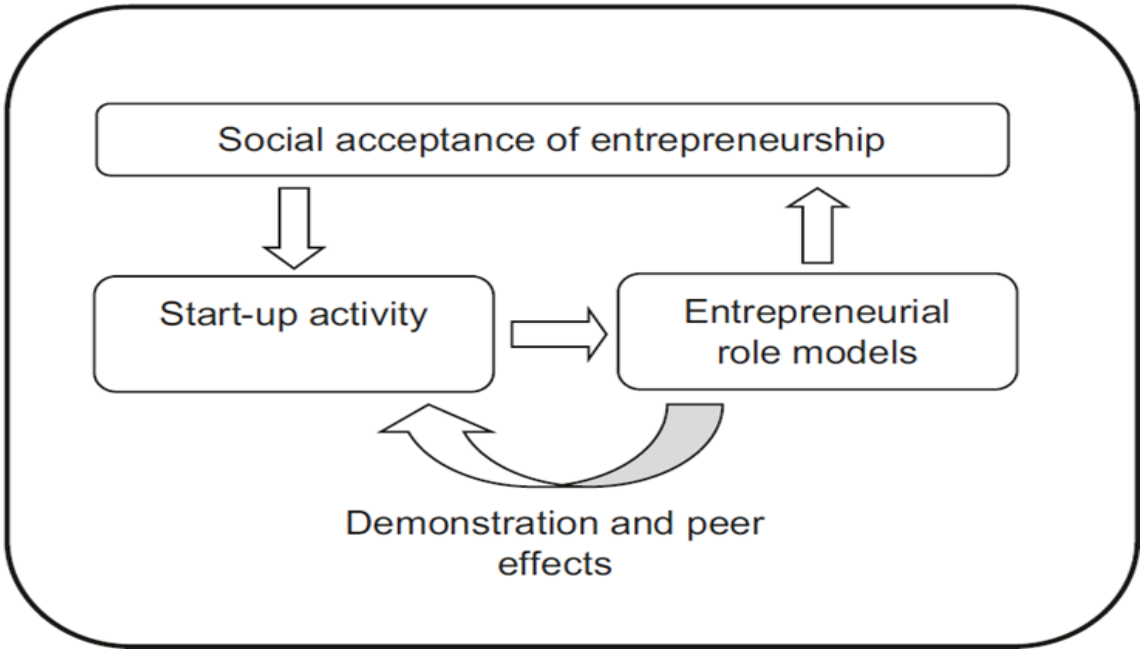

Figure 2.2: **Entrepreneurship and Growth at the Regional Level.**

Source: Fritsch and Wrwich (2014)

Table 2.3: Synthesized summary of the various 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 play a catalytic role in fostering entrepreneurship to support 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.
Ogunlana	2018	Descriptive and cross-sectional survey	The growth of the economy is significantly influenced by entrepreneurship.
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.

2.8 Entrepreneurship among Developed and Developing countries

This section of the meta-analysis takes a different dimension to look at the entrepreneurship-growth nexus amongst developed and developing countries. The general perception or a priori expectation on entrepreneurship and growth is a positive one. This means that naturally we expect entrepreneurship to automatically aid economic growth, but is this always the case, and if so, does it apply to both developed and developing countries. This section takes a deep look into this assertion.

One significant work worth mentioning when issues of entrepreneurship and growth is being discussed is the work of Acs (2010), where he compares the relationship between entrepreneurship and growth using three stages of growth. Acs (2010) adopts Porter et al's (2002) three stages of development; the factor driven stage, efficiency driven stage and innovative driven stage and establishes a connection between entrepreneurship and growth for developed and developing countries. Porter et al 2002, explains the three stages of development as follows; the first stage which is the factor driven stage is mostly associated with high levels

of agricultural self-employment, low cost of production of goods and minimum value added products. Most of the developing countries, particularly in Sub-Saharan Africa and Asia are found in this stage of development. In the second stage of development, which is the efficiency driven stage, countries are characterized by competent production of goods and services in large markets which allows them to enjoy economies of scale. Countries found in this stage are mostly noted for industrialization, manufacturing of goods and provision of basic services. The innovation-driven stage on the other hand, is marked by an upsurge in knowledge demanding activities (Romer, 1990). In the innovation-driven stage knowledge provides the key input and also much focus is on technology. Most of the developed countries like Norway, Germany, Denmark, etc are found in this stage. With this assertion, Acs therefore concludes that, the relationship between entrepreneurship and growth is S-shaped. It can be observed that the impact of entrepreneurship on growth is very minimal at the factor driven stage however when the economy progresses to the efficiency and innovative driven stages the impact of entrepreneurship on growth increases as well. Entrepreneurial activity increases quickly through the efficiency-driven stage and climaxes at the innovation driven stage and this has massive impact on growth as well. It can also be established on the basis of the Global Entrepreneurship Monitor's definition that, at the factor driven stage, which is mostly dominated by developing countries, the necessity type of entrepreneurship is practiced whiles at the efficiency and innovative driven stages which is dominated by developed countries, the opportunity entrepreneurship is practiced. Necessity-based entrepreneurs typically referred to as "Push" entrepreneurs are those entrepreneurs that start businesses out of necessity. More often than not they may be threatened to lose their jobs, dissatisfied with their present jobs or lack career opportunities. For these reasons – unrelated to their entrepreneurial qualities – they are pushed or pressured to start a venture. On the other hand, opportunity-driven entrepreneurship is viewed as a type of productive entrepreneurship in which individuals' pursuit of successes is motivated by their appraisal of market opportunities and their exploitation of creative and innovative ideas.

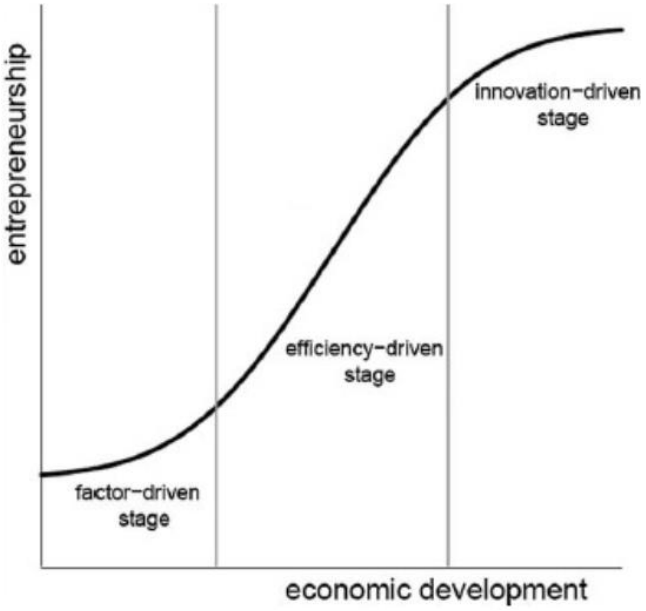

Figure 2.3: Relationship between entrepreneurship and economic development (Source: Porter et al. (2010).

Stam and Van-Stel (2009) investigate the impact of entrepreneurship on economic growth at the national level, focusing on high-, transition-, and low-income countries. In order to conduct a full cross-country comparison, they use data from the Global Entrepreneurship Monitor (GEM) to collect information from a wide range of nations. The effects of entrepreneurship in general and growth-oriented entrepreneurship in particular might be distinguished using this dataset. They offer empirical studies that examine the effects of entrepreneurship on GDP growth over a four-year period for a sample of 36 nations. Three groups—rich, poor, and transition—are used to categorize these 36 nations. The 24 wealthy nations are Australia, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, Taiwan, the United Kingdom, and the United States. South Africa, Argentina, Brazil, Chile, India, Mexico, and Thailand are the seven least developed nations. China, Hungary, Poland, Russia, and Slovenia make up the group of 5 countries in transition. The transitional nations—with the exception of Slovenia and Hungary—can also be grouped under the category of relatively poor nations. In addition, they added a brand-new statistic known as Young Businesses (YB) to the formula, which they defined as "the percentage of the adult population who manages or owns a business that is less than 42 months old (a young business)." OLS regression was performed at the national level using the YB for high, transitional, and low-income countries as independent variables. This led to the construction of the basic model shown below;

$$GDP_{it} = a + b1\ YBrich_{t-1} + c1\ YBtransition_{t-1} + d1\ YBpoor_{t-1} + e \qquad (2.4)$$

In the above equation, Gross Domestic Product (GDP) is the dependent variable in the model. YBrich, YBtransition and YBpoor are the young businesses for the rich, transition and poor countries respectively and e is the error term. The main conclusion reached after running the regression and obtaining the results was that entrepreneurship has no effect on economic growth in low-income countries, but it does in transition and high-income countries, where especially growth-oriented entrepreneurship appears to contribute significantly to macroeconomic growth. This is due to the fact that entrepreneurship in poor countries is mostly motivated by necessity. According to Acs (2010), in most developing nations with high unemployment rates, self-employment is a common occupational choice. In short, even though YB was introduced into the equation as a new indicator, it does not erase the fact that the percentage of adult population that own businesses in the low-income countries are necessity-based entrepreneurship and not growth-oriented based entrepreneurship.

O'Connor et al. (2018) study how different measures of entrepreneurship may explain economic growth in developing and developed economies in their paper "The Function of Entrepreneurship in Stimulating Economic Growth in Developing and Developed Economies." They examine how entrepreneurship varies across high-income and middle/low-income countries using 55 countries and fourteen (14) indicators of entrepreneurship to evaluate entrepreneurial activity, attitudes, and aspirations over an eight-year period, using GDP per capita as a metric for economic growth, and fourteen (14) indicators of entrepreneurship to evaluate entrepreneurial activity, attitudes, and aspirations (2004-2011). Using Principal Component Analysis, the fourteen variables are compressed into three components, and then regression analysis is done to see if the components of entrepreneurship have an impact on growth in high-income and middle-income nations. The findings revealed that while entrepreneurship is an important tool for economic growth in general, the various types of entrepreneurship (entrepreneurial attitude, activity, and aspirations) have a negative relationship with growth in middle/low-income countries but a strong positive relationship with growth in high-income countries. According to O'Connor et al (2018), the fundamental reason

for this is that the impact of entrepreneurship on growth differs depending on the stage of economic development. According to the findings, entrepreneurial attitude has a direct correlation with GDP per capita, but entrepreneurial activity is adversely correlated with GDP per capita. From their observation however, it was apparent that in the high-income countries positive entrepreneurial attitudes directly influenced economic growth and on the other hand the type of entrepreneurial activity being practiced in the middle/low-income also had an inverse relation on growth. In most of the high-income countries most of the individual have the natural enthusiasm to become entrepreneurs, this is the entrepreneurial attitude. This is because in high-income countries, individuals' willingness to explore new opportunities, self-efficacy, and having entrepreneurial role models are easier to attain, and this reflects in GDP per capita. The same cannot be stated for low-income countries, implying that they lack an entrepreneurial mindset and, even if they have, their entrepreneurial activity is motivated by need. Previous study (Minniti & Lévesque, 2010; Amorós et al., 2012) backs up this claim.

In this same disposition, Vinco et al. (2016) also test the impact of entrepreneurship on growth with much focus on developed and developing countries. They however put emphasis on the fact that, entrepreneurship contributes to growth in diverse economies, due to difference in the features of the macro economy, difference in entrepreneurial activity and so on. They outline three main types of entrepreneurships: Opportunity Entrepreneurial Activity (OEA), High-expectation Entrepreneurial Activity (HEA) and Necessity Entrepreneurial Activity (NEA). They then study the impact of the above-mentioned kinds of entrepreneurship on economic growth by means of comparing 22 developed and developing countries (14 developed and 8 developing countries) over a period of three (3) years. Similarly, their results show the effect of entrepreneurship on economic growth in developed countries is higher than that of the developing countries. To attain these results, they specified a regression model as shown below:

$$GDPG = \beta_0 + \beta_1 GCF + \beta_2 FDI + \beta_3 LF + \beta_4 OEF + \beta_5 HEA + \beta_6 NEA \quad \ldots (2.5)$$

Where, GDPG, is the GDP Growth Rate, GCF is the Gross Capital Formation, FDI is Foreign Direct Investment, LF is Labour Force, OEA is Opportunity Entrepreneurial Activity, HEA is High-expectation Entrepreneurship and NEA is Necessity Entrepreneurial Activity. With the help of the hierarchical multiple regression approach, they found that in the developed countries, the highest impact on economic growth was Opportunity Entrepreneurial Activity (OEA), followed by High-expectation Entrepreneurial Activity (HEA) and lowest impact was Necessity Entrepreneurial Activity (NEA). With regards to the developing countries, the highest impact on growth was High-expectation Entrepreneurial Activity (HEA), followed by Necessity Entrepreneurial Activity (NEA), and the lowest was Opportunity Entrepreneurial Activity (OEA). Consequently, it can be summarized that entrepreneurship symbolizes an increasing driving force of economic growth, however its contribution differs considerably for developed and developing countries.

Adusei (2016) also studies how entrepreneurship promotes growth in developing countries, and finds out that entrepreneurship contributes to the positive explanation of disparities in developing country's growth. His study focused on 12 African countries, using the total number of newly registered enterprises as a proxy for entrepreneurship. His findings, using the Random effect regression technique, reveal that newly registered businesses have a beneficial impact on growth. His case was based on the claim that the majority of earlier research on entrepreneurship and growth has come from industrialized countries. According to Bruton et al. (2008), the majority of entrepreneurship research focuses solely on North America and Europe, and hence has minimal relevance in developing nations. Adusei (2016) proves other

writers wrong as he finds new results which shows that entrepreneurship promotes economic growth in some African countries.

In addition, Omoruyi et al. (2017) address the important impact of entrepreneurship on economic prosperity in their paper. Entrepreneurship is described as one of the variables that drive an economy's growth, either directly or indirectly, in the article. As a result, based on evidence from Sub-Saharan Africa (SSA), their research concludes that entrepreneurs play a large and important role in the region (SSA). This is because entrepreneurship leads to the creation of new jobs, which boosts competitiveness and innovation. They go on to say that entrepreneurship is a better predictor of economic growth than foreign aid. As a result, if Sub-Saharan African countries concentrate on improving entrepreneurial activities rather than relying on foreign aid, they will earn more income for their economies. It is thus rational to appreciate the fact that entrepreneurship in developing economies including Africa is useful to promote economic growth, create employment and reduce poverty.

2.9 The Aspect of Sustainable Entrepreneurship

Entrepreneurship in general, and its impact on economic growth and development, is attracting a lot of attention, but more recently the topic of sustainable entrepreneurship is also attracting enormous attention. This is due to the fact that the entrepreneur's task is not complete until it has a good impact on society and the environment.

Sustainable entrepreneurship, although nascent, has been regarded as a fast-emerging discipline that influences the economic growth through an entrepreneurial approach. Within the context of sustainable entrepreneurship, the main concern is the recognition of sustainable innovations which simultaneously intersect with economic, social, and environmental sustainability (Farny and Binder 2021). The fundamental concept that unites all three methods is that entrepreneurs' activities in pursuit of financial gain must not have a negative influence on the environmental and social surroundings in which they operate. Elkinton (1994), for instance, developed the term triple-bottom-line, which refers to the interaction of economic, social, and ecological issues that results in a win-win situation for business, society, and the environment. The idea here is that entrepreneurs must not only measure their performance in terms of financial earnings, but also incorporate a well-rounded view of their operations with the economy, environment, and community. Muñoz and Cohen (2017) reinforce this notion by stating that Sustainable entrepreneurship is a distinct subset of entrepreneurship that seeks a balance of the triple Bottom Line (3BL) outcomes. In addition to the 3BL, they also stress on the importance of the recognition, evaluation, and exploitation of opportunities. The general conclusion they draw is that we may be dealing with sustainable development research rather than sustainable entrepreneurship research when there is no link between the opportunity process and the three elements of sustainability, i.e. the 3BL. Belz and Binder (2015), using a qualitative approach, have a developed a model which postulates that the triple bottom line of ecological, social and economic goals is integrated sequentially, not simultaneously. Shepherd and Patzelt (2011) assert that entrepreneurial activity results in economic gains for investors, entrepreneurs, and economies. As a result, more research on sustainable entrepreneurship is required to examine how entrepreneurial activity can function as a mechanism for preserving nature and ecosystems while also generating economic and non-economic gains for investors, entrepreneurs, and societies as a whole.

Schaltegger and Johnson (2013), in their article “Entrepreneurship for Sustainable Development” clearly stated that, sustainable entrepreneurship could come in the form of “social entrepreneurship” and “ecopreneurship”. According to them, the former is an entrepreneurial approach which meets societal goals whereas the latter seeks to make environmental progress. The most prominent aspect of sustainable entrepreneurship which has been developed more in the literature is social entrepreneurship. Henry (2008) clearly outlines how social entrepreneurship makes social conditions better off through the creation of value. He further explains that through social entrepreneurship, the society as a whole benefit in the form of externalities. Henry (2008) has put forward a conceptual framework which bridges economic growth with social entrepreneurship. According to him, social value can be grouped into two parts; the part which can be internalized by the social organization, and that which is external to the social organization. The framework posits that social entrepreneurship strategy must be structured to improve economic development of a region and on the other hand economic development strategy should be made to enhance social entrepreneurship. Sijabat (2015) has written an excellent piece on social entrepreneurship in which he discusses the function of social entrepreneurship in creating economic opportunities for the underprivileged. According to the author, access to financial resources, social innovation, people empowerment, and job creation are the primary blueprints by which social entrepreneurship may aid the poor. It was discovered that the first three factors are mostly important for the generation of revenue for the poor, exposing them to some economic chances. The latter, on the other hand, lowers the deprivation of competencies that allow the poor to participate in and play vital roles in economic activities. Other examples of social entrepreneurship may include, entrepreneurs giving back to society, introducing new products and services to the community, employment other people within their community, etc.

Ecopreneurship, which is also found under the scope of sustainable entrepreneurship is however a newer term which has paved its way into entrepreneurship. The term is often used interchangeably with eco-entrepreneurship or green entrepreneurship. Pastakia (2002), highlights that, ecopreneurship was the solution to the problem of negative environmental impact caused by industrialization. In fact, more recently, a lot of attention has been paid to the creation of eco-friendly businesses. For instance, Dixon and Clifford (2007), establish the fact that business approaches adopted by ecopreneurs have a much more robust influence on the environment than mere entrepreneurship. Ecopreneurs make a conscious effort not to deplete the environment with their business operations and they protect the environment for the next generation. In these approaches the environment and ecology is primarily taken into consideration. Entrepreneurs typically simply consider how much money they can make, however ecopreneurs consider how much money they can make while also maintaining the environment. While the majority of business owners were just interested in turning a profit, an increasing number of ecopreneurs have adopted a new strategy that is focused on greening the bottom line and fixing societal issues that their firm has exacerbated (Ivanko and Kivirist, 2008). Using the viewpoints of technological and managerial innovation, Huang, Ding, and Kao (2009) study ecopreneurship. Their argument is that "administrative innovation has a direct impact on managerial activities and indirectly influences the design of organizational administrative processes, whereas technical innovation contributes to the improvement and modification of product and service development and manufacturing technology." As a result, any green practices that are embedded in the process of generating products and services, technology, and organizations, whether technical or administrative, are green initiatives and can be referred to as ecopreneurship.

2.10 Other Aspects of Entrepreneurship

The interaction of entrepreneurship with other variables like culture, institutions, physical endowments, socio-political and even competition influence economic growth as well. This section of the meta-analysis focuses on the agglomerated effect of entrepreneurship and other variables on growth. Çelikkol et al. 2019 for instance determine how and to what extent cultural characteristics influence its entrepreneurial success, as well as how they both influence economic development in the long run. In their study, they consider a five-year longitudinal study with 81 countries. Data from Geert Hofstede website and annual reports from the Global Entrepreneurship Monitor were used to gather data on culture and entrepreneurship variables respectively. The research concluded that cultural characteristics such as cultural dimension, Individualism, Long-Term Orientation, Indulgence and Restraint have a positive impact on entrepreneurship success, whereas Masculinity has a negative impact. In the long run however entrepreneurial success influence growth and the reverse is true.

Wennekers and Thurik (1999) try to link entrepreneurship from an individual perspective to an aggregate perspective. They present a conceptual framework that demonstrates that for growth to occur, a variety of mechanisms seem to be at work. At the individual level, psychological endowments, for example, define the motivation for an individual to act on their goals. Cultural and institutional variables influence entrepreneurship at both the corporate and national levels, and all of these aspects can be seen as key elements of entrepreneurship. As a result, entrepreneurship has a positive impact on self-realization at the individual level, firm performance at the company level, and macro-level competitiveness and economic growth. Wennekers and Thurik, (1999), specifically investigates the relationship between entrepreneurship and economic growth by first providing an insight in the causal links between entrepreneurial dimensions and economic growth. The authors try to provide some conditions for the entrepreneurship-growth nexus. Their framework concludes that, the linkage between entrepreneurship and growth may depend upon underlying cultural and institutional conditions. as shown.

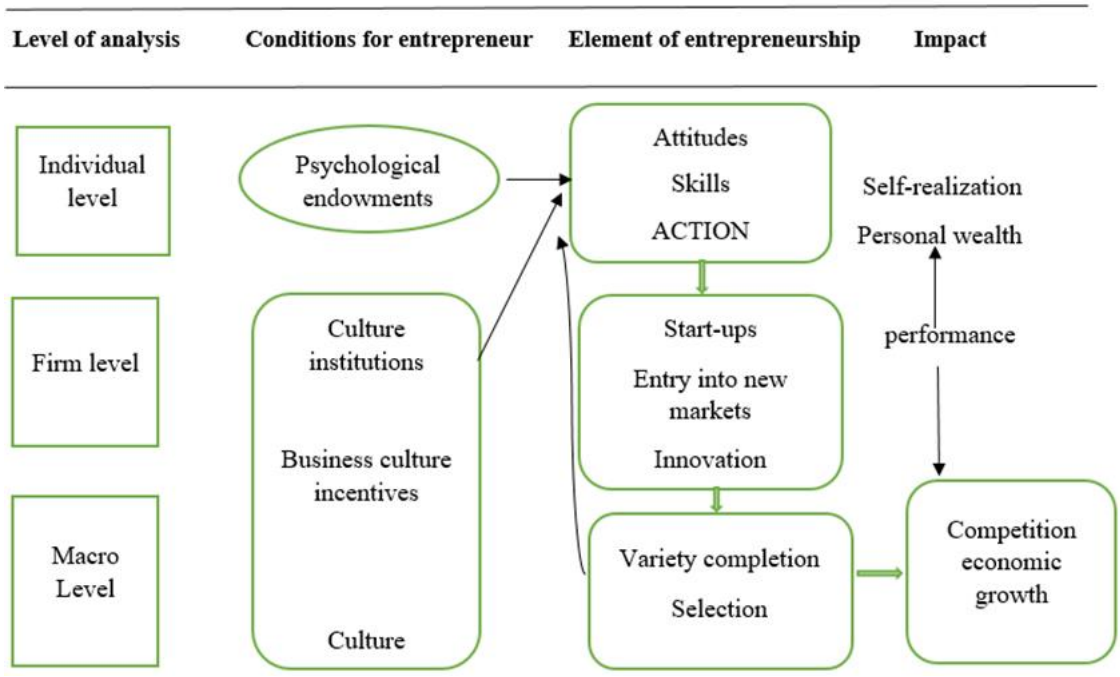

Figure 2.4: Levels of Entrepreneurship-Growth Nexus (source: Wennekers and Thurik (1999))

Boudreaux and Caudill (2019) conducted a research and called into question the widely held belief that entrepreneurship invariably leads to economic growth. Their study considers how, entrepreneurship, institutions and economic growth relates with each other and also try to see if the level of development matters. Using data from the Global Entrepreneurship Monitor (GEM) for a sample of 83 countries from 2002 to 2014, they find out that entrepreneurship promotes economic growth in developed countries but not in developing countries. Again, they discover that a country's institutional environment—as measured by GEM's Entrepreneurial Framework Conditions (EFCs)—contributes to economic growth in developed countries but not in developing countries. Lastly, they discover that opportunity-motivated entrepreneurship promotes economic growth in developed countries, whereas necessity-motivated entrepreneurship inhibits economic growth in developing countries.

2.11 Determinants of Entrepreneurship

To better understand the link between entrepreneurship and growth, it is necessary to investigate the factors that influence entrepreneurial activity. Despite the fact that there has been a significant amount of research attempting to identify key factors that drive entrepreneurship, little consensus has emerged. Hence, this section of the empirical studies tries to analyse some past works on the determinants of entrepreneurship and tries to identify some common variables which typically resurface as determinants of entrepreneurship. Arin et al (2014) in their work "Revisiting the Determinants of Entrepreneurship: A Bayesian Approach" have outlined a number of factors which influence entrepreneurship. These authors have a conception that there is some sort of uncertainty in the empirical research. This is because, more often than not researchers do not know which variables to use and tend to be selective on what variables to be used as determinants. The Bayesian Model Averaging (BMA) is therefore used to reduce the impact of uncertainty in entrepreneurial research. BMA is an inference application to model selection, combined estimation, and prediction problems that results in a simple model choice criteria and less risky predictions. In their analysis, they correct the uncertainty problem and conclude that the main macro variables that are significant and generally associated with aggregate entrepreneurship are unemployment, gross domestic product per capita and the marginal tax rate. Other factors like inflation and taxation do not necessarily influence entrepreneurship directly but it advocates that government has the ability to influence the entrepreneurial activity by providing enabling environment for such activities to take place.

Sayed and Slimane (2014) have also outlined three approaches to entrepreneurship determinants. These are the psychological approach, the economic approach and the institutional approach. The psychological traits have to do with the individual human behaviour as determinants of entrepreneurship; the economic approach, purports that only economic factors influence the formation of new businesses; and the institutional approach, claims that sociocultural factors in the environment discourage the formation of new businesses. In conclusion they find out that the most important determinants of entrepreneurship are the stage of economic development, population growth, employment, as well as educational attainment, financial development, macroeconomic stability, and technological progress. Furthermore, the study finds out that the cost of doing business, the tax system, and corruption all have a negative impact on the level of entrepreneurial activity.

Backman and Karlsson (2013) established the fact that most of the works which try to find the determinants of entrepreneurship focus on personal or individual traits however the impact of spatial factors plays an equally important role. They demonstrate in their research that the determinants of entrepreneurship are not solely explained by the entrepreneur's personal or individual characteristics (such as education, sector of employment, occupation, experience,

and income) but also by three important spatial or regional factors. First and foremost, the localities where they worked before they became entrepreneurs, then, the localities where they currently started their firm and lastly, the regions where these localities are situated influences entrepreneurship as well. Size, population density, firm density, and type of locality are all spatial factors which influence entrepreneurship. Their results show that spatial factors cannot be neglected when we want to understand the variants in the rate of entrepreneurship. After controlling for individual characteristics, the study discovers that a number of factors relating to spatial conditions, particularly the potential for strong networks at the local and regional levels, have a significant positive impact on new firm formation, with the local network potential being stronger than the regional network potential.

Kumar (2019) also highlighted that entrepreneurship is determined by three distinct features: Individual, Economic and Social features. More specifically, he stated that the individual features include salary, wealth, age, and demographic parameters. Economic features include income per capita and unemployment rate, and the social features include religion, social status of entrepreneurs, and education.

Weighing the pros and cons of the matter it can be concluded that entrepreneurship is influenced by two major factors: internal and external forces. Where internal forces refer to all the individual traits and characteristics within the entrepreneur. For instance, the individual's general attitude towards work, the individual's readiness to accept risk and uncertainty, wealth status of the individual, etc. External factors on the other hand refer to forces outside the entrepreneur's capabilities that aid or hinder the entrepreneur. Institutions, economic, socio-cultural, political and any other factors within the entrepreneurial ecosystem can be considered as external forces.

2.12 Summary of Literature Review

The literature review has thrown more light on the theoretical and empirical research. Under the theoretical review some classical, neoclassical, endogenous and development theories were reviewed. Due to their primary focus on factors that boost output or economic growth, all growth theories do not address entrepreneurship, which is a key result of the theoretical review. The role of entrepreneurship in economic growth and development was critically examined in theories of economic development like the Schumpeter's model, Knight's theory, McClelland's theory, Audretsch and Keilbach, etc. Because entrepreneurship is about development, it focuses more on quality of life.

The empirical research on the other hand adopts a meta-analysis 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.

To conclude the whole matter, we can say that based on evidence from the foregoing literature, the role of entrepreneurship in economic growth and development is a very important yet very controversial topic. How to measure entrepreneurship as well as what factors determine, or influence entrepreneurship must all be taken into consideration in other to know the actual impact of entrepreneurship on growth. Thus far, this study tries to bring to light some of the major flaws in previous studies which requires further studies and in addition creates its own verdict on the entrepreneurship-growth nexus across countries.

3 Methodology

3.1 Introduction

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. More specifically, the estimation strategies, the basic econometric model and the specification of the model will be brought to light. Again, the chapter deals with the data sources, types and also give justification to why some variables were included in the model. In addition to the estimation techniques, data sources and types, some tests are also conducted to ensure that the results produced are not spurious or bias. These tests include some diagnostic tests for checking autocorrelation and heteroscedasticity.

3.2 Sources and Description of Data

A panel data that collects data from multiple nations over a specific period is used to assess the contribution of entrepreneurship to economic growth and development among the selected high-income (developed) and low-income (less developed) countries. A number of macro databases are employed to create the data set for the study's important variables. Analysing entrepreneurship and economic growth nexus using a cluster of countries can be a daunting task. This is because, empirical studies have failed to find clear statistical support for this connection (Salgado-Banda, 2005). Clearly, the first issue is the metric used in those studies to measure entrepreneurship and growth in their empirical research. Therefore, in the context of this analysis, growth in GDP per capita served as a stand-in for growth, and self-employment served as a stand-in for entrepreneurship. The aim is to examine how self-employment affects growth in the group of high- and low-income nations. The World Development Indicators (WDI), International Labour Organization (ILOSTAT), International Monetary Fund (IMF), International Financial Statistics (IFS), Organization for Economic Co-operation and Development (OECD), and transparency international databases all provided information on the relevant variables.

The study consists of annual data from 39 high-income countries and 22 low-income countries from the period of 1999 to 2019. This sampling frame was chosen based on the availability of data in the respective databases. Also, evidence from existing literature as well as the measure of entrepreneurship were taken into consideration. The study employs 9 variables of interest, namely, Gross Domestic Product Per capita Growth (GDPPCG), Self-employment (SELF), Domestic Credit to Private Sector (DCPS), Inflation (INF), Gross Domestic Savings (SAV), Economic Openness (ECONOPEN), Labour Force Participation Rate (LFPR), Unemployment (UNEMP) and Corruption Perception Index (CPI). In total, a sample of 61 countries were used. When compared with other references from the literature, the sample of 61 countries is significant to conduct the analysis. For instance; Stam and Van-Stel (2009) used 36 countries altogether to represent High, transition and low income countries. O'conner et al (2018) used 55 countries altogether to represent developed and developing countries. Vinco et al (2016) used 22 countries to altogether to represent developed and developing countries (14 developed and 8 developing countries). The description of all the various variables of interest are illustrated below;

3.2.1 Gross Domestic Product (GDP) Per Capita Growth

GDP per capita growth, used as a proxy for economic growth, is the dependent variable. The World Bank's national accounts data and the OECD's National Accounts data files were used to gather the GDP per capita growth information for this study. In general, the per capita GDP growth is employed as a tool to distribute the economic production per person in an economy. It is often calculated by dividing a nation's GDP by its midyear population. The World Bank database defines GDP per capita growth as the yearly percentage growth rate of GDP per capita, and its aggregates are based on constant 2010 U.S. dollars. Per capita GDP is a global indicator of a country's prosperity that economists use along with GDP to assess a country's prosperity based on its economic growth. Economists argue that, the GDP per Capita measures the average level of national income per person and as such it presents a rough estimate of the average living standards of people in a country (Global Economic Prospect Report, 2018). As it is generally known, the Gross Domestic Product (GDP) is the total monetary worth of all final goods and services produced within a country. It simply measures the quantitative growth of the economy, and it does not include measurement of the living standards of the populace. Using the GDP per capita on the other hand as a measure of economic growth considers not just the quantitative growth of the economy but also the living standards of the populace. Within the context of the research, GDP per capita was used instead of GDP because it shows the actual economic output per person within the economy.

3.2.2 Self-Employment

Although a globally accepted definition for entrepreneurship does not presently exist, the most impressive and also the most common variable used as a proxy to represent entrepreneurship is self-employment. While recent theories advocate for a multidimensional definition of entrepreneurship, most empirical studies take a one-dimensional approach. “Self-employment, the rate of business ownership or new venture creation, and the Total Early-stage Entrepreneurship Activity Index (TEA) are all related to the level and/or dynamics of entrepreneurship and identify the percentage of the working-age population that is engaged or willing to engage in entrepreneurial activity” Acs (1994); Grilo and Thurik (2008). As a result of this evidence, the study adopt self-employment as a proxy for entrepreneurship.

Generally, self-employment has been described as the state of working for oneself rather than an employer. Others argue that a section of the labour force who do not work for a particular employer who pays them regular wages and salary fall under self-employment. Within the framework of this paper the definition for self-employment is modelled by the International Labour Organization (ILO). According to the ILO, “Self-employment or Self-employed workers are those who are working for themselves or with one or a few partners or in cooperative”. The ILO model’s self-employment to comprise of the following subcategories: self-employed workers with employees (employers), self-employed workers without employees (own-account workers), members of producers’ cooperatives and contributing family workers. Mostly, they earn a living by working for themselves without the government or another private entity. Self-employment, as modelled by the ILO is used as a measure of entrepreneurship as it captures all vital elements of the entrepreneur and is harmonized to ensure comparability across countries and over time. Self-employment in this perspective represent a percentage of total employment and the data obtained is sourced from International Labour Organization, ILOSTAT database.

3.2.3 Domestic Credit to Private Sector

Credit is a very important factor entrepreneurs consider when they want to start their own businesses and venture into self-employment. Credit is a vital link in the money transmission chain, as it funds production, consumption, and helps to accumulate capital, which in turn influence economic activity. Domestic credit to the private sector, according to the International Monetary Fund (IMF), is the financial services provided by financial companies to the private sector, such as non-equity securities purchases, loans, trade credits, and other accounts receivable that provide a claim for repayment. These may include corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits. Financial corporations that provide credit to the private sector include finance and leasing firms, money lenders, insurance companies, pension funds, and foreign exchange firms. Klapper et al. (2007) discovered that financial development, as measured by the domestic credit-to-private-sector ratio as a percentage of GDP, is positively correlated with entry rates and business density, implying that greater business opportunities and better access to finance are associated with a more robust entrepreneurial sector. Hence this variable has been chosen as a control variable because credit availability is a good source of financial resource for entrepreneurs. For private businesses, private sector, private investment, and entrepreneurship in general to flourish there is the need for credits to be readily available. Data is obtained from the International Monetary Fund, International Financial Statistics data files.

3.2.4 Inflation

The consumer price index, which measures inflation, indicates the annual percentage change in the cost to the average consumer. It is the increase in the cost of most of the day to day or common goods and services, such as food, clothing, housing, recreation, transportation, and consumer staples. Obamuyi et al. (2018), stated clearly that financial issues matter a lot to entrepreneurs and business owners in general. Since the prime motive of entrepreneurs is to make profits, fluctuations in the general price levels are of major concerns to them. In fact, Parker (2009) identified that, “Inflation, and particularly its volatility, restricts entrepreneurship by making the economic environment riskier and making it more difficult for entrepreneurs to recover the value of their assets and develop correct expectations regarding the industry”. Hence, understanding the inflations’ pattern across the cluster of countries and how they relate with entrepreneurship and growth is very important. This variable is therefore included in the basket of control variables because the volatility or price instability matters a lot to entrepreneurs and the data is sourced from International Monetary Fund, International Financial Statistics data files.

3.2.5 Gross Domestic Savings

Gross domestic savings (GDS), or total consumption less final consumption expenditures, is used to calculate GDP. The portion of GDP that wasn't used for consumption serves as the determining factor. This variable was added to the list of controls since there is a substantial amount of empirical research that lends credence to the idea that savings and growth are somehow related. Patra et al. (2017), Balarinwa et al. (2017), Van Wyk and Kapingura (2021), etc. are a few examples. These empirical literature examples support Solow's theory on saves and economic growth. The World Bank and OECD National Accounts data sets were used to gather the data.

3.2.6 Labour Force Participation Rate

The labour force participation rate represents a section of the economically active persons who are either working or actively looking for work in a given economy. All persons who are eligible to provide labour for the production of goods and services over a given time in an economy are included in the Labour Force Participation Rate. It includes working people, unemployed people looking for jobs, and first-time job seekers, etc. Seasonal jobs come and go, so the labour force composition varies over the year. The labour force participation rate differs from employment to population ratio because it includes all persons within the labour market who either have a job or are actively searching for one. Employment to population ratio on the other hand is a section of the population who are employed. This variable is included in the list of control variables because the labour force participation rate influence entrepreneurship and economic growth in diverse ways. This assertion is backed by evidence from the literature as shown in the works of Denton and Spencer (1997) as well as Duval et al. (2010). Data was sources from International Labour Organization, ILOSTAT database.

3.2.7 Economic Openness

The amount of non-domestic transactions (imports and exports) that occur within an economy is referred to as economic openness. To measure the degree of openness, the Impex rate is used. This is simply the registered number of imports and exports that takes place within an economy over a given period of time. Imports in this context refers to the value of all goods and services received from the rest of the world whiles exports refers to the value of all goods and services provided to the rest of the world. Hence, data on economic openness is obtained by summing up the value of imports and exports. This variable is included in the model as a control variable because there is enough evidence that openness has some correlation with growth. For instance, Capolupo and Celi (2008) have done an extensive work on the Economic Openness- Economic growth nexus. Data files from the OECD National Accounts and World Bank National Accounts are used to compile import and export statistics.

3.2.8 Unemployment

Unemployment is described as the percentage of the workforce that is unemployed but looking for jobs. Two schools of thought have emerged when issues of unemployment, entrepreneurship and growth are being discussed. On one side, unemployment affects people's ability to earn money through paid labour, which may force them to turn to self-employment out of necessity. However, as unemployment increases, business owners face a drop in consumer demand for their goods. While Audretsch and Fritsch (1994) and Garofoli (1994) observed that unemployment is negatively associated to launching new firms, Evans and Leighton (1990) discovered a favorable relationship between unemployment and new business start-ups. To understand better the role unemployment plays in the entrepreneurship growth nexus, it is included as a control variable. Data is obtained from ILOSTAT database.

3.2.9 Corruption Perception Index

Corruption Perception Index (CPI) assigns a ranking to nations based on how corrupt they are seen in the public sector. A scale from 0 to 100 is used to calculate the CPI, where 0 is significantly corrupt and 100 is very clean. Data is obtained from the transparency international database. (www.transparency.org).

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	DCPS: Domestic Credit to the Private Sector.	Credit is easily accessible to the 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 percentage 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

It is extremely important to note that, the fore mentioned variables are included in the model based on evidence from the literature.

3.3 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.

3.3.1 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.

3.3.2 Model Specification

3.3.2.1 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.

3.3.2.2 Empirical model and Econometric issues

As more degrees of freedom are inferred by including the time series dimension, panel data can be used to access the fluctuations in variables across time across a cluster of countries. 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.

As a result, the Generalized Method of Moments (GMM) creates dynamic panel data model estimates that are more effectively constructed. Consistency, according to Arellano and Bond, ignores any or all of the possible orthogonality constraints. An important presumption is that the necessary instruments will be "internal," that is, will be based on lagged values of the instrumented variable(s). The estimators also permit the addition of outside instruments. To address some of the potential econometric issues that arise when dealing with dynamic panel data (DPD), Arellano and Bover (1995) and Blundel and Bond (1998) developed a panel data analysis based on a GMM-type estimator called the "system estimator." By simultaneously accounting for the dynamic interaction between the relevant variables, the system GMM approach.

3.3.2.3 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.

3.3.3 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

3.3.3.1 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. For instance, according to Greene (2008), the primary distinction between fixed and random effects is whether or not the unobserved individual effects that are linked with the model's regressors are stochastic.

Since the entity's error term is unrelated to the predictors in random effects models, time-invariant variables can be employed as explanatory variables. Individual traits that might or might not have an impact on the predictor variables must be stated when RE is utilized. The issue is that some variables might not be accessible, which could lead to model bias from omitted variables.

3.3.3.2 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 each 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.

3.4 Priori Expectation

The main variables of interest are entrepreneurship and economic growth. From the literature most of the research findings conclude that entrepreneurship is important for economic growth. What most studies do not clarify is whether the above statement holds for both high- and low-income countries. Mixed results in the literature has therefore prompted the need for further studies to be undertaken in relation to this status quo. Therefore, the aim is to use data from chosen macroeconomic data sources to determine the actual relationship between entrepreneurship and economic growth among the selected high-income (developed) and low-income (less developed) countries. Therefore, the a priori expectation is to clarify any discrepancies in the literature. Although the logical thinker would come to the conclusion that entrepreneurship should favor growth, we cannot conclusively state that entrepreneurship always results in growth. As a result, it is unclear what the selected cluster of high- and low-income nations should look like in terms of the entrepreneurship-growth nexus. The result of the macroeconomic indicators chosen (growth in the GDP per capita and self-employment) will have a significant impact on the sign.

3.5 Unit Root Tests

The first test in estimating parameters of a model using time series or panel data requires a test for the stationarity of the variables to determine the order of integration of each variable used. In panel estimation processes, it is necessary to test the order of integration for econometric model specification. Again, certain variables, according to economic theories should be integrated or have a random walk. In such a situation, it is important to perform this test in other to find exact estimated values. This study tests for stationarity of the endogenous and exogenous variables within the framework of IM – Pesaran – Shin test procedure. Since the panel is not

balanced the IM – Pesaran – Shin test procedure is considered to be the most appropriate. The objective of this unit root test is to check whether, the variables of interest are not integrated of order one- I (1) before proceeding to estimate the coefficients of the variables. This is to prevent spurious regression which is a common problem associated with time series data.

3.5.1 IM-Pesaran-Shin Unit Root Test

The assumption of cross-sectional independence across units is the main limitation of the IM-Pesaran-Shin (IPS) test, which is part of the framework of the first generations of tests (Levin, Lin, and Chu, 2002; Im, Pesaran, and Shin, 2003).

Im, Pesaran and Shin (2003) used the likelihood framework to suggest a more flexible and computationally simple unit root testing procedure for panels (which is referred as t-bar statistic), that allows for simultaneous stationary and non-stationary series. One main advantage of the IPS test is that it allows for residual serial correlation and heterogeneity of the dynamics and error variances across groups.

3.6 Diagnostic Tests

In regression analysis, model misspecification may have serious implications on the estimators, tests and even outcome of the study. When this happens biased results are produced, and as such, the general conclusions and predictions may be wrong. To ensure that the model is adequate and reliable and that it satisfies the classical assumptions of the least square, there is the need to conduct some diagnostic tests. The Breusch and Pagan Lagrangian Multiplier test is used to determine whether or not heteroscedasticity is present in a regression. In this study, to ensure the model is not mis-specified the diagnostic test is needed to check if the residuals (error term) meet their own essential assumptions.

3.6.1 Breusch-Pagan LM Test

To make predictive analysis or to estimate relationships using regression analysis, it is important to ensure that residuals of the regression are not heteroscedastic. The Breusch-Pagan test is used to test for heteroscedasticity in a regression model and assumes that the error terms are normally distributed. That is, the variance of the residuals does not rise along with the fitted value of the regressors. If the residuals of the model have heteroscedasticity, the constructed model will not be efficient or stable enough to justify the regressand. Breusch and Pagan (1979) proposed this test to verify heteroscedasticity of residual variance, which is a heteroscedasticity-consistent variance estimator of variance matrix. The LM statistic, used in Breusch-Pagan test, is the multiplication between sample size and R squared value. LM also follows a Chi-squared distribution. The hypothesis of this Breusch-Pagan test is suggested as follows:

H_0: no heteroscedasticity

H_1: heteroscedasticity

3.7 List of Countries

3.7.1 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.

3.7.2 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 Empirical Results and Analysis

4.1 Introduction

This chapter presents the estimated results of the empirical models specified in chapter three with focus on the stated research problem, objectives and research questions outlined in chapter one. The analysis begins with a descriptive analysis and visualization of the raw data, where the trends and patterns of entrepreneurship and growth are examined across the cluster of high- and low-income countries. The goal of this exercise is to increase our understanding of the relationship between entrepreneurship and growth among the nations that have been chosen as a cluster as well as the behavior of the variables of interest. Additionally, it offers a straightforward framework for comprehending statistically the relationship between entrepreneurship and economic progress in the chosen high- and low-income nations. As a result, the study compares and contrasts the statistics and relationship between entrepreneurship and growth in the chosen high- and low-income group of nations. The study then moves on to look at the factors that influence entrepreneurship in the chosen high- and low-income nations. The objective is to resolve inconsistencies in the literature and assess if the claim that "entrepreneurship is vital for economic growth" remains true across several countries with various macroeconomic conditions, entrepreneurial activity, cultural backgrounds, and other factors. The results are presented in this chapter based on an unbalanced panel that includes data from 22 low-income countries and 39 high-income countries between 1999 and 2019.

4.2 Descriptive Analysis

To understand the large dataset in a simplified manner, the descriptive statistics is used. Before conducting any regression analysis, it is essential to understand what the sample convey, that is, what are the distinctive features of each variable that make up the sample data. Tables 4.1 and 4.2, respectively, give the summary of the descriptive analysis for the cluster of high- and low-income nations for the combined data.

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. The average Gross Domestic Product (GDP) per capita growth rate of high-income nations is observed to be 9.98%. This indicates that overall from 1999 and 2019, the respective economies grew at an average rate of 9.98%. As stated in chapter three, self-employment or entrepreneurship in the context of this study refers to the proportion of all employees who work for themselves. 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, 61.49% of those who are economically engaged and able to work are also willing and able to do so. The average unemployment rate for the group of high-income nations was 6.63 percent. The typical value of domestic credit provision and availability to the private sector is 90.98. Average savings rates were 27.98 percent and 2.66 percent, respectively, while the total of exports and imports, which measures economic openness, has an average value of 108.35 percent. The Corruption Perception Index for the group of high income nations was 61.02 at the end.

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

On the other hand, Table 4.2 shows the findings of the descriptive analysis for the chosen subset of low-income nations. It can be shown that throughout the same time period, low-income nations saw average growth of about 3.26 percent. Low-income nations have a self-employment rate of 4.38 percent on average. This indicates that, on average, 4.38% of all employed people work for themselves or are self-employed. 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.

4.3 Scatter Plot with overlaid linear prediction

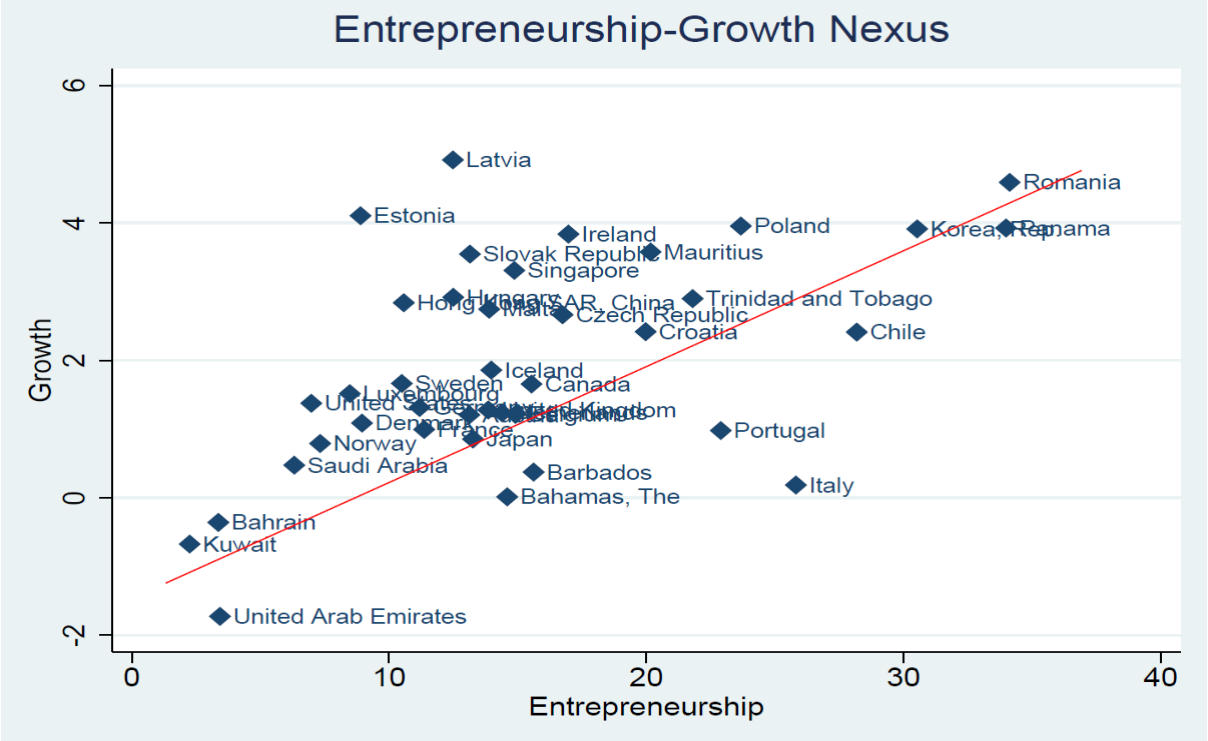

Figure 4.3 Entrepreneurship-Growth Nexus for High-income Countries

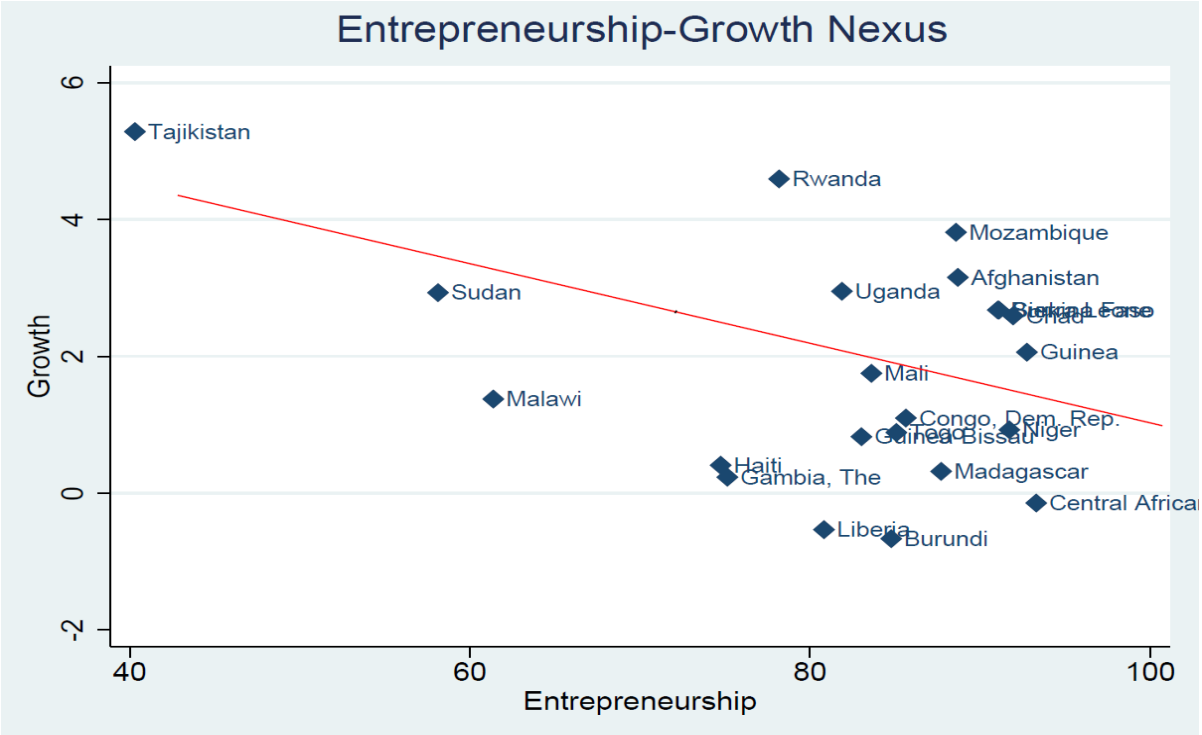

Figure 4.4 Entrepreneurship-Growth Nexus for Low-income Countries

It is necessary to have a general visualization between the two variables in order to comprehend the relationship between entrepreneurship and growth in the selected high- and low-income group of countries. An intriguing connection between entrepreneurship and growth among the chosen high-income and low-income nations is shown in the scatter diagram above. Some restrictions were taken into account when drawing the scatter diagram. As a starting point, we take into account a pooled OLS estimation where we have a "time series of cross sections," but not all of the observations in each cross section necessarily pertain to the same unit (Wooldridge, 2010). As can be seen in the context of this analysis, each cross section's observation relates to the link between entrepreneurship and growth for each distinct nation within the collection of high- and low-income nations.

It may be concluded that entrepreneurship and growth are positively correlated in the case of the high-income group of nations. We may boldly draw the conclusion that entrepreneurship contributes to economic growth and development among the chosen countries using a cluster of 39 countries. The direction of flow indicates that the fitted values have a positive association, and each dot stands for a single country. This suggests that those who are economically active and working for themselves make a good contribution to growth.

However, in the case of low-income nations, it can be seen that based on a cluster of 22 countries, there is generally a dispersed distribution of the countries and an inverse link between entrepreneurship and growth. When the data points in a scatter graph approach creating a straight or dispersed line when plotted along the mean or fitted values, the correlation between the two variables is considered to be greater or weaker, respectively.

If the scatter diagram is carefully studied, it can be deduced that, overall, the influence of self-employment on growth is relatively stronger among the selected high-income countries than it is among the low-income ones. Evidence from the literature can support the rationale for this kind of interaction. For instance, Boudreaux & Caudill (2019) discovered comparable results and linked it to weak institutions in low-income nations. Additionally, productive and unproductive entrepreneurship are discussed by Baumol (1990), with each having a tendency to have a favorable or unfavorable effect on growth. Unproductive entrepreneurship typically arises in weakly structured economies where rent-seeking, tax evasion, and avoidance are prevalent. In order to go farther, Desai and Acs (2007) introduce the idea of negative entrepreneurship. They point out that disruptive entrepreneurship has a detrimental effect on the GDP. Destructive entrepreneurship frequently stifles innovation. Schumpeter's theory states, however, that innovation or creativity propels entrepreneurship, which over time leads to growth. Therefore, if innovation is stifled, entrepreneurship will be discouraged and growth won't be accomplished. Acs (2010) ties together the loose ends and comes to the conclusion that emerging nations, where stronger incentive structures are needed, are where damaging entrepreneurship is most likely to occur. Porter et al. (2002) describe three stages of growth, namely the factor-driven stage, the efficiency-driven stage, and the innovation-driven stage, building on Rostow's (1960) stages of economic growth. Countries in the factor-driven stage compete through low-cost efficiencies, agricultural self-employment, and low income. Low-income nations can be grouped into the stage of this analysis that is factor-driven. The majority of economies move from an efficiency-driven stage to an innovation-driven period. High value-added sectors that place a premium on entrepreneurship define the innovation driven stage. High-income nations can be categorized as being in the stage that is driven by innovation within the context of this analysis. The results from the scatter diagram are in accordance with the data from the literature mentioned above.

The graphical display offers a clear foundation for the type of entrepreneurship that is used in a few high- and low-income nations. The graphical depiction acts as a framework once more for guiding us to the following study goal. The study's analysis of the unit roots and the quantitative effects of entrepreneurship on growth throughout the cluster of high- and low-income nations will be expanded upon in the study's next objective. The effect of entrepreneurship on growth is quantitatively examined using the GMM system.

4.4 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.

4.5 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 among 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 group 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.

4.6 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:

4.6.1 Hausman Test Estimation

The model for Hausman test estimation takes the:

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

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 group 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.

4.9 Diagnostic and Stability test

4.9.1 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 4.10 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 4.11 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

5.1 Major conclusions

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 findings demonstrated that entrepreneurship has a positive and significant impact on growth in high-income nations, but has an inverse association with growth in low-income countries. This is clearly related to the sort of entrepreneurship practiced across the cluster of nations, as well as the factors that drive entrepreneurship across the cluster of countries. As a result of the third research goal, we now have a better understanding of how certain variables influence entrepreneurship across the cluster of high- and low-income nations. Based on the outcomes 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 nurturing 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. As a result of increased R&D, entrepreneurs gain new ideas to enable them to make a range of things, and with a diversity of goods, consumption, output, and eventually economic growth and development will increase. In return, 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.

Limitations include the disparity in the total number of high- and low-income nations. To perform the comparison, a total of 39 high-income countries and 22 low-income countries were included. This suggests that the cluster of high-income nations has 17 more countries than the low-income countries, giving the cluster of high-income countries a larger sample size. The is related to the fact that most low-income countries lack access to data.

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.

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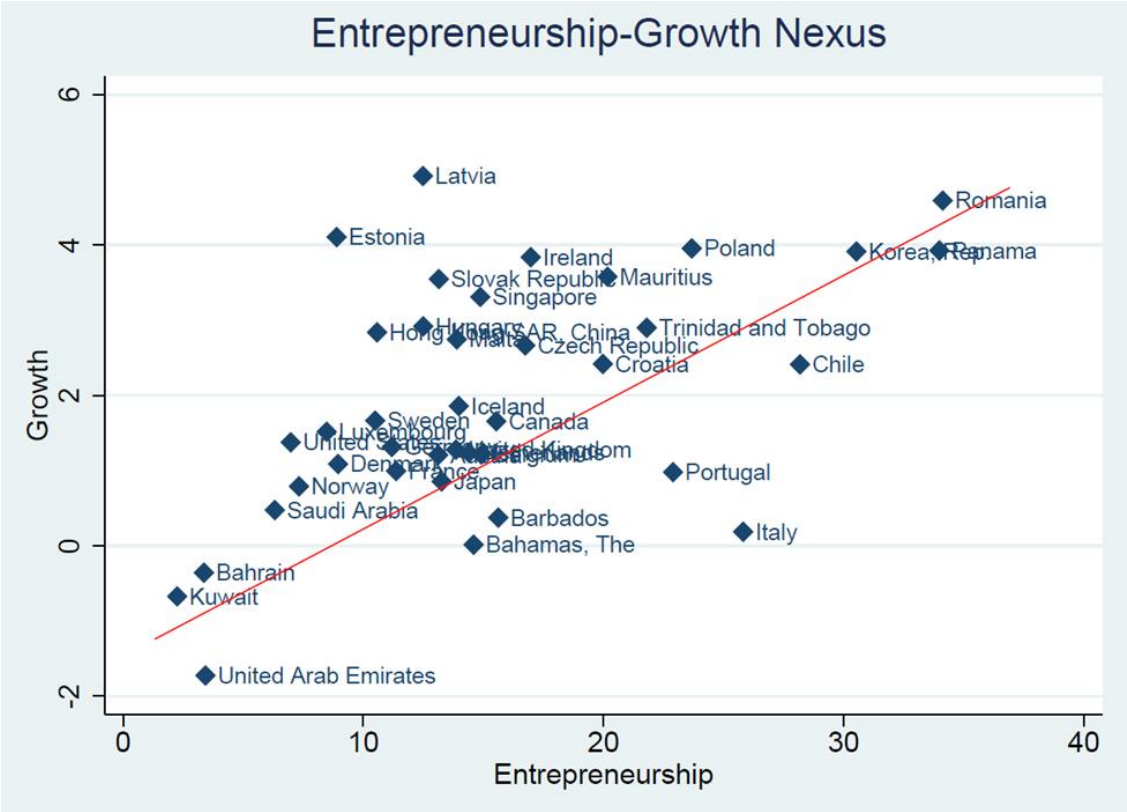
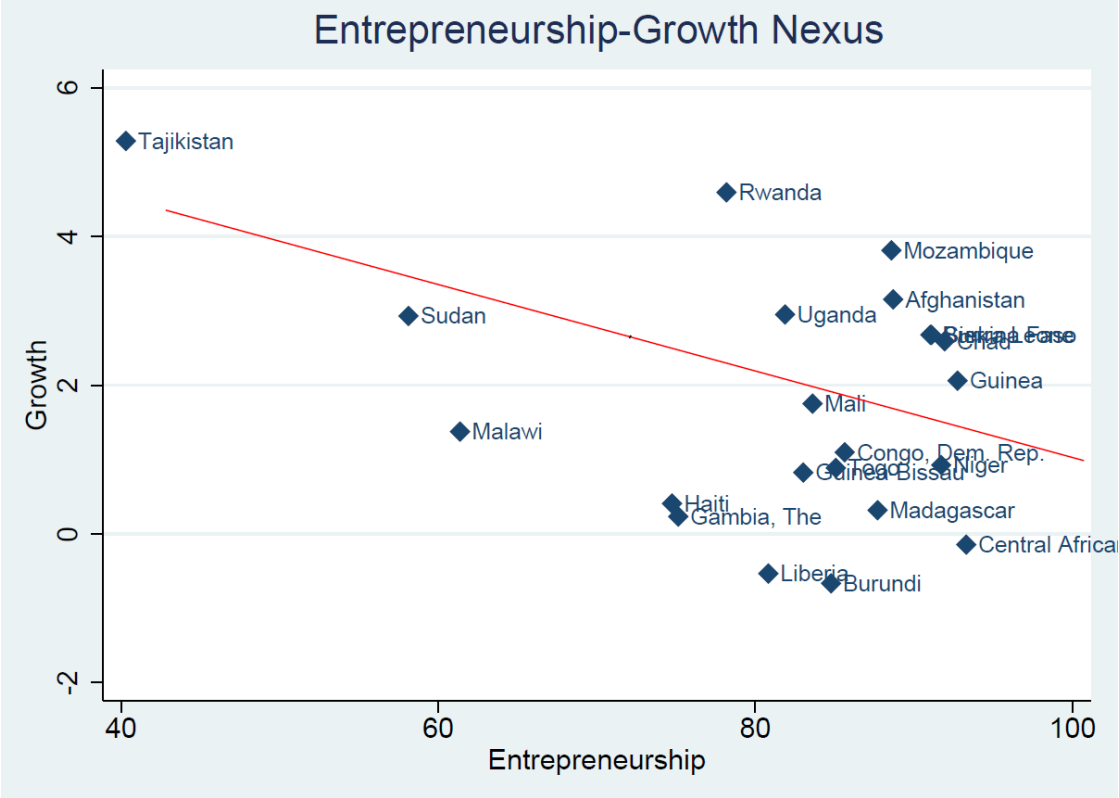
Appendices

Appendix 1: Line graphs

Appendix 1.1 Scatter Plot on Entrepreneurship and Growth for High Income Countries



Appendix 1.2 Scatter Plot on Entrepreneurship and Growth for High Income Countries



Appendix 2: Unit Root test results for High and Low income countries

High Income Countries Unit root

```
. xtunitroot ips GDPpercapitagrowth, trend demean lags (1)

Im-Pesaran-Shin unit-root test for GDPpercapitagrowth
-----------------------------------------------------
H0: panels contain unit roots           Number of panels =     39
Ha: panels are stationary               Number of periods =     21

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
-------------------------------------------------------------------------------
                     Statistic      p-value
-------------------------------------------------------------------------------
 W-t-bar              4.7790        0.0000
-------------------------------------------------------------------------------


xtunitroot ips Selfemployment, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Selfemployment
-------------------------------------------------
H0:  panels contain unit roots           Number of panels =     39
Ha:  panels are stationary               Number of periods =     21

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed
```

```
ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar              1.8019        0.0358
--------------------------------------------------------------------------------


 xtunitroot ips Unemployment, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Unemployment
----------------------------------------------
H0: panels contain unit roots           Number of panels =     39
Ha: panels are stationary               Number of periods =     21

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar              1.9508        0.0255
--------------------------------------------------------------------------------

 xtunitroot ips Inflation, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Inflation
--------------------------------------------
H0: panels contain unit roots           Number of panels       =     39
Ha: panels are stationary               Avg. number of periods = 20.74

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar              3.9144        0.0000
--------------------------------------------------------------------------------

 xtunitroot ips LFPR, trend demean lags (1)
***** Level and 1st Diference

Im-Pesaran-Shin unit-root test for LFPR
---------------------------------------
H0: panels contain unit roots           Number of panels =     39
Ha: panels are stationary               Number of periods =     21

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar             -0.4438         0.3286
--------------------------------------------------------------------------------

 xtunitroot ips dLFPR, trend demean lags (1)
```

```
Im-Pesaran-Shin unit-root test for dLFPR
---------------------------------------
H0: panels contain unit roots           Number of panels =     39
Ha: panels are stationary               Number of periods =     20

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar              -5.3234        0.0000
------------------------------------------------------------------------------


***** Stationary at 1st difference
xtunitroot ips Savings, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Savings
------------------------------------------
H0: panels contain unit roots           Number of panels       =     38
Ha: panels are stationary               Avg. number of periods = 20.87

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lags
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar               1.7157        0.9569
------------------------------------------------------------------------------

xtunitroot ips dSavings, trend demean lags (1)

Im-Pesaran-Shin unit-root test for dSavings
-------------------------------------------
H0: panels contain unit roots           Number of panels       =     38
Ha: panels are stationary               Avg. number of periods = 19.87

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lags
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar              -9.2384        0.0000
------------------------------------------------------------------------------


 xtunitroot ips Domesticcredit, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Domesticcredit
-------------------------------------------------
H0: panels contain unit roots           Number of panels       =     39
Ha: panels are stationary               Avg. number of periods = 19.76

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed
```

```
ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
W-t-bar              -2.5745        0.0050
--------------------------------------------------------------------------------


 xtunitroot ips Economicopenness, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Economicopenness
-----------------------------------------------
H0: panels contain unit roots           Number of panels       =     39
Ha: panels are stationary               Avg. number of periods = 20.92

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar             -16.3673        0.0000
--------------------------------------------------------------------------------

***** Stationary at 1st difference
 xtunitroot ips CPI, trend demean lags (1)

Im-Pesaran-Shin unit-root test for CPI
--------------------------------------
H0: panels contain unit roots           Number of panels =     39
Ha: panels are stationary               Number of periods =     21

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar              -1.2335        0.1087
--------------------------------------------------------------------------------

. gen dCPI=d.CPI
(39 missing values generated)

. xtunitroot ips dCPI, trend demean lags (1)

Im-Pesaran-Shin unit-root test for dCPI
--------------------------------------
H0: panels contain unit roots           Number of panels =     39
Ha: panels are stationary               Number of periods =     20

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar              -7.8258        0.0000
```

```
------------------------------------------------------------------------------
```

Low Income Countries UNIT ROOT

```
xtunitroot ips GDPpercapitagrowth, trend demean lags (1)

Im-Pesaran-Shin unit-root test for GDPpercapitagrowth
-----------------------------------------------------
H0: panels contain unit roots           Number of panels       =     21
Ha: panels are stationary               Avg. number of periods = 21.90

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar              -6.5553        0.0000
------------------------------------------------------------------------------

 xtunitroot ips Selfemployment, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Selfemployment
-------------------------------------------------
H0:  panels contain unit roots           Number of panels =     21
Ha:  panels are stationary               Number of periods =     22

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar              -7.5099        0.0000
------------------------------------------------------------------------------

xtunitroot ips Unemployment, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Unemployment
-----------------------------------------------
H0:  panels contain unit roots           Number of panels =     21
Ha:  panels are stationary               Number of periods =     22

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar              -8.9501        0.0000
------------------------------------------------------------------------------

xtunitroot ips Inflation, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Inflation
--------------------------------------------
H0:  panels contain unit roots           Number of panels       =     21
Ha:  panels are stationary               Avg. number of periods = 21.29
```

```
AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar            -17.9746        0.0000
------------------------------------------------------------------------------

 xtunitroot ips LFPR, trend demean lags (1)

Im-Pesaran-Shin unit-root test for LFPR
---------------------------------------
H0:  panels contain unit roots           Number of panels =     21
Ha:  panels are stationary               Number of periods =     22

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar             -3.0348        0.0012
------------------------------------------------------------------------------

 xtunitroot ips Savings, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Inflation
--------------------------------------------
H0:  panels contain unit roots           Number of panels       =     21
Ha:  panels are stationary               Avg. number of periods = 21.29

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar            -4.4243        0.0000
------------------------------------------------------------------------------

xtunitroot ips Domesticcredit, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Domesticcredit
-------------------------------------------------
H0:  panels contain unit roots           Number of panels       =     21
Ha:  panels are stationary               Avg. number of periods = 21.05

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                    sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar             -5.2418        0.0000
------------------------------------------------------------------------------
```

```
 xtunitroot ips Economicopenness, trend demean lags (1)

Im-Pesaran-Shin unit-root test for Economicopenness
-----------------------------------------------
H0:  panels contain unit roots           Number of panels       =     21
Ha:  panels are stationary               Avg. number of periods = 21.33

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar              -6.5677        0.0000
--------------------------------------------------------------------------------


 xtunitroot ips CPI, trend demean lags (1)

Im-Pesaran-Shin unit-root test for CPI
--------------------------------------
H0:  panels contain unit roots           Number of panels =     21
Ha:  panels are stationary               Number of periods =     22

AR parameter: Panel-specific                Asymptotics: T, N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included                      Cross-sectional means removed

ADF regressions: 1 lag
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 W-t-bar              -5.4418        0.0000
```

Appendix 2.1: High-income Countries – GMM Results

```
Random-effects GLS regression                   Number of obs     =        617
Group variable: Year                            Number of groups  =         19

R-squared:                                      Obs per group:
     Within  = 0.1073                                         min =         19
     Between = 0.1958                                         avg =       32.5
     Overall = 0.0995                                         max =         38

                                                Wald chi2(9)      =      71.89
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

------------------------------------------------------------------------------
GDPpercapitagrowth | Coefficient  Std. err.      z    P>|z|     [95% conf.
interval]
-------------------+----------------------------------------------------------
   Selfemployment |   .0801771   .0154052     5.20   0.000     .0499835
.1103707
     Unemployment |   -.069264   .0408681    -1.69   0.090    -.1493641
.010836
            lnINF |  -.0476398   .0182393    -2.61   0.009    -.0833882   -
.0118915
             LFPR |    .045149    .017808     2.54   0.011     .0800521
.0102459
```

```
          Savings |   .3214451   .1461924     2.20   0.028     .0349132
.6079771
   Domesticcredit |   .0037892   .0075769     0.50   0.617    -.0110612
.0186396
 Economicopenness |   .0153452   .0065873     2.33   0.020     .0282561
.0024343
              CPI |    .752986   .2503365     3.01   0.003     .2623355
1.243637
            _cons |   3.837421   1.319774     2.91   0.004     1.250712
6.424131
------------------+------------------------------------------------------------
----
          sigma_u |  1.1887318
          sigma_e |  2.5136053
              rho |  .18277446   (fraction of variance due to u_i)
------------------------------------------------------------------------------
----
```

Appendix 2.2: Low-income Countries – GMM Results

```
Random-effects GLS regression                   Number of obs     =       379
Group variable: Year                            Number of groups  =        19

R-squared:                                      Obs per group:
     Within  = 0.0543                                         min =        16
     Between = 0.2122                                         avg =      19.9
     Overall = 0.0581                                         max =        22

                                                Wald chi2(9)      =     22.75
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0068

------------------------------------------------------------------------------
----
GDPpercapitagro~h | Coefficient Std. err.      z    P>|z|     [95% conf.
interval]
------------------+------------------------------------------------------------
----
   Selfemployment |  -.0570273   .0268285    -2.13   0.034    -.1096102   -
.0044444
     Unemployment |  -.1401482   .1034905    -1.35   0.176     -.342986
.0626895
            lnINF |  -.0212344   .0093451    -2.27   0.023    -.0395505   -
.0029182
             LFPR |   .2851817   .0969012     2.94   0.003     .0952588
.4751046
          Savings |   .0094495   .0132935     0.71   0.477    -.0166054
.0355044
   Domesticcredit |  -.0391741    .037426    -1.05   0.295    -.1125277
.0341795
 Economicopenness |    .954555    .251031     3.80   0.000     .4625433
1.446567
              CPI |   .0731974   .0369838     1.98   0.047     .0007104
.1456844
            _cons |   10.98336   4.238222     2.59   0.010     2.676596
19.29012
------------------+------------------------------------------------------------
----
          sigma_u |          0
          sigma_e |  4.7899821
              rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
----
```

Appendix 3: Hausman Test Results for High Income Countries

```
xtreg Selfemployment Unemployment Inflation LFPR Savings Domesticcredit
Economicopenness CPI, re

Random-effects GLS regression                   Number of obs     =        731
Group variable: Year                            Number of groups  =         21

R-squared:                                      Obs per group:
     Within  = 0.2651                                         min =         23
     Between = 0.6556                                         avg =       34.8
     Overall = 0.2684                                         max =         38

                                                Wald chi2(7)      =     265.22
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

------------------------------------------------------------------------------
  Selfemployment | Coefficient  Std. err.      z    P>|z|     [95% conf.
interval]
-----------------+------------------------------------------------------------
    Unemployment |   .2348742   .0883556     2.66   0.008     .0617003
.4080481
       Inflation |   .4077916   .0636846     6.40   0.000     .2829721
.532611
            LFPR |  -.0968239   .0418722    -2.31   0.021    -.1788918   -
.0147559
         Savings |  -.1837099   .0342803    -5.36   0.000    -.2508981   -
.1165218
  Domesticcredit |  -.0246137   .0182007    -1.35   0.176    -.0602865
.011059
Economicopenness |   .0155717   .0164442     0.95   0.344    -.0166583
.0478017
             CPI |  -.0973257   .0135069    -7.21   0.000    -.1237987   -
.0708527
           _cons |   30.08202   2.773658    10.85   0.000     24.64575
35.51829
-----------------+------------------------------------------------------------
         sigma_u |          0
         sigma_e |  6.7580969
             rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimate store re

.
 xtreg Selfemployment Unemployment Inflation LFPR Savings Domesticcredit
Economicopenness CPI, fe

Fixed-effects (within) regression               Number of obs     =        731
Group variable: Year                            Number of groups  =         21

R-squared:                                      Obs per group:
      Within = 0.2657                                         min =         23
     Between = 0.6094                                         avg =       34.8
     Overall = 0.2677                                         max =         38

                                                F (7,703)         =      36.34
corr(u_i, Xb) = -0.1388                         Prob > F          =     0.0000
```

```
------------------------------------------------------------------------------
  Selfemployment | Coefficient  Std. err.      t    P>|t|     [95% conf.
interval]
-----------------+------------------------------------------------------------
    Unemployment |   .2642629   .0939114     2.81   0.005     .0798825
.4486432
       Inflation |    .455747   .0678665     6.72   0.000     .3225016
.5889923
            LFPR |  -.1025885    .042519    -2.41   0.016    -.1860679   -
.0191092
         Savings |  -.1742438   .0352016    -4.95   0.000    -.2433567    -
.105131
  Domesticcredit |  -.0226051   .0185044    -1.22   0.222    -.0589357
.0137254
Economicopenness |    .016978   .0166664     1.02   0.309    -.0157438
.0496998
             CPI |  -.1010934   .0139135    -7.27   0.000    -.1284104   -
.0737764
           _cons |   29.73456   2.830664    10.50   0.000     24.17699
35.29212
-----------------+------------------------------------------------------------
         sigma_u |  .68122819
         sigma_e |  6.7580969
             rho |  .01005879   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(20, 703) = 0.32                     Prob > F = 0.9979

. estimate store fe

. hausman re fe

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       re           fe         Difference       Std. err.
-------------+----------------------------------------------------------------
Unemployment |    .2348742     .2642629       -.0293886               .
   Inflation |    .4077916      .455747       -.0479554               .
        LFPR |   -.0968239    -.1025885        .0057647               .
     Savings |   -.1837099    -.1742438       -.0094661               .
Domesticcr~t |   -.0246137    -.0226051       -.0020086               .
Economicop~s |    .0155717      .016978       -.0014063               .
         CPI |   -.0973257    -.1010934        .0037677               .
------------------------------------------------------------------------------
                           b = Consistent under H0 and Ha; obtained from xtreg.
            B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients 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)
```

Appendix 4: Hausman Test Results for Low Income Countries

```
xtreg Selfemployment Unemployment Inflation LFPR Savings Domesticcredit
Economicopenness CPI, re

Random-effects GLS regression                   Number of obs     =        413
```

```
Group variable: Year                            Number of groups  =         21

R-squared:                                      Obs per group:
     Within  = 0.4599                                         min =         14
     Between = 0.8556                                         avg =       19.7
     Overall = 0.4676                                         max =         22

                                                Wald chi2(7)      =     355.71
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

------------------------------------------------------------------------------
  Selfemployment | Coefficient  Std. err.      z    P>|z|     [95% conf.
interval]
-----------------+------------------------------------------------------------
    Unemployment |   .0248906   .1627235     1.32   0.000     .3238218
1.685964
       Inflation |  -.0162288   .0145282    -1.12   0.264    -.0447035
.0122459
            LFPR |   .0698353   .0620721     1.13   0.261    -.0518237
.1914944
         Savings |   .0767957   .0234026     3.28   0.001     .0309275
.122664
  Domesticcredit |   .2446128   .0664022     3.68   0.000     .3747586
.1144669
Economicopenness |  -.0646043   .0238668    -2.71   0.007    -.1113824   -
.0178262
             CPI |  -.1709579   .0566801    -3.02   0.003    -.2820488    -
.059867
           _cons |   94.98947   5.065042    18.75   0.000     85.06217
104.9168
-----------------+------------------------------------------------------------
         sigma_u |          0
         sigma_e |  9.3328867
             rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimate store re


xtreg Selfemployment Unemployment Inflation LFPR Savings Domesticcredit
Economicopenness CPI, fe

Fixed-effects (within) regression               Number of obs     =        413
Group variable: Year                            Number of groups  =         21

R-squared:                                      Obs per group:
     Within  = 0.4602                                         min =         14
     Between = 0.8522                                         avg =       19.7
     Overall = 0.4673                                         max =         22

                                                F(7,385)          =      46.88
corr(u_i, Xb) = 0.0821                          Prob > F          =     0.0000

------------------------------------------------------------------------------
  Selfemployment | Coefficient  Std. err.      t    P>|t|     [95% conf.
interval]
-----------------+------------------------------------------------------------
    Unemployment |    .005109   .1665492    12.04   0.000      .332569
1.677649
```

```
       Inflation |   -.017318   .0151415    -1.14   0.253    -.0470883
.0124524
            LFPR |   .0639683   .0638583     1.00   0.317    -.0615863
.189523
         Savings |   .0773109   .0240795     3.21   0.001     .0299672
.1246546
  Domesticcredit |   .2177404   .0750142     2.90   0.004     .3652292
.0702516
Economicopenness |  -.0617878   .0246902    -2.50   0.013    -.1103322   -
.0132433
             CPI |  -.1717192   .0580889    -2.96   0.003    -.2859304   -
.0575079
           _cons |   95.08832   5.189164    18.32   0.000     84.88567
105.291
-----------------+------------------------------------------------------------
---
         sigma_u |  .88967094
         sigma_e |  9.3328867
             rho |   .0090053   (fraction of variance due to u_i)
------------------------------------------------------------------------------
---
F test that all u_i=0: F(20, 385) = 0.16                     Prob > F = 1.0000

. estimate store fe


 hausman re fe

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       re           fe         Difference       Std. err.
-------------+----------------------------------------------------------------
Unemployment |    .0248906      .005109        .0197816              .
   Inflation |   -.0162288     -.017318        .0010892              .
        LFPR |    .0698353     .0639683         .005867              .
     Savings |    .0767957     .0773109       -.0005152              .
Domesticcr~t |    .2446128     .2177404        .0268724              .
Economicop~s |   -.0646043    -.0617878       -.0028166              .
         CPI |   -.1709579    -.1717192        .0007613              .
------------------------------------------------------------------------------
                           b = Consistent under H0 and Ha; obtained from xtreg.
            B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients 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)

*** If probability value is greater than 0.05 then random effect is more
appropriate.
```

Appendix 5: Breusch Pagan LM results

```
Diagnostic Test Results

Breusch and Pagan Lagrangian multiplier test for random effects

        Selfemployment[Year,t] = Xb + u[Year] + e[Year,t]

        Estimated results:
                         |       Var     SD = sqrt(Var)
```

```
         ---------+------------------------------
       Selfemp~t |   60.67223       7.789238
               e |   45.67187       6.758097
               u |    5.84313       2.101518

Test: Var(u) = 0
                         chibar2(01) =    72.63
                      Prob > chibar2 =   0.1201
```

Breusch and Pagan Lagrangian multiplier test for random effects

```
Selfemployment[Year,t] = Xb + u[Year] + e[Year,t]

Estimated results:
                 |       Var     SD = sqrt(Var)
         ---------+------------------------------
       Selfemp~t |   154.1895       12.41731
               e |   87.10278       9.332887
               u |   22.41869       11.82483

Test: Var(u) = 0
                         chibar2(01) =    11.82
                      Prob > chibar2 =   0.4413
```