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THE IMPACT OF ENTREPRENEURSHIP ON ECONOMIC GROWTH IN THE DEVELOPING COUNTRIES: A PANEL DATA APPROACH

A dissertation presented on the partial fulfilment of the requirements of the master's degree in Economics and Enterprise Management

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Abstract :

The purpose of this paper is to examine the relationship between entrepreneurship, and economic growth. We use real GDP per worker to measure growth as dependent variable; and entrepreneurship measured by the Global Entrepreneurship Index (GEI), Business Freedom (BUSfr), and Starting a Business (STRbus) as independent variables; and several control variables. The data consists of 18 developing countries for the period 2004–2019. Based on Romer's assumption (Romer, 1986), we use a specification of an augmented Cobb-Douglas production function to test the effect of entrepreneurship on growth in developing countries. We employ two estimation methods which are Static Panel Data Method and Generalized Method of Moments (GMM) to carry out the work. Our results suggest that in static model, the impact of only 'Starting Business' entrepreneurship variable has a significantly positive impact on growth in developing countries. The dynamic panel GMM estimation indicate that all entrepreneurship measures; 'Global Entrepreneurship Index', 'Business Freedom' and 'Starting a Business, have significantly positive impacts on growth in developing countries.

Dedication

I dedicate this work to my father Mohamed, who taught me that the best kind of knowledge to have is that which is learned for its own sake. It is also dedicated to my mother, who taught me that even the largest task can be accomplished if it is done one step at a time

TO my husband Salhi Abdelkhalek who never hesitates to help me

To my love RAHIL and SALIHA

To my brothers Khaled, Yakoub, Mohammed Amin,

To my sister Chafa, Safa

To my friends Nabila, Khadija,

To the special promotion of Master two 2019

I dedicate this work

Acknowledgement

First of all, I would like to thank Allah for helping me to finish this dissertation.

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TABLE OF CONTENT:

LIST OF TABLES:

LIST OF FIGURES:

LIST OF ABBREVIATIONS :

BI	business intelligence
BUSfr	Business Freedom
CD	cross-sectional dependence
FE	fixed effects
GCF	Gross capital formation
GDP	gross domestic product
GDPpw	gross domestic product per worker
GEDI	Global Entrepreneurship and Development Institute
GEI	Global Entrepreneurship Index
GLS	Generalized least squares
GMM	Generalized method of moments
GNP	gross national product
GOVexp	government expenditure
HDI	Human Development Index
HR	Heteroscedasticity-Robust
IMRAD	Introduction, Methods, Results, and Discussion
KSTE	The Knowledge Spillover Theory of Entrepreneurship
LFexp	Life expectancy at birth
NGOs	non-profit organizations
NNP	net national product
OLS	Ordinary least squares
R&D	Research and development
RE	random effects
SME	small and medium enterprises
STRbus	Starting a Business
TRDop	Trade openness
UNCTAD	United Nations Conference on Trade and Development
VIF	variance inflation factors
WDI	World Development Indicators

INTRODUCTION

Introduction

Statement of the subject:

Since the 1990s, there has been a resurgence of interest on the role of small scaled business enterprises or small and medium enterprises (both will be referred to as “SMEs” hereafter) in national and international economic and social development, so we can talk the role of entrepreneurship.

Entrepreneurship is acknowledged as a key instrument or channel for economic sustainability and growth, it is very essential to the development and a major solution for several economic, social and environmental consternations.

Entrepreneurship is an important engine of growth in the economy, and the capacity and willingness to formulate, organize and manage a business venture along with anyone its risks to make a profit.

In the political economy, entrepreneurship is defined as a way to provide a framework to transform a great idea into a large company, through all stages of incorporation, growth and financing in an efficient and unconventional way, with a view to continuity, in order to gain profits and achieve financial independence, through the development of a start-up that creates familiarity and positive impression of customers suppliers and investors.

Entrepreneurship is not easy because most new businesses - not well organized - fail. Entrepreneurial activities vary depending on the type of activity in which this emerging organization is engaged. Entrepreneurship ranges from every company (often the leader working part-time) to promises to create new jobs.

Introduction

Many new companies (pilot projects) are seeking financing either for venture capital, for participating investors, to raise capital, or to launch a new project.

There are now many organizations that support entrepreneurs, including some relevant government agencies, business incubators, some scientific organizations and some non-profit organizations (NGOs).

Developing countries are beginning to focus on their business environments and creating an economic space which is conductive to private enterprises – both domestic (local entrepreneurs) and foreign (foreign direct investment), indeed, the promotion of entrepreneurship and the promulgation of small and medium-sized enterprise (SME) policy have become an important development prescription in recent years.

Research questions:

Entrepreneurship is important for new firm creation, job creation in the private sector and legitimate wealth creation. In many developing and transition countries, the public sector is a major employer and public sector employment is often a drain on economic growth as scarce government revenue must be allocated to salaries rather than to other investments such as education and infrastructure.

Entrepreneurial policy will, therefore, encourage private sector development and offer productive alternatives to public sector employment, so, for more details we ask the following question:

- *How can entrepreneurship support economic growth in developing countries?*

1. Hypotheses:

In order to address the issue, the following hypotheses can be relied upon:

- Global Entrepreneurship Index has a positive statistically significant, but not strong, impact on economic growth in developing countries.
- Business Freedom has not a statistically significant impact on economic growth in developing countries.
- Starting a Business has a positive statistically significant impact on economic growth in developing countries.
- Entrepreneurship and human capital do not play a crucial role in the economic growth.

Research aim:

The primary objective of this study is to examine the role of entrepreneurship as the driver of economic growth and its impacts, this aim will include:

- To assess the concept of entrepreneurship and to explain other concepts related to.
- To examine the contribution of entrepreneurship to the economic growth through the creation of employment, GDP.
- To determine the role of human capital in entrepreneurship process and its impacts on economic growth.

- Focusing on key concepts (variables): « entrepreneurship », « economic growth » in developing countries as new experience to develop its economies.

Importance of the study:

The idea that entrepreneurship and economic growth are intimately linked and maintain favourable relationships has no doubt made its way from the work of Schumpeter. More entrepreneurs would lead to more economic growth. The effect would result from the concrete expression of the qualities of the entrepreneur and, more specifically, his propensity to innovate.

The study is an analysis of the factors behind the entrepreneurial renaissance in the developing countries as well as links between entrepreneurial activity and economic growth.

The purpose of our reflection is to study entrepreneurial activity, paying particular attention to the different aspects surrounding this phenomenon, to better explain the private entrepreneurial dynamic, it is better to observe the actors themselves.

Methods:

- Statistical analysis is a component of data analytics. In the context of business intelligence (BI), statistical analysis involves collecting and scrutinizing every data sample in a set of items from which samples can be drawn. A sample, in statistics, is a representative selection drawn from a total population.
- Writing, compliant with IMRAD format (IMRAD writing) typically first presents "(a) the subject that positions the study from the wide perspective",

"(b) outline of the study", develops through "(c) study method", and "(d) the results", and concludes with "(e) outline and conclusion of the fruit of each topics", and "(f) the meaning of the study from the wide and general point of view". Here, (a) and (b) are mentioned in the section of the "Introduction", (c) and (d) are mentioned in the section of the "Method" and "Result" respectively, and (e) and (f) are mentioned in the section of the "Discussion" or "Conclusion".

- Panel method is a hybrid method. All aforesaid methods are used to collect data from the panel. Panel can be defined as: The fixed and relatively permanent sample/group of respondents to obtain information continuously or intermittently (periodical) basis. Panel is relatively fixed and permanent sample of respondents.

Difficulties

There were many difficulties in this research, in spite of the fact that the scientific article was available, as:

- We find it difficult to distinguish between what is directly related to the issue of research and other scientific materials that are not related to it, the aim of the research is not pointless absurd coverage, but rather focus on dealing with the problem of research in a specific and accurate manner.
- The many references on the subject from the point of view of developed countries, which differ completely from developing countries, so, it is not easy to give the same analysis to different situations or using the same economic approach in the explanation.

Introduction

Thesis:

The present study « the impact of entrepreneurship on economic growth in developing countries (the panel data) » is divided into two parts:

- Chapter one is the theorical and conceptual side of the study that means (concepts definitions, theories and approaches, liking between variables of the study, the role of entrepreneurs in achieving economic goals in developing countries)
- Chapter two explains statistics and econometrics in the analysis, using the method of Panel data to find the link between « entrepreneurship » as independent variable, and « economic growth » as dependent one, with a set of control variables.

CHAPTER ONE:

THEORETICAL AND EMPIRICAL LITERATURE ON ENTREPRENEURSHIP AND ECONOMIC GROWTH

The importance of entrepreneurship can be understood from the role it places; entrepreneur plays an important role in economic development of a country. Economic development greatly depends upon entrepreneur and industrial development. Entrepreneurs are prime movers of innovation because the perceive business opportunity and can hold it into a feasible business plan, and ultimately can manage successful business enterprise.

The entrepreneur therefore not only launches a venture, but also contributes significantly to the development of economy by creating employment opportunities, output growth, technological upgradation and improvement in the quality of production, export promotion, import substitution and supply of goods at a raison price to the costumers.

Section one: Conceptual and theoretical framework

Given the differences in attitudes and intellectual opinions presented by researchers on the topic of entrepreneurship in developing countries and its relationship to economic growth, several definitions were provided on these variables, which opened the way to the diligence of thinkers and researchers, Thus, the concepts of entrepreneurship, economic growth and the developing country can be defined as follows:

1. Entrepreneurship:

An 'entrepreneur' can be identified as an economic agent who plays a vital role in the economic development of a country, and the word « entrepreneur » derived from the French verb « entreprendre » that means to undertake.

Baumol defined the concept « entrepreneur » as: "persons who are ingenious and creative in finding ways that add to their own wealth, power, and prestige" (Baumol, 1990)

The term « entrepreneurship » is often used synonymously with the term « entrepreneur » though; they are two sides of the same coin, conceptually they are different.

Entrepreneurship is indivisible process flourishes, when the interlinked dimensions of individual psychological entrepreneurship, entrepreneur traits, social encouragement, business opportunities, Government policies, availability of plenty of resources and opportunities coverage towards the common good, development of the society and economy.

Entrepreneurship is the process of identifying opportunities in the market place, arranging the resources required to pursue these opportunities for long term gains. It involves creating wealth by bringing together resources in new ways to start and operate an enterprise.

According to (Cole, 1968) «entrepreneurship» is the purposeful activity of an individual or a group of associated individuals undertaken to initiate, maintain and aggrandise profit by production or distribution of economic goods and services ».

Entrepreneurship is meant the function of foreseeing investment and production opportunities, organising an enterprise to undertake a new production process, rising capital, hiring labour, arranging the supply of raw materials, finding site, introducing a new technique, discovering new resources or raw materials a selecting top manager for day operations of the enterprise. (Anil Kumar, 2003)

(Kirzner, 1973) defined entrepreneurship as: « the ability to detect and exploit opportunities, which is equivalent to detecting system imperfections to restore the balance ». (Julien & Cadieux, 2010)

Entrepreneurship is defined as an activity that involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organising, markets, processes and raw materials through organising efforts that previously and not existed. (Mbhele, 2012)

A contract intended for a person to perform a certain job on behalf of another person for a fee without being subject to his supervision or management.(العايد، 1428 هـ)

2. Economic growth:

(Kuznets, 1953) defined economic growth as: « A country's economic growth may be defined as a long-term rise in capacity to supply increasingly diverse economic goods to its population, this growing capacity based on advancing technology and the ideological adjustments that it demands. All three components of definition are important. The sustained rise in the supply of goods in the result of economic growth, by which it is identified ». (Kuznets, 1973)

Economic growth is the growth in the inflation-adjusted market value of the goods and services produced by an economy for a time frame. It is usually measured as the percent rate of increase in real gross domestic product (GDP), generally in per capita terms. The increase in the capital stock, technological growth, and improvement in the worth and rate of literacy are seen to be the main causes of economic growth.

According to Economics help, economic growth refers to an increase in real Gross Domestic Product (GDP), this increase shows an increase in the value or worth of national output /national spending. It is an essential macro-economic objective since it allows growth in living standards and help in the creation of employment. (Okey-Colbert, 2019)

(Samuelson, 2001) defined economic growth as : « The main indicator of economic growth is the real national product: NNP (net national product, or gross national product) GNP, where the results obtained on the level of economic growth were close to using one of the two previous indicators, but it is better and more appropriate in his view to use the net national product NNP)

to measure economic growth due to the ease of obtaining data for this indicator. » (موساوي، 2005)

3. Developing countries:

The concept of « developing countries » has emerged at the United Nations level since the 1950s, most of them are colonized countries in various forms, and share a range of specialists distinguish it from developed countries, especially those linked to manifestations of underdevelopment that make them inferior compared to developed countries in terms of the level of growth given the strong development of developed countries, which is expected to apply the system of double rules to international economic relations because of realistic heterogeneity despite the legal equality enshrined in the Charter of the United Nations.

On the other hand, the group of developing countries has varied in terms of the development achieved by our countries without others for internal or external reasons, and as a result, many requests for the creation of subcategory have emerged, it was not until 1979 that developing countries, known as "least developed countries," were created as a separate group from other developing countries. (وماحنوس، 2005)

When economic thought began to address the problem of growth, these countries called the term “lagging countries”, it was defined as "those countries that have not reached a high level of technical or economic progress", or are countries that are dominated by low levels of economic and technological progress so that the prevalence of poverty among the population. However, this definition lacks accuracy and does not clarify the true dimensions of the

problem of underdevelopment of these countries, in addition to the term “delay” is not accepted by many.

Therefore, the previous designation was replaced by another term, "backward states" and known as: "countries where per capita income is less than the average per capita income in developed countries", and therefore this definition includes the existence of growth possibilities in these countries when the available resources are fully exploited.(بن سانية، 2012)

4. Relation between entrepreneurship and economic growth:

The relationship between entrepreneurship and economic growth has preoccupied economists since it was recognized, following the inability of endogenous models to explain the residue, that human action would be at the origin of economic growth. On a theoretical level, two approaches have provided arguments clarifying this relationship: the Schumpeterian approach and the Neo-Austrian approach which is based on the work of (Kirzner, 1973).

For Schumpeter, the entrepreneur is the driving force behind economic growth, its role in the liberal economic system consists in the implementation of new combinations, that is to say innovations. Through his innovations, the Schumpeterian entrepreneur induces imbalances in the market as part of the process of creative destruction. This creative destruction is at the origin of economic dynamism and long-term growth to the extent that the exit of certain firms on the market frees up resources previously used otherwise and makes it possible to reallocate them in new combinations, according to this approach, the effect of entrepreneurship on economic growth results from the intrinsic qualities of the entrepreneur, precisely his ability to innovate, that is to say to economically value an invention, a discovery, an idea.

This activity involves the execution of new combinations. For this, five types of innovation have been distinguished: the introduction of a new product, the introduction of a new production or sales method, the opening of a new market, the implementation of a new type of industrial organization, the conquest of a new source of raw materials.

Thanks to its various innovations, the Schumpeterian entrepreneur is looking for the creation of new profit opportunities, these can arise from increased productivity (Nzaou, 2015) so Schumpeter said : « The function of entrepreneur is to reform or revolutionize the pattern of production by exploiting an invention, or more generally, an untried technological possibility foe producing an old one in a new way… to undertake such new things is difficult and constitutes a distinct economic function, first because they lie outside of the routine tasks which everybody understands, and secondly, because the environment resists in many ways » (Audretsch D. B., 2006)

Thus, greater productivity can translate into increased competitiveness and increased growth, overall, entrepreneurship promotes economic growth through the introduction of innovations that add value. However, it should be noted that the Schumpeterian approach emphasizes the innovative entrepreneur, which suggests that it excludes from its field the self-employed without innovative vocation; while this type of so-called necessity entrepreneurship should not be overlooked as it is booming in developing countries, some of which are experiencing fairly high growth rates. The New Austrian approach to entrepreneurship, of which (Kirzner, 1973) is the main representative, focuses on the role of the entrepreneur in balancing the markets.

According to (Kirzner, 1973), the entrepreneur is an individual who sees opportunities for profit that others do not see and who uses an arbitrator to change the market balance in order to make a profit. (Nzaou, 2015)

(Sternberg & Wennekers, 2005) show that the relationship between entrepreneurship and economic growth is difficult to grasp since different types and different phases entrepreneurship influence economic growth. Also, the relationship is bidirectional in the sense that entrepreneurship encourages economic growth which in turn can affect the arbitration of individuals between different professional occupations including entrepreneurship.

Finally, measuring entrepreneurship is a very delicate task as there is no consensus on a reliable and practical set of indicators. In very detailed study, (Iversen, Jorgensen, & Malchow-Moller, 2008) summarized the different ways to measure entrepreneurship, but the most commonly used measure is what is called "business demography", which is the creation, disappearance and evolution of the number of companies over time or their degree of volatility. Despite these limitations, numerous empirical studies have attempted to identify the effects of entrepreneurship on the economic growth of developed nations.

(Audretsch, Keilbach, & Lehmann, 2005) show that entrepreneurship measured by the entry and exit rate of companies positively influence growth in terms of productivity. For their part, (Wennekers , Van Stel, Carree, & Thurik, 2010) find that the flow of new entrepreneurs tends to decrease with the level of development at some point, to increase again from this point. (Nzaou, 2015)

(Carree & Thurik, 2003) note a paucity of theorical frameworks linking entrepreneurship to conventionally measured economic growth, notwithstanding the numerous claims linking the two. They suggest that

framework connecting entrepreneurial activity to economic growth should identify the micro-economic foundations of growth, emphasize the role of knowledge externalities in the growth process, and identify intermediate linkages from entrepreneurial activity to economic progress. They propose that knowledge spillovers facilitate innovation, which in turn drives growth. The knowledge spillover theory asserts that entrepreneurship contributes to growth by serving as a mechanism to facilitate knowledge spillover from existing activities of incumbent firms or universities to new and innovative ones. Because it facilitates the spillover and commercialization of knowledge that might otherwise have remained dormant and uncommercialized within the incumbent firm, entrepreneurship has a positive impact on innovation and subsequently on growth. (Olafsen & Cook, 2016)

Section two: The role of entrepreneurs in achieving economic goals in developing countries

SMEs (Small and Medium-sized enterprises) play an important role in entrepreneur activities as an instrument of small business, means a separate and distinct business entity, including cooperative enterprises and non-governmental organizations managed by one owner or more.

Table 1.1: Definition of SME

Definitions of SMMEs given in the National Small Business Act			
Enterprise size	Number of employees	Annual turnover	Gross assets, excluding fixed property
Medium	Fewer than 100 to 200, depending on industry	Less than R4 million to R50 million, depending upon industry	Less than R2 million to R18 million, depending on industry
Small	Fewer than 50	Less than R2 million to R25 million, depending on industry	Less than R2 million to R4,5 million, depending on industry
Very small	Fewer than 10 to 20, depending on industry	Less than R200 000 to R500 000, depending on industry	Less than R150 000 to R500 000, depending on industry
Micro	Fewer than 5	Less than R150 000	Less than R100 000

Source: (Sitharam & Hoque, 2016)

- Small and medium-sized enterprises are tools for entrepreneurship, and they vary according to the activities that they undertake, we find medium enterprises with a number of employees ranging from 100 to 200 workers, and the amount of returns achieved between 4 and 50 million dollars and the size of the assets in them excluding fixed property between two and 18 million Dollars.

- Small enterprises with a number of employees fewer than 50 workers, and the amount of returns achieved less than 2 to 25 million dollars, and the size of the assets in them excluding fixed property between 2 and 4.5 million Dollars.

The criteria, about European Union definition of SME in 1996 and 2005, are presented in Table 1.2 below:

Table 1.2: European union's definition of SMEs

SME CATEGORY	EMPLOYMENT*	TURNOVER (Million €)		BALANCE SHEET (Million €)	
		1996	2005	1996	2005
Medium	250	40	50	27	43
Small	50	7	10	5	10
Micro	10	**	2	**	2

Source: (LJ Spence, 2009)

In European Union, the definition of SME includes those with fewer than 250 employees. (Keskin & SENTÜRK, 2010)

1. Job creation and unemployment reduction:

As far as unemployment (or the fear becoming unemployed; is concerned, the literature points out to stylized facts:

- Those who have entered self-employment from unemployment exit to a higher extent than those who have entered from paid employment.
- New founders who were formerly unemployed have on average lower economic outcomes and a lower propensity to contribute positively to job creation. For instance, the study of (Arrighetti & Vivarelli, 1999) found that defensive motivations such as concern about future career development and the fear of becoming unemployed were predictors of a below –the –average post-entry evolution. (Vivarelli, 2012)

Table 1.3: Estimated number of SMEs worldwide by region

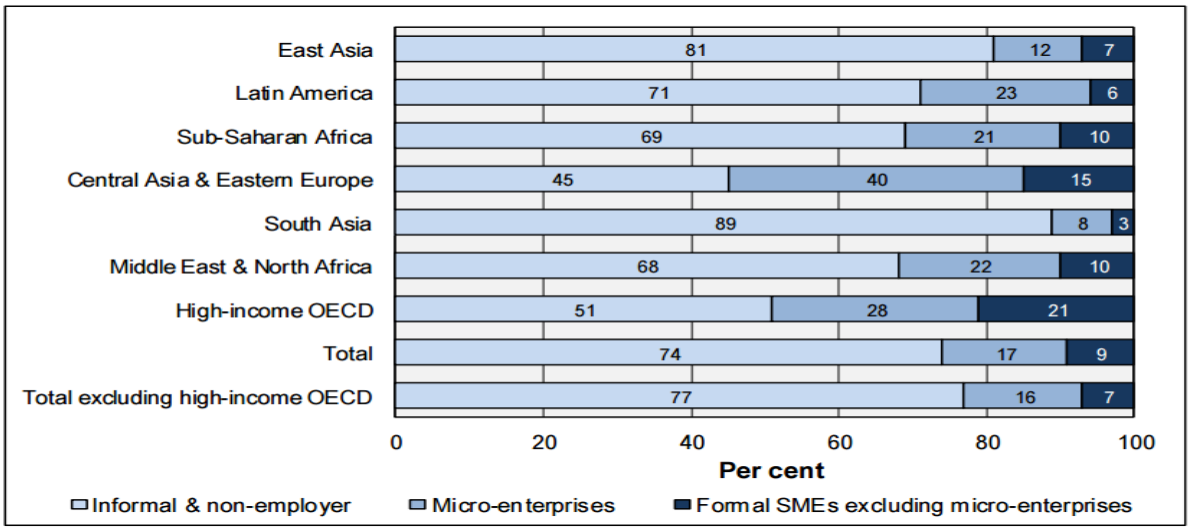
Region	**No. of SMEs in region** (million)	**Percentage of total SMEs worldwide**	**Total formal SMEs** (million)
East Asia	170–205	44–46	11–14
Latin America	47–57	10–12	3–4
Sub-Saharan Africa	36–44	8–10	3–5
Central Asia and Eastern Europe	18–22	3–5	2–4
South Asia	75–90	16–20	2–3
Middle East and North Africa	19–23	4–6	1–3
High-income OECD countries	56–67	12–14	11–14
Total	**420–510**	**100**	**36–44**
Total excluding high-income OECD countries	365–445	80–95	25–30

Source: (International Labour Conference, 2015)

SMEs tend to dominate the corporate community in all countries, at least in terms of company registration, if not always in terms of aggregate size. In less developed countries, SMEs represent the vast bulk of the corporate sector. And even at the other end of the economic spectrum in Asia (especially), SMEs play an important economic role in virtually all countries, albeit to varying degrees, and it is their relationship with other elements of the corporate

community – including foreign-invested enterprises and large domestic corporation – that is often a critical determinant of their long- term success.

Figure 1.1: Estimated share of SMEs worldwide by region



Source: (International Labour Conference, 2015)

A. Excess of business creation over the number of exits from the market:

Over a given period, the economy sees a certain percentage of businesses disappear while others are created, if the entry rate exceeds the exit rate, it is likely that there will be net job creation, this process is subject to the influence of economic conditions. In addition, when unemployment increases, some people start their own businesses to escape it.

B. Expansion of existing businesses:

The expansion of existing companies is a very important source of job creation, but this phenomenon is concentrated in a relatively small group of companies characterized by strong growth, in the other side, there are opportunities for governments to facilitate job growth by encouraging or making it easier for entrepreneurs to expand their businesses. (Estimé & Murphy, 2004)

Table 1.4: SME employment share in several developed and developing countries

	SME Employment as share of	SME Share (%)	Year
Rep.of Korea	Enterprise employment	87.7	2012
Thailand	Enterprise employment	80.3	2014
Bangladesh	Non-agricultural employment	75.0	2014
Cambodia	Enterprise employment	71.8	2014
Japan	Enterprise employment	69.7	2012
PRC	Industry employment	64.7	2011
Philippine	Enterprise employment	63.7	2013
Singapore	Total employment	68.0	2012
Malaysia	Total employment	65.0	2014
Vietnam	Total employment	46.8	2012
Sri lanka	Total employment	35.0	2013
Kazakhstan	Total employment	32.1	2014

Source: (Vandenberg, Chantapacdepong, & Yoshino, 2016)

2. Entrepreneurship and its role in economic growth:

The theory of efficiency X is concerned with the degree of inefficiency in the use of resources within the firm, it represents the extent to which the firm fails to reach its productive potential, either because the resources are used inappropriately, either because they are wasted.

(Leibenstein, 1968) sees the entrepreneurial function as a creative response to inefficiency X, he notes that the entrepreneur is the engine of growth. (Berber, 2014)

(Leibenstein, 1968) said : « per capita income growth requires shifts from less productive to more productive techniques per worker, the creation or adoption of new commodities, new materials, new markets, new organizational forms, the creation of new skills, and the accumulation of new knowledge … the entrepreneur as gap filler and input- completer is probably the prime mover

of the capacity creation part of these elements in the growth process. (Zoltan & Virgill, 2009)

Table 1.5: developing economies rate of growth of real GDP, 2009-2019

	2009–2016[a]	2009	2010	2011	2012	2013	2014	2015	2016	2017[b]	2018[c]	2019[c]
East Asia	6.7	5.9	9.5	7.6	6.5	6.4	6.1	5.7	5.6	5.9	5.7	5.6
North Africa	1.9	3.2	4.0	-5.0	8.5	-2.9	1.9	3.2	2.8	4.8	4.1	4.1
South America	1.4	-1.0	6.4	4.7	2.6	3.2	0.3	-1.9	-2.7	0.4	1.8	2.4
Southern Africa	2.5	0.0	4.0	3.8	3.8	3.5	2.6	1.9	0.6	1.2	2.3	2.5
South Asia	6.0	5.7	8.1	6.5	3.4	4.4	6.1	6.2	7.7	6.3	6.5	7.0

Source: (United Nations , 2018)

The GDP contribution per Small and Medium-sized enterprises is the difference between the return on capital and the cost of capital.

Table 1.6: SME Share of enterprises, Exports, and Outputs in many developed and developing countries

	Share of all enterprises (%)	Share of export (%)	Share of output (%)	Indicators for output	Year
High income					
Japan	99.7	…	43.4	Sales	2012
Rep.of Korea	99.9	18.8	47.6	MVA	2012
Singapore	99.4	…	45.0	GDP	2012
Upper middle-income					
PRC	97.3	41.5	60.0	GDP	2011,2013
Kazakhstan	97.5	…	26.0	GDP	2014 ,2013
Malaysia	97.3	…	35.9	GDP	2014
Philippine	99.6	…	35.7	GVA	2013,2006
Thailand	99.7	26.3	39.6	GDP	2014
Lower-middle income					
Bangladesh	99.0	…	25.0	GDP	2013,2014
India	…	42.4	37.5	GDP	2013
Indonesia	99.9	15.7	60.3	MVA	2013

Sri lanka	99.5	20.0	30.0	GDP	2013
Vietnam	99.7	…	…	GDP	2012
Low income					
Cambodia	99.8	…	…		2014

*GDP = gross domestic product, GVA = gross value added, MVA = manufacturing value added, PRC = People's Republic of China, SME = small and medium-sized enterprise.

Source: (Vandenberg, Chantapacdepong, & Yoshino, 2016)

3. Innovation:

The concept of innovation refers to the putting into practice of inventions, a narrow strictly technological approach focuses specifically on product and process innovations, or technological innovation. A broader approach refers to innovation as the development of new products, new processes new sources of supply, but also to the exploitation of new markets and the development of new ways to organize business. (Szirmai, Naudé, & Goedhuys, 2011)

Table 1.7: The relation between 'innovation' and 'entrepreneurship'

Stage in lifecycle of an organization	Start-up	Growth	Sustain/scale	Renew
Creating commercial value	Individual entrepreneur exploiting new technol-ogy or market opportunity	Growing the business through adding new products/ services or moving into new markets	Building a portfolio of incremental and radical innovation to sustain the business and/ or spread its influence into new markets	Returning to the radical frame-breaking kind of innovation which began the business and enables it to move forward as something very different
Creating social value	Social entrepreneur, passionately concerned to improve or change something in their immediate environment	Developing the ideas and engaging others in a network for change – perhaps in a region or around a key issue	Spreading the idea widely, diffusing it to other commu-nities of social entrepreneurs, engaging links with main-stream players like public sec-tor agencies	Changing the system – and then acting as agent for the next wave of change

Source: (Tidd & Bessant, 2015)

Before answering the question of why entrepreneurs are the source of growth, it is very important to carefully distinguish economic growth from economic progress, as the theory of the entrepreneur is constructed more to explain economic progress than quantitative growth in production.

The growth of the Soviet Union reminds us, in fact, that the entrepreneur is not a necessary condition for the growth of production, on the other hand, it is possible to think that it is necessary for economic progress, as (Holcombe, 1998) argues, economic progress does not rhyme with more goods, but with better quality goods, of a greater variety and produced with more efficient production techniques. So, when we compare living standards in 1900 and 2007, the biggest difference is not in the volumes of goods consumed, but in their nature.

In the Schumpeterian world, the entrepreneur does not discover a profit, he creates it. In the Kirzner world, the entrepreneur discovers a profit opportunity. The Schumpeterians model opportunities as endogenous, in other words as the result of an intention of the entrepreneur who invests resources in R&D and in human capital to generate innovative products while the Kirznerians think of profits as exogenous.

(Audretsch, Keilbach, & Lehmann, 2005), To reconcile these two models, argue that firms present on the market can be the source of new ideas, greater uncertainty, asymmetry and transaction costs which can ultimately generate opportunities for incoming firms driven by a new entrepreneurial outlook. New firms are born as responses to knowledge not exploited by firms already present on the market which do not take full advantage commercially of all profit opportunities. These opportunities are thus created by the investment of firms in

knowledge. They are not exogenous because they are created by investing in knowledge, but they are also not completely endogenous because they are not independent of the market and its developments.

The most general figure of the entrepreneur has been theorized by (Kirzner, 1973) by defining the entrepreneur as the individual who adopts a posture of alertness to profit opportunities (alertness), Kirzner builds a theory on which one can organize the other theories of the entrepreneur present in economic theory and more particularly the theory of the innovative entrepreneur.

The other consequence of this definition is that it leads to maintain that the growth is explained by the discovery of mutually advantageous exchanges by entrepreneurs. Their discovery work promotes exchanges, the division of labour, specialization and productivity gains.

The entrepreneur supports the growth of production because it reveals new uses and / or informs of the misuse of existing resources. (Facchini, 2007)

Developing countries are able to profit from the advantages of technological backwardness clearly depends on their social capabilities and absorptive capacities, hence, importantly for developing countries, innovation does not refer to the development of new products or processes, but also the capacity to creatively absorb technology. (Szirmai, Naudé, & Goedhuys, 2011)

Section three: Review of empirical literature

Linking entrepreneurship to economic growth is certainly not new, there was many studies that try to explain the relation between the two concepts.

The recognition of the importance of entrepreneurial activity has been absent for a while in mainstream (theoretical) economics. (Baumol, 1990) complained that entrepreneurship, being hard to capture into mathematical equations, disappeared from mainstream (neo-classical) economics, and (Kirzner, 1973) who observed that the neo-classical model constrained the decision making of the entrepreneur, in terms of product quality and price, technology, within limits wholly alien to the context in which real world entrepreneurs characteristically operate.

1. **(Schumpeter, 1931):**

In his classic treatise, "*Theorie der wirtschaftlichen Entwicklungen* (Theory of Economic Development)"**,** Schumpeter proposed that entrepreneurs starting new businesses provided the engine for economic growth, Even in his 1942 classic, "Capitalism, socialism and Democracy"**,** he saw that progress itself can be "mechanized" just as well as managing a stationary economy and this mechanization of progress is likely to affect individual initiative (entrepreneurship) and capitalist society almost as much as stopping economic progress.

To demonstrate this, it suffices to note, firstly, what constitutes the function of entrepreneur and, secondly, what it means for bourgeois society and from the point of view of the survival of the capitalist regime, Shumpeter said : « The function of entrepreneurs is to reform or revolutionize the pattern of production by exploring an invention, or more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way… To undertake such new things is difficult and constitutes a distinct economic function, first because they lie outside of the routine tasks

which everybody understands, and secondly, because the environment resists in many ways. »

2. **(Baumol, 1990):**

William Baumol in his study, "« entrepreneurship: Productive, unproductive and destructive »", distinguished between many forms of entrepreneurship.

Baumol mentions that entrepreneurs are individuals who are ingenious and creative in finding means that add to their own wealth, power, and prestige, and he argues that it is to be expected that not all of them will be immensely concerned with whether an activity that achieves these goals adds much or little to the social product or, for that matter, even whether it is an actual impediment to production.

Baumol focused on « Shumpeterian innovative entrepreneurs » that coexist with « defensive and necessity entrepreneurs », the latter being those who enter a a new business not because of market opportunities and innovative ideas, but merely because they need an income to survive, for obvious reason, this kind of « survival –driven » self-employed is particularly diffused in the developing countries.

3. **(Salgado-Banda, 2005):**

In his research:" « entrepreneurship and economic growth: an empirical analysis »" Salgado-Banda proposes a new variable based on patent data to proxy for productive entrepreneurship. Data on self- employment is used as an alternative proxy. In particular, he studies the impact of entrepreneurship on economic growth by using these two measures. The study considers 22 OECD

countries and finds a positive relationship between the proposed measure of productive entrepreneurship –degree of innovativeness of different nations- and economic growth, while the alternative measure, based on self-employment, appears to be negatively correlated with economic growth.

4. **(Ogunlana, 2018):**

In her thesis titled: "« The role of entrepreneurship as the driver of economic growth »", Folarin Ogunlana tries to examine the impacts of entrepreneurship on economic growth, also, analyses challenges faced by business start-up or small and medium enterprises. The study found entrepreneurship can play a significant role in achieving economic growth for the country to overcome her economic crisis, economic can generate employment, innovation, increase production and diversify the economy source of revenue while fostering the development of small and medium enterprises.

As for our study, it addresses the question of entrepreneurship and its implications for economic growth in developing countries, which motivates the need for an integrated system of entrepreneurship, because this system works to provide policies and procedures.

Compared to their counterparts in developed countries, entrepreneurs suffer from the deteriorating economic conditions in developing countries, which makes the environment in which they conduct their activities more complicated, which leads them to search for more effective ways and to find suitable funding channels for entrepreneurial projects and small and medium-sized enterprises, and to create a stimulating and supportive culture. For entrepreneurs, create a set of support mechanisms (including infrastructure, accelerators and business incubators), develop human capital capable of

building entrepreneurial facilities, as well as having markets suitable and favourable to projects entrepreneurial, this system includes a group of key stakeholders, such as universities, large companies, daring capital and entrepreneurs, and the main role of the stakeholders is to develop the elements of the aforementioned entrepreneurial system to enable the creation and growth of small and medium-sized emerging businesses.

5. (Aparicio, Urbano , & Audretsch, 2016):

In their study « Institutional factors, opportunity entrepreneurship and economic growth: panel data Evidence », Aparicio, Urbano , & Audretsch explore the institutional factors that encourage opportunity entrepreneurship in order to achieve higher rates of economic growth, They suggest that institutions may not have an automatic effect, as is typically assumed in models of endogenous growth, rather, a mechanism is required to serve as a conduit into the society for those institutional factors that affect productive behaviour such as entrepreneurial activity.

Thus, opportunity entrepreneurship is identified as one such mechanism that impacts on economic growth. Using a three-stage least square method through unbalanced panel data with 43 countries (2004-2012), they find that informal institutions have a higher impact on opportunity entrepreneurship than formal institutions.

Variables such as control of corruption, confidence in one’s skills and private coverage to obtain credit promote a positive effect of opportunity entrepreneurship.

CHAPTER TWO:

STATIC AND DYNAMIC IMPACT OF ENTREPRENEURSHIP ON ECONOMIC GROWTH IN THE DEVELOPING COUNTRIES: AN EMPIRICAL STUDY

This chapter applies a quantitative research approach to conduct a country-level empirical study using an unbalanced panel-data structure. It aims to extend the existing empirical research and provide additional insights to the complex relationship between entrepreneurial activity and economic growth. The entrepreneurship-economic growth literature in the late 1990s and early 2000s was dominated by cross-sectional country analysis. The use of panel data is a positive development in this literature, since investigating growth in a cross-section structure might lead to omitted variable bias and other econometric problems.

Section one: Data and Methodology

1. Data:

To analyze the contribution of different types of entrepreneurship to economic growth, we considered a sample of 18 developing countries, namely: Argentina, Brazil, Chile, China, Colombia, Ecuador, India, Iran, Latvia, Malaysia, Mexico, Peru, Russia, Slovenia, South Africa, Thailand, Turkey, and Uruguay. We chose the countries according to the availability of data for the variables considered in the analysis. For each country we have considered a set of indicators measuring economic growth, the entrepreneurial activity, and the macroeconomic conditions.

The dependent variable in our study is GDP per worker, which represents one of the most important indicators of economic growth. Data on this indicator was obtained from the World Bank's World Development Indicators (WDI) database (World Bank, 2020). Our key explanatory variables are entrepreneurial activity at the country level, measured by the Global Entrepreneurship Index (GEI), Business Freedom (BUSfr), and Starting a Business (STRbus).

Data on the Global Entrepreneurship Index variable comes from The Global Entrepreneurship and Development Institute (GEDI, 2020), which is one of the most important sources of data on entrepreneurship. The Global Entrepreneurship Index (GEI) is an annual index that measures the health of the entrepreneurship ecosystems in each of 137 countries. It then ranks the performance of these against each other. This provides a picture of how each country performs in both the domestic and international context.

Data on the Business Freedom variable comes from the Index of Economic Freedom (The Heritage Foundation, 2020) , which is an annual guide published by The Heritage Foundation, Washington's No. 1 think tank. The business freedom component (BUSfr) measures the extent to which the regulatory and infrastructure environments constrain the efficient operation of businesses.

Data on Starting a Business variable comes from Doing Business (Doing Business, 2020), which captures several important dimensions of the regulatory environment affecting domestic firms. Starting a Business topic (STRbus) measures the number of procedures, time, cost and paid-in minimum capital requirement for a small- to medium-size limited liability company to start up and formally operate in each economy’s largest business city.

In our econometric model, we have included, in addition to the variables mentioned above, several control variables. The control variables are represented by different factors, suggested by the theories of economic growth, that would affect the economic growth: the investment ratio (proxied through the gross capital formation), knowledge (measure by Human Development Index), Life expectancy at birth, government expenditures, and trade openness.

In Table 2.1, we describe the dependent, independent, and control variables used in this study, including their definition and sources.

Table 2.1 Description of the variables considered in the analysis.

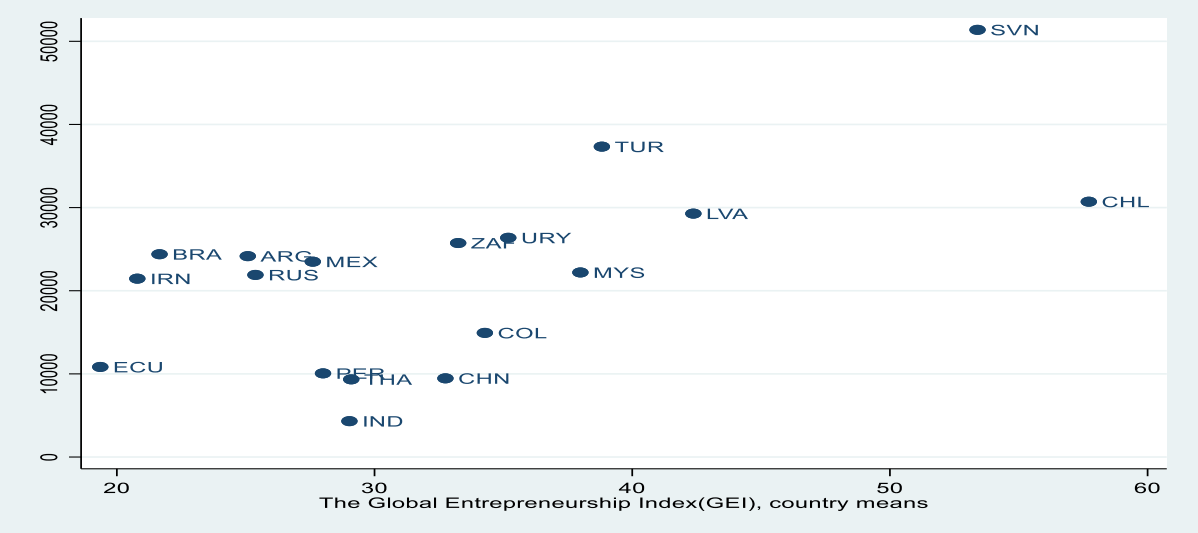
Variable	Definition	Source
Dependent Variable		
Labour productivity (GDP per worker-GDPpw)	Labour productivity represents the total volume of output (measured in terms of Gross Domestic Product, GDP) produced per unit of labour (measured in terms of the number of employed persons or hours worked). Data are in constant 2010 U.S. dollars	International Labour Organization ILOSTAT
Independent variables		
The Global Entrepreneurship Index (GEI)	annual index that measures the health of the entrepreneurship ecosystems. The index methodology collects data on the entrepreneurial attitudes, abilities, and aspirations of the local population and then weights these against the prevailing social and economic 'infrastructure' – this includes aspects such as broadband connectivity and the transport links to external markets.	The Global Entrepreneurship and Development Institute
Business Freedom (BUSfr)	The business freedom score for each country is a number between 0 and 100, with 100 indicating the freest business environment. The quantitative score is derived from an array of factors that affect the ease of starting, operating, and closing a business.	The Heritage Foundation
Starting a Business (STRbus)	The Starting a Business indicator measures the number of procedures, time, cost and paid-in minimum capital requirement for a small- to medium-size limited liability company to start up and formally operate in each economy's largest business city.	Doing Business, The World Bank Group's Global Indicators Group
Control variables		
Gross capital formation (GCF)	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Data are in constant 2010 U.S. dollars.	World Bank's World Development Indicators (WDI) database

Trade openness (TRDop)	The sum of exports and imports of goods and services measured in US dollars at current prices in millions.	United Nations Conference on Trade and Development UNCTADstat
Human Development Index (HDI)	The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.	United Nations Development Programme Human Development Report
government expenditure (GOVexp)	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees).	World Bank's World Development Indicators (WDI) database
Life expectancy at birth (LFexp)	Life expectancy at birth indicates the number of years a new-born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	World Bank's World Development Indicators (WDI) database

Source: student's own elaboration

Figure 2.1 to Figure 2.3 below provide the first encounter of the data, where the relationship between different measures of entrepreneurial activity (country-mean) and country-mean GDP growth are presented. All the figures seem to indicate a positive relationship between our measures of entrepreneurial activity and economic growth.

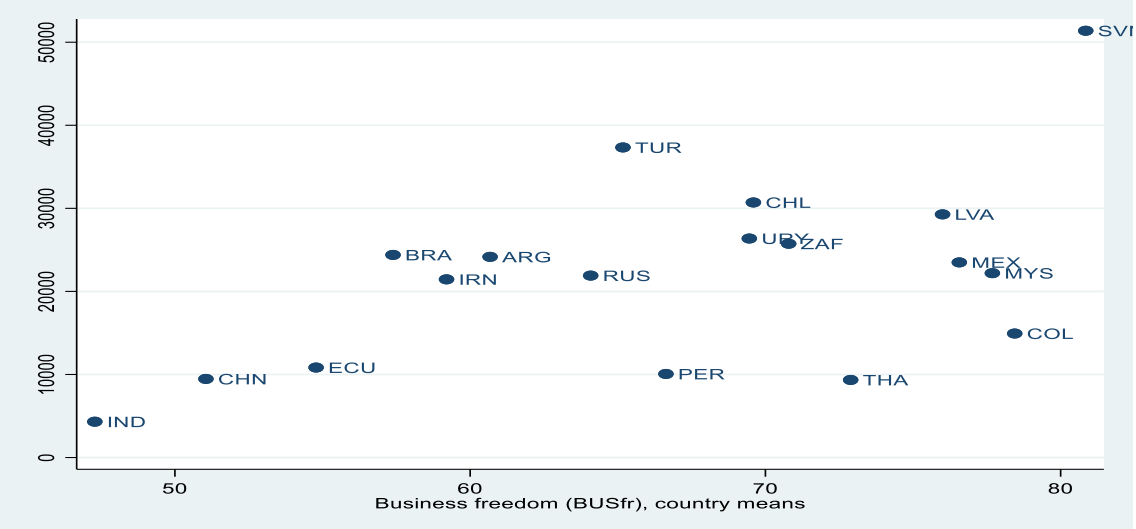
Figure 2.1 Growth and the relation to The Global Entrepreneurship Index, (country-means)



Source: Stata/MP 16 outputs.

Generally, countries with high rates of Global Entrepreneurship Index are also reported to have high rates of growth. For instance, countries like India and Ecuador report low values of Global Entrepreneurship Index, and below the sample average GDP growth. Slovenia on the other hand is found at the very topmost of the graph, suggesting very high values of both Global Entrepreneurship Index and GDP growth rates.

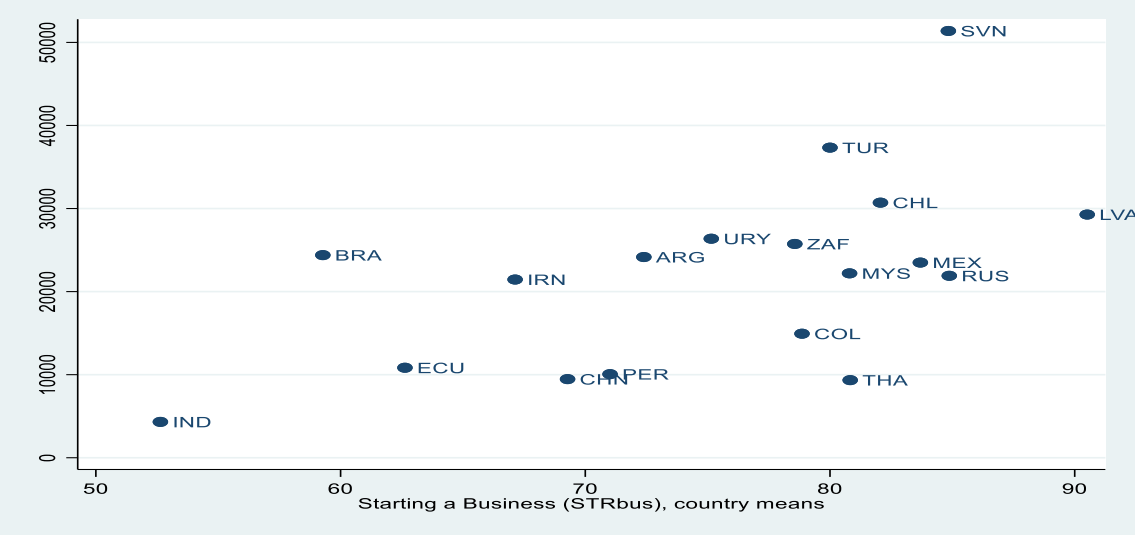
Figure 2.2 Growth and the relation to business freedom, (country-means)



Source: Stata/MP 16 outputs.

Although the vast majority of countries recorded high rates of business freedom, only a few of them recorded growth rates higher than the world mean. For instance, countries like India, China, and Ecuador report below the sample of business freedom and GDP growth. Slovenia on the other hand is found at the very topmost of the graph, suggesting very high values of both business freedom and GDP growth rates.

Figure 2.3 Growth and the relation to Starting a Business, (country-means)



Source: Stata/MP 16 outputs.

Although all countries recorded high rates of Starting a Business, this did not match the results of growth rates. For instance, India report below the sample of Starting a Business and GDP growth. Slovenia on the other hand is found at the very topmost of the graph, suggesting very high values of both Starting a Businessand GDP growth rates.

Note: Country codes (alphabetical order): **ARG**-Argentina; **BRA**-Brazil; **CHN**-China; **CHL**-Chile; **COL**-Colombia; **ECU**-Ecuador; **IND**-India; **IRN**-Iran; **LVA**-Latvia; **MEX**-Mexico; **MYS**-Malaysia; **PER**-Peru; **RUS**-Russia; **SLO**-Slovenia; **THA**-Thailand; **TUR**-Turkey; **UR**-Uruguay; **ZAF** -South Africa.

Table 2.2 displays descriptive statistics (mean and standard deviation) of the variables that are included in the analysis. The descriptive statistics provides a summary of the sample and observations in the panel data.

Table 2.2 Description of the variables considered in the analysis.

Variable		Mean	Std. Dev.	Min	Max	Observations	
GDPpw	overall	22075.12	11338.05	2676.295	58006.7	N =	288
	between		11428.31	4314.29	51381.62	n =	18
	within		2184.336	15306.46	28700.2	T =	16
GEI	overall	32.875	10.87204	15.40001	61.59999	N =	288
	between		10.43145	19.35625	57.71875	n =	18
	within		3.88244	12.65313	46.025	T =	16
BUSfr	overall	66.58576	11.23757	35.5	93.5	N =	288
	between		9.898782	47.2875	80.85	n =	18
	within		5.780857	47.38576	82.39826	T =	16
STRbus	overall	75.25174	12.87975	24.1	94.7	N =	288
	between		9.991564	52.6375	90.5125	n =	18
	within		8.442417	46.71424	103.6142	T =	16
GCF	overall	320374.3	765137.8	4652.065	5100940	N =	288
	between		721689.3	7389.553	3120951	n =	18
	within		303021	-1617227	2300363	T =	16
TRDop	overall	243797.5	445962.9	4383.477	2924264	N =	288
	between		421510.2	11550.06	1846523	n =	18
	within		174636.6	-1050550	1321539	T =	16
HDI	overall	.7547569	.068303	.53	.905	N =	288
	between		.0642287	.5945	.88175	n =	18
	within		.0274878	.6775694	.811257	T =	16
GOVexp	overall	148217.8	292228.5	3970.854	2230870	N =	288
	between		261653.9	4875.815	1100475	n =	18
	within		143223.3	-680424.3	1278613	T =	16
LFexp	overall	73.81827	4.817099	53.444	81.72684	N =	288
	between		4.663842	59.00137	79.76288	n =	18
	within		1.609301	68.2609	78.9929	T =	16

Source: Stata/MP 16 outputs.

The dependent variable mean, GDP per worker, in the developing countries under study is lower than both the world and upper-middle-income countries mean. It is roughly the same as the middle-income countries mean. Likewise, the global entrepreneurship index (GEI) mean for developing countries under study is much less than the median value of the index.

Conversely, both the business freedom (BUSfr) and Starting a Business (STRbus) means, were higher than the median values of the two indexes.

2. Estimation Strategy:

The relationship between entrepreneurship and economic growth has been widely explored (Acs, Audretsch, Braunerhjelm, & Carlsson, 2012) ; (Audretsch, & Keilbach,, 2008) ; (Acs, Estrin, Mickiewicz, & Szerb, 2018) ; (Noseleit, 2013). Nonetheless, to specify the sequence of the institutional environment, entrepreneurship, and economic growth, an augmented production function that includes an explicit measure of entrepreneurship is estimated. On this basis, we are able to test the impact of entrepreneurship on economic growth using a Cobb–Douglas function of the form:

$$Y_{it} = \alpha BUSfr_{it-1}^{\beta_1} GEI_{t-1}^{\beta_2} STRbus_{it-1}^{\beta_3} GCF_{t-1}^{\beta_4} TRDop_{it-1}^{\beta_5} HDI_{t-1}^{\beta_6} GOVexp_{it-1}^{\beta_7} LFexp_{t-1}^{\beta_8} L_{it}^{\beta_9} \text{.....(01)}$$

Our endogenous growth model follows Romer's assumption (Romer, 1986) regarding the labour coefficient (β_9) settled in one. To some extent, this implies that externalities are not internalized, knowledge is given (and expressed through entrepreneurship), and capital is foregone consumption. Taking this into account, dividing output by labour in order to guarantee a function with constant returns to scale, and introducing lags on the right-hand side, we obtain our economic growth equation to estimate:

$$\frac{Y_{it}}{L_{it}} = \alpha BUSfr_{it-1}^{\beta_1} GEI_{t-1}^{\beta_2} STRbus_{it-1}^{\beta_3} GCF_{t-1}^{\beta_4} TRDop_{it-1}^{\beta_5} HDI_{t-1}^{\beta_6} GOVexp_{it-1}^{\beta_7} LFexp_{t-1}^{\beta_8} \text{.....(02)}$$

where Y_{it} is the economic output of country i at time t, measured as the GDP, Lit represents the total labour force (hence Y_{it}/L_{it} is labour productivity, a proxy for economic growth), $BUSfr$, GEI, and $STRbus$ represent the

endowment of entrepreneurial activity, GCF is country i's endowment of capital, $TRDop$ is the openness trade, HDI is The Human Development Index, $GOVexp$ is the government consumption, and $LFexp$ is the health expenditures in each country. Thus, this formally specifies that entrepreneurship contributes to the economic growth of countries. Following the appendix of (Acs, Audretsch, Braunerhjelm, & Carlsson, 2012) to linearize the production function, we use the natural logarithm in the dependent and independent variables in our growth model. According to (Wooldridge J. M., 2013), the models using the logarithm on both sides (dependent and independent variables) allow a direct interpretation of their coefficients in terms of the percentage change in the independent variable implying a change in the dependent variable expressed in the respective coefficient.

In this study, the impact of different types of entrepreneurial activity on economic growth is empirically tested using a panel data setting, covering 18 countries over a sixteen-year period 2004-2019. The selected empirical strategy is subject to theoretical considerations, dataset structure, and the potential econometric issues that need to be dealt with in this investigation. The use of panel data is the first remedy to address some the above-listed issues in the entrepreneurship-economic growth relationship. This study follows the previous research practice which suggests that static estimators, namely fixed effects (FE) and random effects (RE) are more commonly used in panel data analysis. The suitability of the two alternative estimators is assessed on theoretical basis, the relationship to be investigated, the type of the data (heterogeneity; unobserved effects) and on the diagnostics tests. Random effects (RE) estimator is preferred in situations where the unobserved country effects are assumed to

be uncorrelated with the included regressors (Gujarati, 2004). In the other hand, the fixed effects (FE) estimator accounts for such correlation between the unobserved heterogeneity and explanatory variables in the model, within each cross-sectional observation, i.e., between countries. The FE rather than the RE is more frequently applied in the entrepreneurship-economic performance literature. Favouring the use of FE, (Wooldridge J. M., 2013).

The study relies on Hausman test to confront the decision of which is the most appropriate estimator for this investigation (Hausman, 1978). The null hypothesis states that there are no systematic differences between the two estimators, i.e., that the RE model is valid. A rejection of the null hypothesis suggests that the fixed effects (FE) is preferred over the random effects (RE) (Baltagi, 2005). As a result, the baseline regression model, the FE, to be estimated in this study is the one of the form:

$$growth_{it} = \beta_{0i} + \beta 1 ENT_{it} + \gamma_i \mathrm{CONT}_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots (03)$$

where, β_{0i} represents the specific intercept for each country,ENT_{it} is a vector of entrepreneurship measures, CONT_{it} is the vector of control variables, while ε_{it} represents the idiosyncratic error term.

The vast majority of panel data growth studies use a fixed effect (within-group) estimator rather than a random effects estimator. Standard random effects estimators require that the individual effects α_i are distributed independently of the explanatory variables, and this requirement is clearly violated for a dynamic panel such as (04) by construction, given the dependence of log $y_{i,t-1}$ on α_i.

The use of panel data methods to address unobserved heterogeneity can bring substantial gains in robustness, but is not without costs. The fixed-effects identification strategy cannot be applied in all contexts. Sometimes a variable of interest is measured at only one point in time. Even where variables are measured at more frequent intervals, some are highly persistent, in which case the within-country variation is unlikely to be informative.

Given the potentially unattractive trade-off between robustness and efficiency, (Barro & Sala-i-Martin, 1997), (Temple, 1999), and (Wacziarg, 2002) all argue that the use of fixed effects in empirical growth models has to be approached with care. The price of eliminating the misleading component of the between variation – namely, the variation due to unobserved heterogeneity – is that all the between variation is lost.

There are alternative ways to reveal this point, but consider the random effects GLS estimator of the slope parameters, which will be more efficient than the within-country estimator for small T when the random-effects assumptions are appropriate. This GLS estimator can be written as a matrix-weighted average of the within-country estimator and the between-country estimator, which is based on averaging the data over time and then estimating a simple cross-section regression by OLS (Durlauf, Johnson, & Temple, 2005).

To address some the above empirical issues and to ensure econometric validity and statistical inference, (Hoechle, 2007) suggests using (Driscoll & Kraay, 1998) standard errors adjusted for unbalanced panel data. (Hoechle, 2007) argues that "*Driscoll-Kraay standard errors are well calibrated when the regression residuals are cross-sectionally dependent*". According to (Driscoll

& Kraay, 1998), Driscoll-Kraay standard errors are robust to most of the forms of cross-sectional "spatial" and dependence. The second concern in the empirical analysis is the presence of time-invariant or slowly-moving (rarely-changing) regressors.

Most empirical growth models estimated using panel data are based on the hypothesis of conditional convergence, namely that countries converge to parallel equilibrium growth paths, the levels of which are a function of a few variables. A corollary is that an equation for growth (essentially the first difference of log output) should contain some dynamics in lagged output. In this case, the growth equation can be rewritten as adynamic panel data model in which current output is regressed on controls and lagged output (Islam, 1995). In statistical terms this is the same model, the only difference of interpretation being that the coefficient on initial output (originally β) is now $1+\beta$:

$$\log y_{i,t} = (1+\beta) \log y_{i,t-1} + \psi X_{i,t} + \pi Z_{i,t} + \alpha_i + \mu_t + \varepsilon_{i,t} \ldots\ldots\ldots\ldots (04)$$

The potential endogeneity between entrepreneurial activity measures and economic growth is however, accounted for by using “system GMM” (Generalized Method of Moments). In addition, the System GMM, developed by (Arellano, & Bover, 1995) and, accounts for the “dynamics of adjustment”, which according to (Bond, 2002) help improve the estimated consistency of the coefficients and of the model. Consequently, Bond suggests including the lagged dependent variable even when researchers are not primarily concerned with its impact on the dependent variable. Moreover, (Roodman, 2009) claims that, besides accounting for endogeneity, GMM models are also robust to heteroscedasticity and serial correlation, within the unit of analysis (countries),

and allow relaxing the normality of error terms. Further, the superiority of system GMM estimator is that it combines the equation in first differences with the equation in levels (Blundell & Bond, 1998).

The superiority of system GMM compared to the first-differenced GMM is further demonstrated by (Bond, Hoeffler, & Temple, 2001). Among other advantages, system GMM outperforms difference GMM by providing better finite sample properties. The finite sample bias, or the bias due to "weak instruments" in this investigation, might be further influenced by the small sample size (especially small time-series) and persistent explanatory variables. According to (Bond, Hoeffler, & Temple, 2001) the two conditions are a typical characteristic of empirical growth models. Further, the time-invariant variables, identified above, would remain in the model only when system GMM is applied and would be dropped in the difference GMM, thus reducing its explanatory power and casting doubts on economic inference.

For the dynamic approach, the study follows (Bond, Hoeffler, & Temple, 2001) model specification guidelines when using system GMM to empirically estimate growth models. Accordingly, the initial Eq. (5) below presents a growth model which includes the lagged dependent variable, our main variables of interest (entrepreneurship measures) and a vector of other control variables (χ). In addition, the equation allows the inclusion of the initial condition level of GDP to account for convergence. Eq. (4.3) takes the following the form:

$$growth_{it} = \beta_0 + \beta_1 growth_{i,t-1} + \beta 2ENT_{it} + \gamma_i \chi_{it} + (u_i + \varepsilon_{it}) \ldots\ldots\ldots (5)$$

where, β_0 is the intercept, $growth_{i,t-1}$ is the lagged dependent variable, ENT_{it} is a vector of entrepreneurship measures, χ_{it} is a vector of control

variables. The time-constant composite error term, also known as country heterogeneity, of an unobserved effect is represented by (u_i), while (ε_{it}) represents the idiosyncratic error term.

Section two: Results and discussion

In this section, empirical results of the relationship between entrepreneurship and economic growth using both static and dynamic approach estimation methodologies, explained in the previous section, are provided. Entrepreneurship measures are grouped into three main categories, namely 'Global Entrepreneurship Index', 'Business Freedom', and 'Starting a Business'.

1. Static analysis:

First, the correlation matrix is performed to check whether the variables included in the specified econometric models suffer from high correlation. Table 2.3 displays the descriptive statistics of correlation among the dependent and the independent variables:

Table 2.3 correlation matrix of the variables considered in the analysis.

	lGDPpw	lBUSfr1	lGEI1	lSTRbus1	lGCF1	lTRDop1	lHDI1	lGOVexp1	lLFexp1
lGDPpw	1.0000								
lBUSfr1	0.5302	1.0000							
lGEI1	0.4216	0.4878	1.0000						
lSTRbus1	0.5989	0.6135	0.3938	1.0000					
lGCF1	-0.3666	-0.4914	-0.3077	-0.2448	1.0000				
lTRDop1	-0.2708	-0.3155	-0.1667	-0.0333	0.9278	1.0000			
lHDI1	0.7621	0.5053	0.3699	0.6677	-0.4480	-0.2997	1.0000		
lGOVexp1	-0.2476	-0.4278	-0.3020	-0.1800	0.9705	0.9139	-0.3779	1.0000	
lLFexp1	0.2498	0.2040	0.1983	0.2429	-0.2247	-0.1726	0.6606	-0.2672	1.0000

Source: Stata/MP 16 outputs.

High correlation between 'lGOVexp' and 'lGCF' (0.97), between 'lGOVexp' and 'lTRDop' (0.91), and between 'lGCF' and 'lTRDop' (0.92) is suspected and found.

After considering the above outlined correlation issues, the variance inflation factors (VIFs) of some variables are above 10, thus indicating that there are problems of multicollinearity.

Table 2.4 First multicollinearity test.

Variable	VIF	1/VIF
lGCF1	40.21	0.024872
lGOVexp1	26.54	0.037674
lTRDop1	10.65	0.093870
lHDI1	5.27	0.189814
lSTRbus1	3.01	0.332430
lLFexp1	2.84	0.352620
lBUSfr1	2.27	0.441038
lGEI1	1.43	0.698476
Mean VIF	11.53	

Source: Stata/MP 16 outputs.

Therefore, we exclude the variable with the highest VIF (lGCF), and then retest again.

Table 2.5 Second multicollinearity test.

Variable	VIF	1/VIF
lGOVexp1	8.25	0.121281
lTRDop1	7.89	0.126695
lHDI1	4.12	0.242787
lSTRbus1	3.01	0.332639
lLFexp1	2.23	0.448945
lBUSfr1	2.08	0.480579
lGEI1	1.43	0.699849
Mean VIF	4.14	

Source: Stata/MP 16 outputs.

The variance inflation factors (VIFs) are now below 10, thus indicating that there are no problems of multicollinearity.

Table 2.6 shows the results of fixed effects estimation:

Table 2.6 Fixed effects model estimation.

```
Fixed-effects (within) regression               Number of obs      =       270
Group variable: country                         Number of groups   =        18

R-sq:                                           Obs per group:
     within  = 0.8157                                         min =        15
     between = 0.0283                                         avg =      15.0
     overall = 0.0118                                         max =        15

                                                F(7,245)           =    154.95
corr(u_i, Xb)  = -0.6434                        Prob > F           =    0.0000
```

lGDPpw	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lBUSfr1	.0488001	.0411255	1.19	0.237	-.0322046	.1298048
lGEI1	-.0388119	.0310635	-1.25	0.213	-.0999975	.0223737
lSTRbus1	.2763601	.0448144	6.17	0.000	.1880895	.3646308
lTRDop1	.0405635	.0189646	2.14	0.033	.0032091	.0779178
lHDI1	.6082891	.3002058	2.03	0.044	.0169755	1.199603
lGOVexp1	.2757947	.0310835	8.87	0.000	.2145697	.3370198
lLFexp1	-.5981439	.3025664	-1.98	0.049	-1.194107	-.0021806
_cons	7.887797	1.576638	5.00	0.000	4.782302	10.99329
sigma_u	.80781168					
sigma_e	.05770276					
rho	.99492352	(fraction of variance due to u_i)				

F test that all u_i=0: F(17, 245) = 397.51 Prob > F = 0.0000

Source: Stata/MP 16 outputs.

It is evident from the outputs of the previous table that the comparison between the pooled model and the fixed effects model based on the restricted Fisher statistic (F) test, which indicates the rejection of the null hypothesis and acceptance of the alternative hypothesis, meaning that the fixed effects model is the best. The next step is to estimate the random effects model:

Table 2.7 Random effects model estimation.

```
Random-effects GLS regression                   Number of obs      =       270
Group variable: country                         Number of groups   =        18

R-sq:                                           Obs per group:
     within  = 0.8026                                         min =        15
     between = 0.0425                                         avg =      15.0
     overall = 0.0695                                         max =        15

                                                Wald chi2(7)       =    872.97
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

lGDPpw	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lBUSfr1	.0190133	.0451299	0.42	0.674	-.0694398	.1074663
lGEI1	-.0122133	.0339419	-0.36	0.719	-.0787381	.0543115
lSTRbus1	.3249106	.0487586	6.66	0.000	.2293455	.4204757
lTRDop1	.0083616	.0203703	0.41	0.681	-.0315635	.0482867
lHDI1	1.568247	.2989467	5.25	0.000	.9823222	2.154172
lGOVexp1	.1687777	.0297155	5.68	0.000	.1105364	.227019
lLFexp1	-1.091993	.3226488	-3.38	0.001	-1.724373	-.459613
_cons	11.64262	1.638783	7.10	0.000	8.430661	14.85457
sigma_u	.3296778					
sigma_e	.05770276					
rho	.97027588	(fraction of variance due to u_i)				

Source: Stata/MP 16 outputs.

After obtaining the estimates of the random effects model, it is required to perform a Hausman test for the comparison between the fixed effects model and the random effects model.

Table 2.8 Hausman test .

	Coefficients (b) fixed	(B) random	(b−B) Difference	sqrt(diag(V_b−V_B)) S.E.
lBUSfr1	.0488001	.0190133	.0297869	.0056056
lGEI1	−.0388119	−.0122133	−.0265987	.0052803
lSTRbus1	.2763601	.3249106	−.0485505	.0088535
lTRDop1	.0405635	.0083616	.0322019	.0049835
lHDI1	.6082891	1.568247	−.9599579	.1443396
lGOVexp1	.2757947	.1687777	.107017	.0172755
lLFexp1	−.5981439	−1.091993	.4938491	.088548

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b−B)'[(V_b−V_B)^(−1)](b−B)
= 53.46
Prob>chi2 = 0.0000

Source: Stata/MP 16 outputs.

The output of the previous table shows the rejection of the null hypothesis and acceptance of the alternative hypothesis, meaning that the fixed effects model is the best. The next step is to run the diagnostic tests for the fixed effects model.

Pesaran CD (cross-sectional dependence) test is used to test whether the residuals are correlated across entities. Cross-sectional dependence can lead to bias in tests results (also called contemporaneous correlation) (Pesaran, 2004).

Table 2.9 Pesaran cross-sectional dependence test.

Pesaran's test of cross sectional independence = 1.125, Pr = 0.2607

Average absolute value of the off-diagonal elements = 0.448

Source: Stata/MP 16 outputs.

The result of the Pesaran test indicates the acceptance of the null hypothesis, which denotes that the model is devoid of the problem of non-cross-sectional dependence.

Modified Wald statistic is used to test for groupwise heteroskedasticity in the residuals of a fixed effect regression model. The modified Wald statistic is workable when the assumption of normality is violated, at least in asymptotic terms (Greene, 2000).

Table 2.10 Modified Wald test for groupwise heteroskedasticity.

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (18)   =      961.08
Prob>chi2 =        0.0000
```

Source: Stata/MP 16 outputs.

The null is homoskedasticity (or constant variance). According to the results of the modified Wald test above, we reject the null hypothesis and conclude heteroskedasticity.

A number of tests for serial error correlation in panel data models have been proposed in the literature. HR-test is used to test the first order serial correlation in fixed effect panel data models without gaps (Born & Breitung, 2016), (Wursten, 2018).

Table 2.11 HR-Born & Breitung test.

```
Heteroskedasticity-robust Born and Breitung (2016) HR-test on ue_residuals_1
Panelvar: country
Timevar: year
```

Variable	HR-stat	p-value	N	maxT	balance?
ue_residuals_1	-0.73	0.468	18	15	balanced

```
Notes: Under H0, HR ~ N(0,1)
   H0: No first-order serial correlation.
   Ha: Some first order serial correlation.
```

Source: Stata/MP 16 outputs.

The null hypothesis is no serial correlation. Above we fail to reject the null hypothesis and conclude the data does not have first-order autocorrelation.

Diagnostics tests of the specified model suggest the presence of heteroscedasticity, and the absence of serial correlation and cross-sectional

dependency. The modified Wald test for group-wise heteroscedasticity in the fixed effects regression model indicate the presence of heteroscedasticity (p-value=0.000). The fixed effects estimator is either inconsistent, biased, or inefficient in the presence of heteroscedasticity. To illustrate this, heteroscedasticity would make the estimates inefficient and their standard errors biased. Following (Baltagi, 2005), to correct for such bias in the standard errors, robust standard errors must be used.

Table 2.12 Robust standard errors fixed effects model estimation.

```
Fixed-effects (within) regression               Number of obs      =       270
Group variable: country                         Number of groups   =        18

R-sq:                                           Obs per group:
     within  = 0.8157                                         min =        15
     between = 0.0283                                         avg =      15.0
     overall = 0.0118                                         max =        15

                                                F(7,17)            =     59.82
corr(u_i, Xb)  = -0.6434                        Prob > F           =    0.0000

                                 (Std. Err. adjusted for 18 clusters in country)
------------------------------------------------------------------------------
             |               Robust
      lGDPpw |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lBUSfr1 |   .0488001   .0438702     1.11   0.281    -.0437579    .1413581
       lGEI1 |  -.0388119   .0629017    -0.62   0.545    -.1715228     .093899
    lSTRbus1 |   .2763601   .0521551     5.30   0.000     .1663225    .3863978
     lTRDop1 |   .0405635   .0350551     1.16   0.263    -.0333964    .1145233
       lHDI1 |   .6082891   .5046324     1.21   0.245    -.4563923     1.67297
    lGOVexp1 |   .2757947   .1103359     2.50   0.023     .0430063    .5085831
     lLFexp1 |  -.5981439   .5708049    -1.05   0.309    -1.802437    .6061493
       _cons |   7.887797   2.934552     2.69   0.016     1.696434    14.07916
-------------+----------------------------------------------------------------
     sigma_u |  .80781168
     sigma_e |  .05770276
         rho |  .99492352   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: Stata/MP 16 outputs.

The result of the robust fixed effect model used to solve the heteroscedasticity problem differs from the fixed effect regression model. Although the value of the coefficient of determination remained the same, the number of statistically significant variables decreased from five to two.

To address some empirical issues and to ensure econometric validity and statistical inference, (Hoechle, 2007) suggests using (Driscoll & Kraay, 1998) standard errors adjusted for unbalanced panel data. Driscoll-Kraay standard

errors are robust to most of the forms of cross-sectional "spatial" and dependence.

Table 2.13 Driscoll-Kraay standard errors fixed effects model estimation .

```
Regression with Driscoll-Kraay standard errors   Number of obs     =       270
Method: Fixed-effects regression                 Number of groups  =        18
Group variable (i): country                      F(  7,    14)     =   4795.97
maximum lag: 2                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.8157
```

lGDPpw	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
lBUSfr1	.0488001	.0509132	0.96	0.354	-.0603978	.1579981
lGEI1	-.0388119	.0241369	-1.61	0.130	-.0905804	.0129565
lSTRbus1	.2763601	.0565211	4.89	0.000	.1551344	.3975858
lTRDop1	.0405635	.0099375	4.08	0.001	.0192497	.0618772
lHDI1	.6082891	.2252493	2.70	0.017	.1251773	1.091401
lGOVexp1	.2757947	.0149371	18.46	0.000	.2437579	.3078315
lLFexp1	-.5981439	.1398985	-4.28	0.001	-.8981963	-.2980914
_cons	7.887797	.7127556	11.07	0.000	6.359088	9.416506

Source: Stata/MP 16 outputs.

The result of the Driscoll-Kraay standard error model used to solve the heteroscedasticity problem differs from the fixed effect regression model and the robust fixed effect model. although the value of the coefficient of determination remained the same, the number of statistically significant variables re-rise to five.

Only The coefficient of one of the three entrepreneurship measures: ‘Starting a Business’ has a significantly positive impact in explaining variation in output per worker. The coefficients of all control variables are statistically significant: 'Trade openness', 'Human Development Index', and 'government expenditure' have positive impacts in explaining variation in output per worker; however 'Life expectancy at birth' has a negative impact in explaining variation in output per worker.

2. Dynamic analysis:

In this subsection, we estimate both textbook Solow model and augmented Solow model using panel data of 18 developing countries over the period of 2004-2019. In the Solow model, per worker output growth depends on the initial value of per worker output, the Global Entrepreneurship Index, Business Freedom, Starting a Business, Gross capital formation, Trade openness, Human Development Index, government expenditure, Life expectancy at birth. Since lag occupies a central role in economics and is clearly reflected in the short-run and long-run methodology of economics (Gujarati, 2004), and getting valid (external) instruments both from theoretical and empirical point of view is very difficult, We decided to use the Generalized Method of Moments (GMM), which permits one or more lags of the dependent variables are included as explanatory variables, in order to display the effect of entrepreneurship on growth adjusting over time towards the long-run equilibrium. Moreover, this method helps us solve the problems of endogeneity, simultaneity bias, reverse causality and omitted variables that may weaken the results from static panel data method. There are two GMM approaches: the first is the difference GMM (DIF-GMM) and the second is system GMM (SYS-GMM). The DIF-GMM developed by (Arellano & Bond, 1991) uses past values of the regressor in levels as instruments of the differenced dependent variable. The SYSGMM combines equations of the first differences instrumented by lagged levels with an additional set of equations in levels instrumented by lagged first-differences (Arellano, & Bover, 1995); (Blundell & Bond, 1998).

The dynamic Solow growth equation we wish to estimate has the following form:

$$\ln GDPpw_{it} = \alpha + \beta_1 \ln GDPpw_{it-1} + \beta_2 \ln BUSfr_{it} + \beta_3 \ln GEI_{it} + \beta_4 \ln STRbus_{it} + \beta_5 \ln GCF_{it} + \beta_6 \ln TRDop_{it} + \beta_7 \ln GOVexp_{it} + \beta_8 \ln LFexp_{it} - \beta_9 \ln(n + g \ \delta)_{it} + \tau_t + \eta_i + \varepsilon_{it} \quad \text{.....(6)}$$

Where α is a constant term, β_1 to β_9 are the parameters to be estimated and ε_{it} is the error term which represents the effect of omitted variables that are particular to each country and period. τ_t represents year dummies, and η_i stands for country fixed effect. $GDPpw_{it}$ is economic growth measured by Real Gross Domestic Product (GDP) per worker in constant 2010 U.S. dollars (USD). $BUSfr_{it}$ is Business Freedom measured by a number between 0 and 100, with 100 indicating the freest business environment. GEI_{it} is the Global Entrepreneurship Index that measures the health of the entrepreneurship ecosystems. $STRbus_{it}$ is Starting a Business that measures the number of procedures, time, cost and paid-in minimum capital requirement for a small- to medium-size limited liability company to start up and formally operate in each economy's largest business city. H is human capital measured by mean years of schooling. GCF_{it} is the capital stock measured by gross fixed capital formation in constant 2010 U.S. dollars. $TRDop_{it}$ is Trade openness that measures The sum of exports and imports of goods and services measured in US dollars at current prices in millions. $GOVexp_{it}$ is government expenditure measured by the general government final consumption expenditure includes all government current expenditures for purchases of goods and services. $LFexp_{it}$ is Life expectancy at birth measured by the number of years a new-born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. ($n + g + \delta$) includes: n the rate of labour force growth, g is the rate of technological progress and δ is the rate of depreciation. Note that

g and δ are assumed to be constant across countries and over time and their sum equals 0.05, following (Mankiw, Romer, & Weil, 1992).

Our results for the basic Solow growth model are reported in Table 2.14:

Table 2.14 GMM basic Solow growth model estimation.

```
Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       270
Time variable : year                            Number of groups   =        18
Number of instruments = 22                      Obs per group: min =        15
F(18, 251)     =   1637.49                                     avg =     15.00
Prob > F       =     0.000                                     max =        15
------------------------------------------------------------------------------
      lGDPpw |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lGDPpw |
         L1. |    .739501   .1305787     5.66   0.000     .4823314    .9966706
             |
      lBUSfr |   .0949823   .0711252     1.34   0.183    -.0450961    .2350606
        lGEI |   .1075078   .0479621     2.24   0.026     .0130483    .2019672
     lSTRbus |   .2097913   .0990615     2.12   0.035     .0146937     .404889
        lGCF |  -.1603806   .0990719    -1.62   0.107    -.3554989    .0347377
     lTRDop  |  -.0283097       .0177   -1.60   0.111     -.063169    .0065497
     lGOVexp |   .1880332   .1133849     1.66   0.098    -.0352738    .4113401
      lLFexp |   .6590318   .3665645     1.80   0.073    -.0629024    1.380966
     l_n_g_δ |  -.537996    .304941    -1.76   0.079    -1.138565    .0625731
      yr2011 |    .005161   .0128618     0.40   0.689    -.0201698    .0304917
      yr2012 |  -.0184393   .0125708    -1.47   0.144     -.043197    .0063184
      yr2013 |  -.0118741   .0127561    -0.93   0.353    -.0369967    .0132485
      yr2014 |  -.0200408   .0136431    -1.47   0.143    -.0469104    .0068288
      yr2015 |  -.0422979   .0171043    -2.47   0.014    -.0759841   -.0086118
      yr2016 |  -.0492278   .0243911    -2.02   0.045    -.0972651   -.0011905
      yr2017 |  -.0366491    .018632    -1.97   0.050    -.0733441     .000046
      yr2018 |  -.0428352   .0187891    -2.28   0.023    -.0798396   -.0058308
      yr2019 |  -.0600066   .0239292    -2.51   0.013    -.1071342    -.012879
       _cons |  -2.016319   1.192414    -1.69   0.092    -4.364731    .3320928
------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(lBUSfr lGEI lSTRbus lGCF lTRDop lGOVexp lLFexp l_n_g_δ yr2011 yr2012
    yr2013 yr2014 yr2015 yr2016 yr2017 yr2018 yr2019)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L.lGDPpw collapsed
Instruments for levels equation
  Standard
    lBUSfr lGEI lSTRbus lGCF lTRDop lGOVexp lLFexp l_n_g_δ yr2011 yr2012
    yr2013 yr2014 yr2015 yr2016 yr2017 yr2018 yr2019
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.lGDPpw collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.78  Pr > z =  0.005
Arellano-Bond test for AR(2) in first differences: z =  -0.82  Pr > z =  0.414
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(3)     =   2.71  Prob > chi2 =  0.439
  (Not robust, but not weakened by many instruments.)

Difference-in-Sargan tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Sargan test excluding group:     chi2(2)     =   2.42  Prob > chi2 =  0.298
    Difference (null H = exogenous): chi2(1)     =   0.29  Prob > chi2 =  0.592
```

Source: Stata/MP 16 outputs.

There are two diagnostic tests associated with the dynamic panel GMM: the over-identification test Sargan/Hansen, which can test the validity of the lagged variables as instruments, and the (Arellano & Bond, 1991) test for

autocorrelation where the null hypothesis is the absence of autocorrelation of the first order errors in the level equation. The results of both tests in Table 2.14 fail to reject both H_0 of validity of the lagged variables as instruments and no autocorrelation of the second order provides a justification for the model specification.

The final diagnostic check for the dynamic approach is with regard to the coefficient of the lagged dependent variable. The lagged dependent variable suggests for convergence and has a coefficient of less than one (<1). According to (Roodman, 2009) a coefficient of 1.00 would suggest 'unstable dynamics'. The coefficient of the lagged output per worker in this model shows the significance of including this variable, and its value less than one (0.74) confirms that there is clear evidence of conditional convergence.

The coefficients of the two entrepreneurship measures; 'Global Entrepreneurship Index' and 'Starting a Business', have significantly positive impacts in explaining variation in output per worker even after controlling for unobserved individual (country) specific effect. Similarly, we also identified a 10% significantly negative impact of l_n_g_δ as expected as well which implies that the specifications are correct.

We augment the textbook Solow regression by adding human capital measured by the Human Development Index (HDI). Explicitly, in augmented Solow model, we estimate equation (7) by adding measure of human capital:

$$\ln GDPpw_{it} = \alpha + \beta_1 \ln GDPpw_{it-1} + \beta_2 \ln BUSfr_{it} + \beta_3 \ln GEI_{it} + \beta_4 \ln STRbus_{it} + \beta_5 \ln GCF_{it} + \beta_6 \ln TRDop_{it} + \beta_7 \ln HDI_t + \beta_8 \ln GOVexp_{it} + \beta_9 \ln LFexp_t - \beta_{10} \ln(n + g + \delta)_{it} + \tau_t + \eta_i + \varepsilon_{it} \ldots\ldots\ldots(7)$$

For estimating augmented Solow model, we focus on Human Development Index (HDI) measuring in the geometric mean of a long and healthy life, being knowledgeable, and have a decent standard of living.

Table 2.15 reports our results for a version of the augmented Solow model:

Table 2.15 GMM augmented Solow model estimation.

```
Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       270
Time variable : year                            Number of groups   =        18
Number of instruments = 26                      Obs per group: min =        15
F(22, 247)    =   2905.08                                      avg =     15.00
Prob > F      =     0.000                                      max =        15
------------------------------------------------------------------------------
      lGDPpw |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lGDPpw |
         L1. |   .6848887   .1132106     6.05   0.000     .4619073     .90787
             |
      lBUSfr |   .1088425   .0541183     2.01   0.045     .0022502    .2154348
        lGEI |    .097416   .0312687     3.12   0.002     .0358286    .1590034
     lSTRbus |   .0783694   .0278141     2.82   0.005     .0235862    .1331525
        lGCF |  -.0990951   .0488373    -2.03   0.044    -.1952858   -.0029043
     lTRDop  |  -.0416826   .0170533    -2.44   0.015    -.0752711   -.0080942
     lGOVexp |   .1494462   .0667781     2.24   0.026     .0179191    .2809732
     lLFexp  |  -.2543396   .0864632    -2.94   0.004    -.4246387   -.0840405
     l_n_g_δ |  -.4996626   .2051393    -2.44   0.016     -.903708   -.0956173
        lHDI |   1.389766   .4928511     2.82   0.005     .4190395    2.360493
      yr2008 |  -.0100848    .009102    -1.11   0.269    -.0280122    .0078426
      yr2009 |  -.0811168   .0133263    -6.09   0.000    -.1073645   -.0548691
      yr2010 |  -.0168503    .011047    -1.53   0.128    -.0386087    .0049081
      yr2011 |   -.024723   .0086231    -2.87   0.005    -.0417072   -.0077388
      yr2012 |  -.0462329   .0099842    -4.63   0.000    -.0658981   -.0265678
      yr2013 |  -.0487936   .0128863    -3.79   0.000    -.0741746   -.0234125
      yr2014 |  -.0588453   .0151662    -3.88   0.000    -.0887169   -.0289737
      yr2015 |  -.0838558   .0200235    -4.19   0.000    -.1232944   -.0444173
      yr2016 |  -.0915623   .0265303    -3.45   0.001    -.1438169   -.0393078
      yr2017 |  -.0813412   .0224053    -3.63   0.000     -.125471   -.0372115
      yr2018 |  -.0857948   .0219632    -3.91   0.000    -.1290539   -.0425357
      yr2019 |  -.0950598   .0235774    -4.03   0.000    -.1414981   -.0486215
       _cons |   3.305228    1.09586     3.02   0.003     1.146806    5.463651
------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(lBUSfr lGEI lSTRbus lGCF lTRDop lGOVexp lLFexp l_n_g_δ lHDI yr2008
    yr2009 yr2010 yr2011 yr2012 yr2013 yr2014 yr2015 yr2016 yr2017 yr2018
    yr2019)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L.lGDPpw collapsed
Instruments for levels equation
  Standard
    lBUSfr lGEI lSTRbus lGCF lTRDop lGOVexp lLFexp l_n_g_δ lHDI yr2008 yr2009
    yr2010 yr2011 yr2012 yr2013 yr2014 yr2015 yr2016 yr2017 yr2018 yr2019
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.lGDPpw collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.98  Pr > z =  0.047
Arellano-Bond test for AR(2) in first differences: z =   0.04  Pr > z =  0.968
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(3)    =   0.84  Prob > chi2 =  0.840
  (Not robust, but not weakened by many instruments.)

Difference-in-Sargan tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Sargan test excluding group:     chi2(2)    =   0.03  Prob > chi2 =  0.985
    Difference (null H = exogenous): chi2(1)    =   0.81  Prob > chi2 =  0.369
```

Source: Stata/MP 16 outputs.

There are two diagnostic tests associated with the dynamic panel GMM: the over-identification test Sargan/Hansen, which can test the validity of the lagged variables as instruments, and the (Arellano & Bond, 1991) test for autocorrelation where the null hypothesis is the absence of autocorrelation of the first order errors in the level equation. The results of both tests in Table 2.15 fail to reject both H_0 of validity of the lagged variables as instruments and no autocorrelation of the second order provides a justification for the model specification.

The final diagnostic check for the dynamic approach is with regard to the coefficient of the lagged dependent variable. The lagged dependent variable suggests for convergence and has a coefficient of less than one (<1). According to (Roodman, 2009) a coefficient of 1.00 would suggest 'unstable dynamics'. The coefficient of the lagged output per worker in this model shows the significance of including this variable, and its value less than one (0.68) confirms that there is clear evidence of conditional convergence.

The coefficients of the three entrepreneurship measures; Global Entrepreneurship Index', 'Business Freedom' and 'Starting a Business, have significantly positive impacts in explaining variation in output per worker even after controlling for unobserved individual (country) specific effect. Similarly, we also identified a significantly negative impact of l_n_g_δ as expected as well which implies that the specifications are correct. The coefficient of the 'Human Development Index' expressing human capital in the augmented Solow model, has expected sign and significant effects indicating strong evidence of faster convergence.

Compared with Solow model, inclusion of 'Human Development Index' variable in the regression leads to several important changes in augmented Solow model. The coefficients of 'Gross capital formation', 'Trade openness', 'government expenditure', 'Life expectancy at birth', and 'Business Freedom' become statistically insignificant while we add human capital measure. And the coefficient of the 'Human Development Index' variable now explains a major portion of cross country differences in per worker output in developing economies.

CONCLUSION

Conclusion

The relationship between entrepreneurship and economic growth was studied in the lenses of growth theories, primarily neoclassical, endogenous and Schumpeterian growth theories. Most of the latest analytical research, at the national and regional level, applied either explicitly or implicitly one of the paradigms for economic growth to the entrepreneurial/economic growth relationship, in their analyses. The Knowledge Spillover Theory of Entrepreneurship (KSTE) contribution was highlighted by a channel that clarified how entrepreneurship has an impact on economic growth. The Schumpeterian growth theory has also linked entrepreneurship with economic growth through the process of 'creative destruction' and as it was discussed, many studies have used this approach.

The systematic national and regional analysis of scientific literature in general has demonstrated a positive impact on economic performance through entrepreneurship initiatives. The study of growth theories and models and the scientific literature linking entrepreneurship to economic growth found a lack of unanimity, while the number of studies showing positive results was dominant.

Main findings:

The initial results of the study contribute to the review in Chapter one of the theoretical and empirical literature. The entrepreneurship theory, advanced by (Schumpeter, 1931), illustrated the role of entrepreneurship in stimulating economic development and growth. Motivated by Schumpeter 's work, empiric literature has developed steadily, particularly in the last two decades, and has, in large part, shown the positive impact of entrepreneurial

activity on economic growth. The theories and models of early economic growth, on the other hand, remained silent and overlooked the position of entrepreneurship.

In the context of this study, we examine the impact of entrepreneurship on economic growth in 18 developing countries over the period 2004-2019. The choice of entrepreneurship and economic growth measures was guided by the measurement and definitional challenges identified, and the review of literature on Chapter one.

The results using the static approach estimators, suggested that only the coefficient of one of the three entrepreneurship measures: ‘Starting a Business’ has a significantly positive impact in explaining economic growth. The results also indicated that a set of control variables have a significant effect on economic growth. Specifically, 'Trade openness', 'Human Development Index', and 'government expenditure' are suggested to have a positive impact on growth. At odds with previous studies, this study found that 'Life expectancy at birth' is negatively related to economic growth.

Using a robust and consistent dynamic panel GMM technique (system GMM), we have examined the role of textbook and augmented Solow model in explaining the growth process. Firstly, the estimation of the textbook Solow model demonstrates that a higher workforce growth rate significantly elevates the output per worker. Secondly, when we append human capital measure and estimate the augmented Solow model, the effect of ‘Global Entrepreneurship Index’ in explaining cross-country variation of output per worker decreases slightly from 11 percent to 10 percent; the effect of

‘Starting a Business’ in explaining cross-country variation of output per worker considerably reduces from 21 percent to 8 percent; the 'Business Freedom' entrepreneurship measure has become a significant effect in explaining cross-country variation of output per worker with 11 percent. Importantly, about 139 percent contribution is exerted by human capital measure i.e. 'Human Development Index'. In real context, it implies that the countries whose labour force has more human development and thus skill, the output per worker grow faster.

The result suggests that cross-country variation in income per worker is better explained by the augmented Solow growth model. In this model, the income per worker is determined from the three entrepreneurship measures, 'Gross capital formation', 'Trade openness', 'government expenditure', 'Life expectancy at birth', 'Business Freedom', rate of labour force growth, rate of technological progress, rate of depreciation, and human capital.

Policy implications

Researchers and policymakers' intensified emphasis on entrepreneurship as a trend impacting economic growth, makes the results of this study important to the government and the community of policymaking. In this sense, entrepreneurship and human capital measured by Human Development Index are considered two key instruments for promoting economic growth in developing countries.

Governments need to be patient, because the impact of entrepreneurship and human capital requires a period of adjustment. Governments need to be careful, and an adjustment period is needed for the effects of entrepreneurship

and human capital. The long-term benefits will significantly compensate short-term losses. Governments should encourage both creativity and human capital at the same time to produce the best outcome. Especially, developing countries should pay more attention on human capital such as basic skill development, school quality, enhancing R&D efficiency, etc., in order to maximize the its benefits.

high growth potential entrepreneurship is essential for sustained economic growth and that investment in creating a business environment conducive to growth oriented entrepreneurial activity pays off. More importantly, the long-term advantages of growth--oriented entrepreneurship investment can encourage policymakers to adopt plans and policies that can also provide the economic climate for promoting growth ambitions in addition to facilitating new company entry.

Limitations and recommendations for future research:

This research is subject to a variety of limitations that may have influenced the findings which may have hindered their generalizability. This mainly emerge from sample restrictions. Just 16 years of data set can prevent detection of lag effects occurring only on longer time scales. In order to investigate and clarify the relationship between entrepreneurship and growth, a larger set of panel data , particularly regarding time observations, might be more efficient. In addition to time-dimensional limitations, limitations exist in the group of countries included in the data. Some of the study variables for a significant number of developing countries suffer greatly from the problem of missing data.

Conclusion

Future study at the micro level and at the country level may also be expanded to include export-oriented (international) entrepreneurship, social entrepreneurship, and intrapreneurship. The continuation of this study in this direction would also make a substantial contribution to the current literature. The impact of social entrepreneurship on other phases of development and growth, e.g. poverty reduction and disparity reduction, will offer an important component of the essence of entrepreneurship.

REFERENCES:

Acs, Z. J., Estrin, S., Mickiewicz, T., & Szerb, L. (2018). Entrepreneurship, institutional economics, and economic growth: an ecosystem perspective. *Small Business Economics*, pp. 1-14.

Acs, Z., Audretsch, D., Braunerhjelm, P., & Carlsson, B. (2012). Growth and entrepreneurship. *Small Business Economics, 39*(2), pp. 289-300.

Anil Kumar, S. P. (2003). *entrepreneurship development.* New Delhi: New age international publisher.

Arellano, , M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, *68*(1), pp. 29-51.

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

Audretsch, D. & Keilbach, M. (2008). Resolving the knowledge paradox: Knowledge-spillover entrepreneurship and economic growth. *Research Policy*, *37*(10), pp. 1697-1705.

Audretsch, D. B. (2006). *entrepreneurship and economic growth.* Newyork: Oxford university press.

Baltagi, B. H. (2005). *Econometric Analysis of Data Panel.* England: John Wiley & Sons Ltd.

Barro, R., & Sala-i-Martin, X. (1997). Technological diffusion, convergence, and growth. *ournal of Economic, 2*, pp. 1-26.

Baumol, W. (1990). “Entrepreneurship:productive, unproductive, and destructive. *The journal ospolitical economy, 98*(5), pp. 893-921.

Berber, N. (2014). *L'entreprenariat en Algérie.* Mémoire de Magistère, Université d'Oran, Oran.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics, 87*(1), pp. 115-143.

Blundell, R., & Bond, S. (2000). GMM estimation with persistent panel data: an application to production functions. *Econometric reviews, 9*(3), pp. 321-340.

Bond, S. R. (2002). Dynamic panel data models: a guide to micro data methods and practice. *Portuguese economic journal, 1*(2), pp. 141-162.

Bond, S., Hoeffler, A., & Temple, J. (2001). GMM Estimation of Empirical Growth Models. *CEPR Discussion Paper*(3048).

Born, B., & Breitung, J. (2016). Testing for Serial Correlation in Fixed-Effects Panel Data Models,. *Econometric Reviews*.

conference, I. l. (2015). *Small and medium-sized enterprises and decent and productive employment creation.* Geneva.

Doing Business. (2020, July 12). Retrieved from https://www.doingbusiness.org/en/data/exploretopics/starting-a-business

Driscoll, J., & Kraay, A. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of economics and statistics, 80*(4), pp. 549-560.

Durlauf, S. N., Johnson, P. A., & Temple, J. R. (2005). Growth Econometrics. Dans P. Aghion, & S. N. Durlauf, *Handbook of Economic Growth* (Vol. Volume 1A, pp. 555-677). Elsevier B.V. doi:10.1016/S1574-0684(05)01008-7

Estimé, M.-F., & Murphy, M. (2004). Encourager L'entreprenariat en tant que Moteur de la Croissance dans une Économie Mondialisée. (pp. 12-13). Istambul: Organisation de Coopération et de Développement Économiques.

Facchini, F. (2007). Entrpreneur et croissance économique; développements récents. (D. B. Université, Éd.) *Revue d'économie industrielle*, pp. 3-5.

GEDI. (2020, July 10). Retrieved from The Global Entrepreneurship and Development Institute: https://thegedi.org/datasets/

Greene, W. (2000). *Econometric Analysis* (Vol. 4). New Jersey: Pearson Education, Inc.

Gujarati, D. (2004). *Gujarati, D.* West Point: United States Military Academy.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the econometric society*, pp. 1251-1271.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *Stata Journal, 7*(3), p. 281.

International labour conference .(2015) .*Small and medium-sized enterprises and decent and productive employment creation* .Geneva.

Islam, N. (1995). Growth empirics: A panel data approach. *Quarterly Journal of Economics, 110*(4), pp. 1127–1170.

J. A. Schumpeter .(1931) .The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle .*Harvard University Press*.

Joe Tidd ، and John Bessant .(2015) .Entrepreneurial Goals and Context .*Innovation and entrepreneurship*.

Julien, P.-A., & Cadieux, L. (2010). *La mesure de l'entrepreneuriat.* Québec: Institut de la Statistique de Quebec.

Keskin, h., & SENTÜRK, C. (2010). The importance of SMEs in developing coutries. *2nd International Synoposium on sustainable development*, (p. 188). Sarajevo.

KUZNETS, S. (1973, June). Modern economic growth: findings and Reflexions. *The american economic review, 63*(3), p. 247.

Mankiw, N., Romer, D., & Weil, D. (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics, 107*, pp. 407-437.

Mbhele, T. P. (2012). The study of venture capital finance and investment behaviour in small and Medium-sized entreprises. *Sagems*(01), p. 94.

Nations, U. (2018). *World economic situation prospects.* Newyork.

Noseleit, F. (2013). Entrepreneurship, structural change, and economic growth. *Journal of Evolutionary Economics, 23*(4), pp. 735-766.

Nzaou, J. (2015, June). Renaissance Entreprenariale et dynamique de la croissance au Congo. *International Multilingual Journal if Contemporary Research*, p. 53.

Okey-Colbert, E. U. (2019). The impact of Entrepreneurship in economic growth. *World Journal of Entreprenarial Development Studies, 3*(1), pp. 2-3.

Olafsen, E., & Cook, P. A. (2016). *Growth entrepreneurship in Developing Countries A Preliminary Literature Review.* Washington: World bank Group.

Pesaran, M. (2004). General diagnostic tests for cross section dependence in panels. *Cambridge Working Papers in Economics*(0435), p. 4 8 2.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of political Economy, 98*(5, Part 2), pp. S71-S102.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and statistics, 71*(1), pp. 135-158.

Roodman, D. (2009). *Estimating fully observed recursive mixed-process models with cmp.* Retrieved from SSRN: http://ssrn.com/abstract=1392466

Sitharam, S., & Hoque, M. (2016). Factors affecting the performance of small and medium enterprises in KwaZulu-Natal, South Africa. *Problems and Perspectives in Management, 14*(2), pp. 277-278.

Szirmai, A., Naudé, W., & Goedhuys, M. (2011). *Entrepreneurship ,innovation, and economic development.* Newyork: Oxfotd university press.

Temple, J. (1999). The new growth evidence. *Journal of Economic Literature, 37*(1), pp. 112–156.

The Heritage Foundation. (2020, 12). *Index of Economic Freedom*. Retrieved from https://www.heritage.org/index/explore

Tidd, J., & Bessant, J. (2015). Entrepreneurial Goals and Context. *Innovation and entrepreneurship*, p. 12.

United Nations .(2018) .*World economic situation prospects* .Newyork.

Vandenberg, P., Chantapacdepong, P., & Yoshino, N. (2016). *SMEs in Developing Asia:New Approaches to Overcoming Market Failures.* Tokyo: Asian Development Bank Institute.

Vivarelli, M. (2012). Entrepreneurship in Advanced and developing countries: a macro economic perspective. *IZA discussion paper*(6513), p. 25.

Wacziarg, R. (2002). Review of Easterly's The elusive quest for growth. *Review of Easterly's The elusive quest for growth, 40*(3), pp. 907–918.

William Baumol .(1990) .Entrepreneurship: productive, unproductive, and destructive .*The journal of political economy*.

Wooldridge, J. M. (2009). *Introductory Econometrics: A Modern Approach* (Vol. 4). Mason: South-Western Cengage Learning.

Wooldridge, J. M. (2013). *Introductory Econometrics: A modern Approach* (Vol. 5). South-Western Cengage Learning.

World Bank. (2020, July 10). *World Development Indicators*. Retrieved from https://databank.worldbank.org/source/world-development-indicators

Wursten, J. (2018). Testing for serial correlation in fixed-effects panel models. *Stata Journal*.

Zoltan, A., & Virgill, N. (2009, June). entrepreneurship in developing countries. *Jena Economic Research paper*(23), p. 22.

العايد, ع. ا (1428 .هـ) .اختلاف المتعاقدين في المقاولة .مجلة الإمام.328 .p ,(53)

بن سانية, ع. ا .(2012) .الانطلاق الاقتصادي بالدول النامية في ظل التجربة الصينية .أطروحة دكتوراه, جامعة أبوبكر بلقايد, تلمسان.

موساوي, م .(2005) .استعمال نماذج دوال الإنتاج لتحليل النمو الاقتصادي في الجزائر .مذكرة ماجستير, جامعة تلمسان, كلية العلوم الاقتصادية.

وماحنوس, ف .(2005) .مفهوم البلدان أقل نموا في العلاقات الإقتصادية الدولية .مذكرة ماجستير, جامعة الجزائر – كلية الحقوق, الجزائر.