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THE RELATIONSHIP BETWEEN ENTREPRENEURSHIP AND ECONOMIC GROWTH

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ABSTRACT

There is a widespread consensus between researchers that entrepreneurship is considered as the missing link explaining economic growth in countries. Despite the rapid upsurge in the number of researches conducted in that field, the diverse approaches and methodologies have led to contrasting findings and could not reach a common understanding that embraces the whole convolution related to entrepreneurial activity. Based on an unbalanced panel data consisting of 86 developed and developing countries covering annual data for the period 1996-2015, this research empirically investigates the relationship between entrepreneurship and economic growth by adopting different measures of entrepreneurship and different estimation techniques. The empirical findings suggest that economic growth does not only embrace the factors that affect growth directly, but it is also affected by those essential determinants that shape the decisions of economic agents such as institutions.

KEYWORDS: Entrepreneurship, Economic growth, Institutions, Business Density, TEA.

1. INTRODUCTION

Determining the wealth of nations, defining the factors that affect it, in addition to identifying the elements that have an impact on it, was and still is an ongoing crucial concern in the economy dating back to the first schools of economic thought. Thus, there have been substantial progress in what is known as "the growth accounting" where the growth rate of the economy's total output was first explained by the classical factors of production, capital and labor, to include human capital at a later stage, or other determinants of investment such as entrepreneurship, in addition to explanatory causes of what has been known as the Solow Residual such as social capital. By the beginning of the 21st century, several researchers have included issues such as institutions, governance, and corruption that were previously considered as elements for sociology but turned into a concern for economists.

The initial economic theory of entrepreneurship has emanated from the fact that the economy is endowed with several factors; hence, entrepreneurship is the main contributor to the production process through a combination of productive factors (capital and labor), consequently, the achievement of greater production and well-being are conditioned by more entrepreneurial resource allocation. Latest studies achieved in the domain pursue the identification of certain features and characteristics of the contribution aspect of entrepreneurship in Economic Growth. In 2009, Koo and Kim argued that there are several interconnected policy issues that should be studied in a broader policy framework such as entrepreneurship, human capital, social capital, and industry structures. It became widely acknowledged that entrepreneurship is a main factor for economic development, as such; stimulating entrepreneurship activities is a main focus for policy makers.

2. LITERATURE REVIEW

This study draws upon three frames of literature: (1) Traditional theory vs. new growth theory; (2) Sources of Economic Growth; and (3) Entrepreneurship: New Entry, survival and Exit. The first section presents the difference between traditional and new growth theories in perceiving the role of entrepreneurship in economy, the second section summarizes the main studies concluding the presence of additional sources of economic growth mainly entrepreneurship while the final section highlights the life cycle of the entrepreneurial activity.

2.1 Traditional theory vs. new Growth theory

Where entrepreneurship was the focus in the preceding section, we will now focus upon economic growth. In section 3.1 we briefly deal with growth theories. Some aspects of the history of economic growth are surveyed in section 3.2. Finally, in section 3.3, some modern views as formulated in industrial economics and in evolutionary economicsare discussed.

The theoretical framework associating entrepreneurship and economic growth is drawn by new growth theory and mainly theories of industrial evolution (Jovanovic, 1982; Hopenhayn, 1992; Ericson and Pakes, 1995; and Klepper, 1996). These theories advocate that entrepreneurship will encourage and produce economic growth, at the contrary of the traditional theories that propose that entrepreneurship will delay economic growth. The discrepancies between these two theories arise from the framework of the underlying theory. The traditional theory relies on the role of capital and labor in inducing economic development without any acknowledgment of the role of new knowledge; thus, growth is driven by a static efficiency that is mainly determined by its capacity to deplete scale economies. The theory was first developed in 1956 by Robert Solow in his paper "A contribution to the Theory of Economic Growth" where he discusses that economic growth is a function of two inputs, capital and labor. He argues then that the nature of the function relies on technology available in the country (i.e, the level of knowledge), however, it was unaccounted for and perceived as exogenous.

At the contrary, new growth theories take into account the role of knowledge in economic development. Since knowledge is intrinsically ambiguous and asymmetric by nature in addition to being correlated to high costs of transaction, the expected value of new ideas differs widely. Thus, economic agents have a reason to leave a company and found a new one in order to commercialize their knowledge. In other words, entrepreneurship is the mean to implement ideas.

2.2 Sources of Economic Growth

More recently, researchers and policy makers suggested other sources for economic growth such as market friendly government policies. Hans Pitlik, in the paper "The Path of Liberalization and Economic Growth" (2002), elucidates several empirical studies proving the positive effect of pro-market government policies on economic growth of a country.

Such policies raise the benefits individuals obtain in return of conducting activities that favor economic growth. Such findings suggest that entrepreneurship is significantly affected by market friendly government policies. It was highly sustained by other studies conducted by Matthieu Chemin. In his article "The Impact of the Judiciary on Entrepreneurship: Evaluation of Pakistan's 'Access to Justice Program" (2009), Chemin found that the reform of the jurisdictional system in Pakistan led to a substantial upsurge in the entrepreneurial activity which is also consistent with the previous finding that certain government policies are positively correlated with the level of entrepreneurship and this latter is affected by at least one of the traditional factors of economic growth. Nevertheless, though entrepreneurship might be affected by certain traditional elements of economic growth but it doesn't revoke it as an isolated predictor of economic growth. In the case where a factor affecting entrepreneurship is not considered amongst the traditional factors of economic growth while entrepreneurship does affect economic growth, then, entrepreneurship should be considered as additional independent factor of economic growth. The intuition behind the conclusion is that if entrepreneurship is impacted by determinants other than the traditional ones of economic growth and in its turn has an impact on economic growth, then it is basically acting as proxy for these variables.

Accounting for entrepreneurship as a separate determinant of economic growth would therefore guarantee that the impact of the other factors was at least partially being taken into account. Many theories suggested that entrepreneurship is certainly affected by several factors beyond traditional ones believed to affect economic growth. Such theories are present in the notions of Joseph Schumpeter. In "*The Theory of Economic Development*", Schumpeter considered that entrepreneurship leads to economic growth in a society by using the factors of production in innovative and effective combinations. Consequently, he concluded that technological innovation is not only caused by knowledge, but also through entrepreneurship. He claims that entrepreneurship is a practice that is totally different from the rational economic behavior dominant in a society and not a natural outcome of it. In fact, for individuals to act in an economically rational way, they must have a certain level of knowledge that enables them to make decisions. He also indicated that since individuals naturally count on past experiences to develop their knowledge, all their economic behavior will be relying on past thoughts and practices.

Thus, rational economic behavior cannot be considered as innovative according to Schumpeter. Consequently, it cannot lead to the formation of completely new arrangements of the means of production, the main element of entrepreneurship

(Schumpeter, pp. 79-81). Therefore, rational economic behavior would just allow people to adjust to any modifications in these traditional issues in whatsoever manner had found to be most effective in the past.

Subsequently, entrepreneurship, necessitating innovation, cannot be considered as an outcome of just the traditional elements of economic growth. In this regard, a similar argument for dealing with entrepreneurship as an independent element of economic growth is embedded in the study of Max Keilbach and David Audretsch: "Entrepreneurship and Regional Growth: An Evolutionary Perspective" who examined the precise nature of the relationship between knowledge and economic growth. They reasoned that a differentiation should be done between the common forms of publicly accessible knowledge and economic knowledge that can be identified as a subdivision of common knowledge which industries have figured a system to use commercially and beneficially.

Keilbach and Audretsch (2004) argued that accessible knowledge can be altered into economic knowledge by entrepreneurs who basically examine the general knowledge till they discover a part that they consider it can be exploited and thus, start a new business relying on that part of knowledge. Such way of scrutinizing and inspecting the common knowledge can be considered as the course of innovation. Such economic knowledge is the driver for economic growth (Keilbach and Audretsch, pp. 606-607). The authors concluded that knowledge solely cannot generate economic growth but rather entrepreneurship that alters accessible knowledge into economic knowledge.

Such argument runs against the old theories considering entrepreneurship as a natural outcome of high levels of labor, capital and knowledge. In fact, the findings of Keilbach and Audretsch's were supported by other studies conducted by C. Mirjam van Praag and Peter H. Versloot (2007) who, in their article "What is the Value of Entrepreneurship? A Review of Relevant Research" found that countries having high levels of entrepreneurship enjoyed high levels of innovation and technological change. This is consistent with the theory of Keilbach and Audretsch considering that entrepreneurship is essential for converting common knowledge into economic knowledge and thus innovation. And it is also analogous to another theory established in the work of Kirzner "The Alert and Creative Entrepreneur: A Clarification". In this article, Kirzner disputes that the key reason driving entrepreneurship is the individuals observing and benefiting from formerly unrecognized price discrepancies. An illustration of such idea might be translated through individuals recognizing the fact that they may possibly utilize a present but little-known method needed for the production and sale of a certain good cheaply than anyone else, or individual buying goods that can be sold later at a higher price. Such recognition and exploitation of the price discrepancies is the main driver leading markets to equilibrium. Despite the fact that Kirzner's idea contradicts with the ideas of Schumpeter who considers entrepreneurship to unavoidably disturb market equilibrium; However, both Kirzner and Schumpeter approve that entrepreneurship is not only affected by the traditional factors of economic growth but there are other factors involved.

Despite the fact that Keilbach, Audretsch, and Kirzner disagree about the precise nature of the opportunities for profits facing prospective entrepreneurs, however, they agree that entrepreneurship is initiated by the capacity of individuals to recognize these opportunities and act on it with innovation. Based on the assumption that this finding is correct, the level of entrepreneurship in a certain society is determined by the extent to which individuals identify and exploit hidden opportunities in order to realize profits on one hand and by the existence of the traditional factors of economic growth on the other hand.

Robert Bednarzick (2000), in his article "The Role of Entrepreneurship in U.S. and European Job Growth," also argued that entrepreneurship is not only caused by the traditional factors of economic growth. He presented seven main factors that affect entrepreneurship in a certain society, of which six are already defined in the Global Entrepreneurship Monitor study in 1999: The Entrepreneurial Opportunities, the Entrepreneurial Capacity, the Infrastructure, the Demographics, the Level of Education, the Culture, in addition to the seventh important cultural and structural feature identified by Bednarzick which is the shift for capital control (i.e. if capital is controlled chiefly by banks or public markets) (Bednarzick, pp. 14-15). Only the first three factors are considerably influenced by traditional factors of economic growth in a certain nation. The entrepreneurial opportunities would be considerably affected by the presence of pro-market governmental policies. Likewise, the level of education would evidently be associated with the level of knowledge in that nation, and the size of the labor force would be influenced by the population demographics of that nation.

Other factors listed in Bednarzick's article cannot be strongly correlated with the traditional factors of economic growth. Entrepreneurial capacity would be normally perceived as an exogenous variable with uncertain causes (Otani, p. 273). The infrastructure would be mainly affected by government spending and not by market-friendly government policies and regulations, and the degree to which a nation's culture fosters entrepreneurship is most probably affected by sociological

factors. The shift for capital control relies on the general economic structure of a given country. This implies that, despite the fact that the traditional factors of economic growth will impact entrepreneurship in a nation to a certain level, however, they do not have enough influence to explain its rejection from the neoclassical model of economic growth.

R.G. Hubbard (2008) strongly supports this view in his article "Nondestructive Creation: Entrepreneurship and Management Research in the Study of Growth". He concluded that the high economic growth witnessed in the US in the 90's and early 2000's is a direct consequence of increased levels of entrepreneurs and managers at firms having the flexibility to adapt to varying business conditions. He stresses on the fact that high level of economic growth cannot only be caused by high levels of labor, capital and technology existing in the U.S., indicating that several European and Asian countries had high level of technology exceeding that of the U.S. throughout the same period and that productivity in the U.S. remained high despite its decrease in the early 2000's in several other countries.

Based on the assumption that the level of technology in a certain nation relates to the level of knowledge in that nation, Hubbard argument implies that at least three out of the four traditional economic growth factors do not significantly influence entrepreneurship. The analysis of Hubbard's on the U.S. economic growth during this period strongly recommends the inclusion of a measure of entrepreneurship as an independent factor of economic growth. The essential phenomenon of these new theories is the emphasis on change. Change can be translated through innovative activities, in this regard; entry, growth, survival and other forms through which companies and even industries change over time are directly related to innovation.

2.3 Entrepreneurship: New Entry, survival and Exit

The reason for new firms to enter an industry whether they are startups or existing firms diversifying the business activity is mainly embedded in the traditional equilibrium based view that assumes entry to be motivated by abnormal profits. As a result, the growing supply resulting from firms entry will reduces prices and reinstates profits to their long run equilibrium level. Therefore, the equilibrium view is a disciplinary mechanism for firms. Alternative classifications of entry based on innovation and costs of firm growth were introduced and assessed by new theories of industry evolution. A study conducted in 1995 by Audretsch examines the variables affecting the rate of new firm startups. He concluded that the latter are common in industries where small firms earn the greatest share of the industry's innovations. Thus, firms are created to capitalize on distinguished knowledge created outside the industry's leaders. New entrant firms face a greater degree of uncertainty compared to incumbent ones, which is the basis of the theory of firm selection and industry evolution suggested by Jovanovic (1982). He introduced a model in which new firms - referred to as entrepreneurs- confront costs that are random and differs widely across firms. The firm cannot determine its cost function and relative efficiency prior to its entry but rather learns it from its post-entry performance.

Jovanovic considers that entrepreneurs are uncertain about their prospects for success. They enter the industry based on certain expectations of post-entry performance, however, their real ability to run the firm in terms of managerial know-how and viability of the idea underlying the firm cannot be determined unless the firm is already established. As a result, many firms will expand the scale of the business if their ability proved to surpass their expectations while others will exit the industry if their performance was less adequate with the expectations. The Jovanovic's model is a theory of "noisy selection" where proficient entrepreneur will survive and develop while incompetent firms will degenerate and exit the industry; the model is one of the most influential models regarding the growth and survival of the firms, linking innovation, entry, exit and the evolution of the industry.

3. METHODOLOGY

This study is initiated from quantitative and deductive approaches in order to comprehend how entrepreneurship affects economic growth. An unbalanced panel-data analysis was conducted on 86 countries to test a model extended from prior researches. Different panel model techniques were adopted (Fixed effect and Dynamic model) to capture any potential difference in the estimates arising from methods applied.

3.1 The model

The empirical model in this research will be developed starting from this general equation of growth resulting from the contributions of Levine and Renalt (1992) and Levine and Zervos (1993). Levine and Renalt searched for an empirical relationship between economic growth and a number of economic, political, and institutional variables advocated by previous theories and after reviewing most of the literature analyses. They registered 40 cross-sectional studies conducted between 1980 and 1990; each of the studies regresses economic growth against a number of variables over a certain period of time.

They found that over 50 variables significantly explains economic growth and since it is unlikely that all these variables are important for growth, Levine and Renalt & Levine and Zervos suggest a strict test of the robustness of these regressions founded on extreme bound analysis developed by Leamer's in 1983.
The typical methodical framework is based on the following growth regression:

$$Y = B_i I + B_m M + B_2 Z + \mu$$

Where:
Y: The average annual growth rate of GDP per capita (dependent variable)
I: The set of variables or the so-called conditioning variables always included in the regression (Control Variable)
M: The variable of interest
Z: The subset of variables (Independent variables), selected from a pool of variables, which are expected or recognized to be significant explanatory variables to growth.
The selection of Z-variables is built based on either past empirical studies or economic theory.
μ: The random error term indicating the collective unobservable effect of any omitted variables.

As a first step, the regression will be estimated through a time-series-cross-section analysis only with the control variables (I variables), then we run a regression by adding the variable of interest M (Entrepreneurship) in order to determine if the latter is significantly correlated with economic growth. Second, we run separate regressions with all possible combinations of Z-variables. If the coefficient of the M variables is significant and remains of the same sign in all the regressions, then the result is considered to be robust. However, if the coefficient turns insignificant or changes its sign in any regression, then the result is considered to be fragile. Entrepreneurship is not only shaped by institutions but entrepreneurs influence institutions themselves. Such bilateral causal relationship should be tested in this research. Following Audretsch et al., (2006), an interaction variable representing the product of the two variables (Institutions and Entrepreneurship) should be included in the baseline equation; we will add the variable (Ent*Inst) to the regression model. The result is:

$$Y = B_i I + B_m M + B_2 Z + B_3 Inst + B_4 Ent * Inst + \mu$$

Where Inst measures Institutions
Thus, the model will be as follows:

$$Y = B_{0+} B_1 GDP_{it} + B_2 POP_{it} + B_3 CAP_{it} + B_4 EDU_{it} + B_5 ENT_{it} + B_6 LAB_{it} + B_7 RD_{it} + B_8 EXP_{it} + B_9 EXPEND_{it} + B_{10} INST_{it} + B_{11} INTER_{it} + \mu$$

Where:

B_0	represents the intercept
B	represents the coefficient value
Y	represents GDP growth rate in year t in country i.
GDP	represents GDP per capita in year t in country i.
POP	represents population growth in year t in country i.
CAP	represents Gross capital formation (%GDP) in year t in country i.
EDU	represents the Investment in Human Capital measured as Secondary School enrollment in year t in country i.
ENT	represents measure of entrepreneurship in year t in country i.
LAB	represents labor force participation rate (% of total population aged 15-64) in year t in country i.
RD	represents research and development expenditure as % of GDP in year t in country i.
EXP	represents Exports of goods and services (%GDP) in year t in country i.
EXPEND	represents Gross national expenditure in year t in country i.
INST	represents a proxy of Institutions in year t in country i.
INTER	represents the interaction term $ENT_{it} * INST_{it}$

3.2 Data

This study employs unbalanced panel data consisting of 86 developed and developing countries covering annual data for the period 1996-2015 for a total number of 1097 observations. Missing data on one or more variables led to reduce the initial dataset from the potential 1097 observations to an unbalanced panel dataset containing much less observations varying depending on the model.

Countries incorporated in the study presents a representative and illustrative sample because of the wide variety of countries included in this data set and it was chosen based on data availability.

Data for Annual percentage growth rate of GDP per capita, the conditioning variables or control variables (population growth, investment in human capital measured as Gross enrollment in Secondary school ratio and initial level of GDP per capita), and the independent variables (labor force participation rate, gross capital formation, and R& D spending as % of GDP) were collected from the World Bank's online World Development Indicators database. Data for the variable of interest "Entrepreneurship" measured as business density (new businesses registered are the number of new limited liability corporations registered in the calendar year) is obtained from World Development Indicators database; however, when measured as TEA (Total Early Stage Entrepreneurial Activity), data is obtained from the Global Entrepreneurial Monitor (GEM). Data for Institutions measured as distance to frontier is acquired from the World Bank, Doing Business Project; while data for institutions measured as Global Competitiveness Index is retrieved from World Economic Forum Global Competitiveness Index; lastly, data for institutions measured as composite governance index is obtained from the Worldwide Governance Indicators project

3.3 Estimation Techniques

Since the purpose of this study is to examine country-level factors of growth-aspiration entrepreneurial activity, a fixed effect model will be more suitable to estimate the equations by controlling for the time-invariant variables, and establish a country-level analysis that is not affected by unobservable country-specific variations in the model. Consequently, fixed effect estimation will be adopted in this research. A Hausman specification test will verify and confirm the choice of fixed effects model.

On the other hand, Entrepreneurship and growth have a dynamic relationship in which one generates the other; in other words, history matters and should be introduced in estimating the relationship since the lagged dependent variable comprises the effects of the entire time path of the independent variables; therefore, the above models will also be tested using Dynamic panel data method which is done through the inclusion of a lagged dependent variable among the repressors. However, in order to proceed with such method, testing stationarity is required. In case unit root is present in the panel data, the regression results will be spurious since the presence of unit root makes the mean value of the series less representative in addition to the fact that stationarity assumption is implicit in most tests. Data was tested using separate unit root test assuming individual unit root process and panel unit root test yielding higher test powers and stationarity was confirmed for both tests.

4. RESULTS AND ANALYSIS

As presented earlier, this study investigates the effect of entrepreneurship on economic growth conditioned by institutional quality. There are two measures of entrepreneurship tested separately while several definitions and proxies of institutions were tested. So the data is being divided into three categories (Baseline regression with business density as measure of entrepreneurship, Baseline with Total Early Stage Entrepreneurial Activity (TEA) as measure of entrepreneurship, and the institutional variables). The collected data will be studied from different perspectives including descriptive analysis, graphical comparisons and regression models.

4.1 Descriptive Statistics and Correlation

The descriptive statistics provides a summary of the sample and observations in the panel data; it presents the minimum, maximum, mean and standard deviation of each variable in the model. Since the research uses a panel unbalanced data, missing values were skipped and the sample size was adjusted accordingly; thus, presenting no effect on the results. Table 1 and table 2 show the summary statistics of the endogenous variable, the variables that are traditionally linked to economic growth and the entrepreneurship variables measured by Business density and TEA. All variables show substantial inequality and high variability suitable for exploratory examinations; such variations arise from the differences in the development of the countries incorporated in the study. The differences in New Business density among countries are pronounced as shown in the table 1. There are, on average, 4 new registered businesses for every 1,000 active individuals (age 15-64). Business density ranges from 0.0 in Pakistan, Japan, Paraguay and 39 in Cyprus, 32 in Hong Kong, and 21 in New Zealand.

Total Early Stage Entrepreneurial Activity (TEA) refers to the percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business. The worldwide average is 9.96%. The difference between countries is statistically significant. Rates are as low as 1.48% in Japan, 1.63% in France, and 1.88% in Hungary and as high as 40.3% in Peru, 39.9% in Zambia and Nigeria, 38.6% in Bolivia and Senegal.

Table 1: Summary Statistics (Entrepreneurship measured as Business Density), using 527 observations

Variable	Min	Max	Mean	S.D.
Y	-14.6	14.1	1.95	3.83
GDP	1,641	102,517	25,938	16,207
POP	-2.26	2.89	0.517	0.831
CAP	12.3	45.8	23.5	5.59
EDU	34.6	164.	99.8	16.7
LAB	30.1	90.6	59.8	7.98
RD	0.0305	4.28	1.19	0.961
EXP	10.6	223.	52.1	36.8
EXPEND	64.8	155.	102.	12.2
Business Density	0.0242	39.3	4.72	5.59

Done by author. Data Source: World Bank's online World Development Indicators

Table 2: Summary Statistics (Entrepreneurship measured as TEA), using 289 observations

Variable	Min	Max	Mean	S.D.
Y	-11.9	13.6	2.32	3.29
GDP	2,084	57,850	23,761	11,853
POP	-1.67	2.53	0.610	0.646
CAP	12.0	47.7	23.8	6.14
EDU	36.6	161.	98.0	16.0
Lab	42.0	83.1	60.3	7.32
RD	0.0435	4.23	1.29	0.946
EXP	9.04	186.	38.7	26.6
EXPEND	82.8	125.	99.7	6.42
TEA	1.48	40.3	9.96	6.07

Done by author. Data Source: World Bank's online World Development Indicators, Global Entrepreneurial Monitor

Table 3 summarizes the descriptive statistics for the institutional variables. Measures of Governance (Voice & Accountability, Political Stability, Gov. Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption) show negative signs since the value of these measures range from -2.5 to 2.5.

Table 3: Summary Statistics (Institutional variables), using N observations

Variable	N	Min	Max	Mean	S.D.
DTF	140	39.6	89.2	67.7	9.58
GCI	245	3.34	5.50	4.37	0.534
Voice & Accountability	288	-1.66	1.61	0.356	0.747
Political Stability	288	-2.81	1.48	0.0601	0.823
Gov. Effectiveness	288	-1.13	1.91	0.336	0.814
Regulatory Quality	288	-1.24	2.19	0.462	0.773
Rule of Law	288	-1.33	1.90	0.202	0.887
Control of Corruption	288	-1.32	2.34	0.160	0.939

Done by author. Data Source: World Bank, Doing Business Project, Global Entrepreneurial Monitor, World Economic Forum, Worldwide Governance Indicators project

The descriptive statistics of correlation between the dependent and the independent variables are presented in the subsequent tables. Since there are two measures of entrepreneurship tested with several institutional variables; the following tables should be divided into two main categories. Table 4 shows the correlation between variables, Business Density as a measure of Entrepreneurship and institutional variables while Table 5 will present TEA as a measure of Entrepreneurship.

Table 4: **Correlation Coefficients (Model With Business Density)**

Correlation coefficients (Baseline Line Regression)
5% critical value (two-tailed) = 0.0756 for n = 672

Y	GDP	POP	CAP	EDU	ENT	Lab	RD	EXP	EXPEND	
1.000	-0.203	-0.039	0.368	0.177	0.020	-0.065	-0.207	0.048	-0.163	Y
	1.000	0.143	-0.167	0.523	0.403	0.216	0.616	0.519	-0.665	GDP
		1.000	-0.038	-0.159	0.036	0.132	-0.076	0.032	-0.120	POP
			1.000	-0.058	-0.040	0.087	-0.063	-0.013	0.309	CAP
				1.000	0.149	0.159	0.498	0.112	-0.317	EDU
					1.000	0.141	0.020	0.542	-0.194	ENT
						1.000	0.157	-0.008	-0.329	LAB
							1.000	0.044	-0.377	RD
								1.000	-0.402	EXP
									1.000	EXPEND

Correlation coefficients (Regression with business Density and DTF)
5% critical value (two-tailed) = 0.1303 for n = 227

Y	GDP	POP	CAP	EDU	ENT	LAB	RD	EXP	EXPEND	DTF	INTER	
1.000	-0.177	-0.089	0.336	-0.179	0.015	-0.041	-0.143	0.058	-0.178	-0.059	0.019	Y
	1.000	-0.024	-0.160	0.475	0.635	0.127	0.598	0.542	-0.596	0.698	0.645	GDP
		1.000	0.083	-0.263	-0.047	0.267	-0.114	-0.076	0.066	0.037	-0.017	POP
			1.000	-0.144	-0.123	0.265	-0.021	0.157	0.273	0.021	-0.113	CAP
				1.000	0.152	0.255	0.349	0.050	-0.357	0.247	0.143	EDU
					1.000	-0.011	0.052	0.774	-0.207	0.608	0.996	ENT
						1.000	0.055	0.064	-0.297	0.163	0.016	LAB
							1.000	0.089	-0.403	0.493	0.064	RD
								1.000	-0.207	0.458	0.789	EXP
									1.000	-0.354	-0.201	EXPEND
										1.000	0.622	DTF
											1.000	INTER

Correlation coefficients (Regression with business Density and GCI)
5% critical value (two-tailed) = 0.0998 for n = 386

Y	GDP	POP	CAP	EDU	ENT	LAB	RD	EXP	EXPEND	GCI	INTER	
1.000	-0.158	-0.054	0.334	-0.145	0.027	-0.023	-0.157	0.054	-0.198	0.104	-0.016	Y
	1.000	-0.094	-0.124	0.517	0.554	0.199	0.640	0.498	-0.558	0.847	0.591	GDP
		1.000	-0.077	-0.290	-0.060	0.188	-0.155	-0.077	0.034	-0.042	-0.028	POP
			1.000	-0.078	-0.034	0.070	-0.008	0.124	0.328	0.061	-0.056	CAP
				1.000	0.169	0.156	0.390	0.096	-0.250	0.456	0.169	EDU
					1.000	0.098	0.044	0.674	-0.151	0.429	0.992	ENT
						1.000	0.131	0.055	-0.379	0.257	0.110	LAB
							1.000	0.032	-0.363	0.655	0.065	RD
								1.000	-0.225	0.424	0.714	EXP
									1.000	-0.549	-0.172	EXPEND
										1.000	0.478	GCI
											1.000	INTER

Correlation coefficients (Regression with business Density and control of corruption) 5% critical value (two-tailed) = 0.0926 for n = 449												
Y	GDP	POP	CAP	EDU	ENT	LAB	RD	EXP	EXPEND	GOV	INTER	
1.000	-0.182	-0.007	0.346	-0.141	0.008	-0.004	-0.166	0.059	-0.168	0.074	-0.033	Y
	1.000	-0.065	-0.141	0.509	0.544	0.208	0.648	0.478	-0.559	0.787	0.653	GDP
		1.000	-0.141	-0.292	-0.004	0.161	-0.135	-0.084	0.016	-0.003	0.171	POP
			1.000	-0.017	-0.058	0.136	-0.013	0.133	0.323	-0.176	-0.136	CAP
				1.000	0.149	0.159	0.394	0.101	-0.243	0.473	0.168	EDU
					1.000	0.093	0.058	0.626	-0.150	0.517	0.888	ENT
						1.000	0.128	0.081	-0.393	0.185	0.202	LAB
							1.000	0.023	-0.345	0.495	0.154	RD
								1.000	-0.227	0.336	0.658	EXP
									1.000	-0.440	-0.205	EXPEND
										1.000	0.663	INST
											1.000	INTER

Done by author. Data Source: World Bank's online World Development Indicators, World Bank, Doing Business Project, World Economic Forum, Worldwide Governance Indicators project

The correlation determines the strength and direction of a linear relationship between two variables. Since all included aspects of institutions are associated with entrepreneurial activity, some variables stand out having a degree of correlation.

Table 5: Correlation Coefficients (Model With TEA)

Correlation coefficients (Baseline Line Regression with TEA) 5% critical value (two-tailed) = 0.0732 for n = 718										
Y	GDP	POP	CAP	EDU	TEA	LAB	RD	EXP	EXPEND	
1.000	-0.311	-0.015	0.478	-0.206	0.198	0.199	-0.167	0.049	0.067	Y
	1.000	-0.068	-0.200	0.464	-0.356	0.095	0.694	0.181	-0.197	GDP
		1.000	-0.110	-0.171	0.405	0.279	-0.132	-0.175	-0.091	POP
			1.000	-0.211	0.119	0.131	0.043	0.113	0.124	CAP
				1.000	-0.214	-0.043	0.350	0.166	-0.224	EDU
					1.000	0.422	-0.392	-0.172	0.008	TEA
						1.000	0.207	-0.083	-0.150	LAB
							1.000	-0.073	-0.154	RD
								1.000	-0.383	EXP
									1.0000	EXPEND

Correlation coefficients (Baseline Line Regression with TEA and DTF) 5% critical value (two-tailed) = 0.1420 for n = 191												
Y	GDP	POP	CAP	EDU	TEA	LAB	RD	EXP	EXPEND	DTF	INTER	
1.000	-0.310	0.142	0.420	-0.235	0.328	0.225	-0.213	0.009	0.125	-0.054	0.300	Y
	1.000	-0.134	-0.124	0.455	-0.383	0.039	0.740	0.155	-0.408	0.620	-0.261	GDP
		1.000	-0.073	-0.314	0.411	0.249	-0.135	-0.357	0.049	-0.148	0.370	POP
			1.000	-0.311	0.151	0.120	0.043	0.271	0.174	0.145	0.184	CAP

			1.000	-0.083	0.200	0.282	0.082	-0.458	0.218	-0.038	EDU
				1.000	0.478	-0.476	-0.264	0.080	-0.217	0.977	TEA
					1.000	0.028	-0.025	-0.077	0.312	0.529	Lab
						1.000	0.229	-0.385	0.642	-0.369	RD
							1.000	-0.431	0.247	-0.210	EXP
								1.000	-0.155	0.045	EXPEND
									1.000	-0.018	DTF
										1.000	INTER

Correlation coefficients (Baseline Line Regression with TEA and GCI)
5% critical value (two-tailed) = 0.1035 for n = 359

Y	GDP	POP	CAP	EDU	TEA	LAB	RD	EXP	EXPEND	GCI	INTER	
1.000	-0.326	0.018	0.534	-0.195	0.286	0.230	-0.170	-0.014	0.101	-0.128	0.274	Y
	1.000	-0.082	-0.259	0.454	-0.412	0.065	0.712	0.174	-0.270	0.808	-0.274	GDP
		1.000	-0.141	-0.210	0.442	0.267	-0.135	-0.189	-0.084	0.050	0.443	Pop
			1.000	-0.188	0.167	0.193	0.048	0.113	0.107	-0.002	0.191	CAP
				1.000	-0.161	0.054	0.289	0.131	-0.276	0.344	-0.115	EDU
					1.000	0.424	-0.430	-0.191	0.018	-0.211	0.981	TEA
						1.000	0.144	-0.090	-0.249	0.324	0.484	LAB
							1.000	-0.016	-0.233	0.748	-0.308	RD
								1.000	-0.351	0.153	-0.162	EXP
									1.000	-0.306	-0.033	EXPEND
										1.000	-0.036	GCI
											1.000	INTER

Correlation coefficients (Baseline Line Regression with TEA and Governance)
5% critical value (two-tailed) = 0.0765 for n = 657

Y	GDP	POP	CAP	EDU	TEA	LAB	RD	EXP	EXPEND	GOV	INTER	
1.000	-0.320	-0.014	0.478	-0.218	0.201	0.204	-0.167	0.040	0.073	-0.170	-0.132	Y
	1.000	-0.059	-0.207	0.458	-0.363	0.087	0.701	0.177	-0.193	0.724	0.599	GDP
		1.000	-0.113	-0.144	0.407	0.280	-0.125	-0.183	-0.083	-0.046	0.001	POP
			1.000	-0.223	0.116	0.133	0.039	0.114	0.126	-0.233	-0.215	CAP
				1.000	-0.208	-0.035	0.340	0.144	-0.220	0.496	0.358	EDU
					1.000	0.425	-0.395	-0.185	0.009	-0.253	-0.058	TEA

			1.000	0.205	-0.080	-0.155	0.154	0.178	LAB
				1.000	-0.069	-0.149	0.552	0.372	RD
					1.000	-0.372	0.217	0.109	EXP
						1.000	-0.107	-0.064	EXPEND
							1.000	0.846	GOV
								1.000	INTER

Done by author. Data Source: World Bank's online World Development Indicators, Global Entrepreneurial Monitor, World Bank, Doing Business Project, World Economic Forum, Worldwide Governance Indicators project

4.2 Graphical Presentation

The following section presents a framework of the level of entrepreneurial activity and the across countries in the study sample. A graphical analysis is presented below to reflect the variation in the level of entrepreneurial activity in countries along with economic growth in the country. The comparison is based on averaged values for each country in the panel from 2001-2015. Figure 1 shows the average ranking of countries giving the level of their entrepreneurial activity (measured as business density) from high to low, and highlights the level of economic growth compared to business density for countries in the study sample. The association shows that business density rate and economic growth are not very closely related. In fact, several countries have fewer entrepreneurs but high economic growth (Czech Republic, Morocco, Argentina, and Uzbekistan).

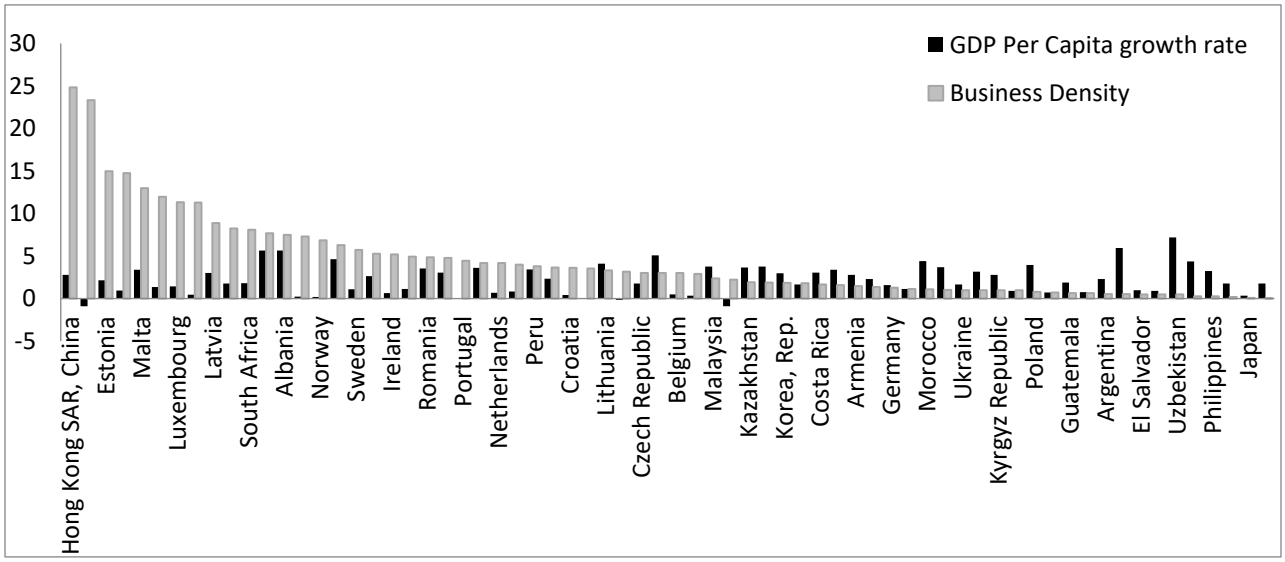

Figure 1: Business Density and Economic Growth

Ranking the entrepreneurial activity compared to economic growth according to the stage of development of a country i.e. developed and developing countries (Figure 2) demonstrates that developing countries are generally more involved in entrepreneurial activity compared to developed countries.

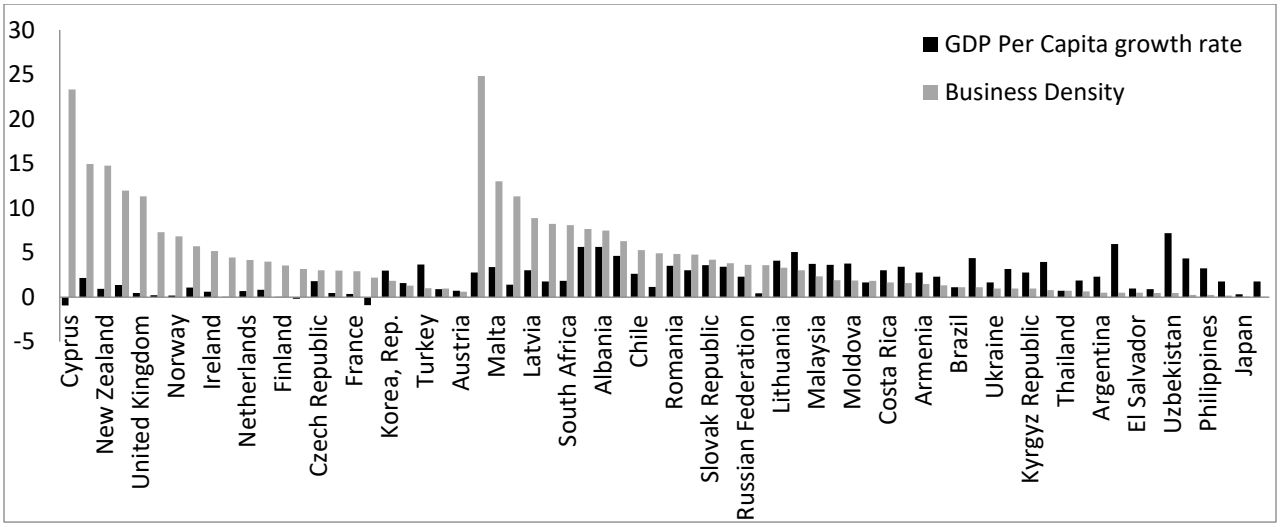

Figure 2: Business Density and Economic Growth (Ranking by Stage of Development)

Similarly to Business Density, Total Early Stage Entrepreneurial Activity and economic growth are not closely related (figure 3 and Figure 4). In fact, several countries have more entrepreneurs but lower economic growth (Thailand, Mexico, United States, and Canada).

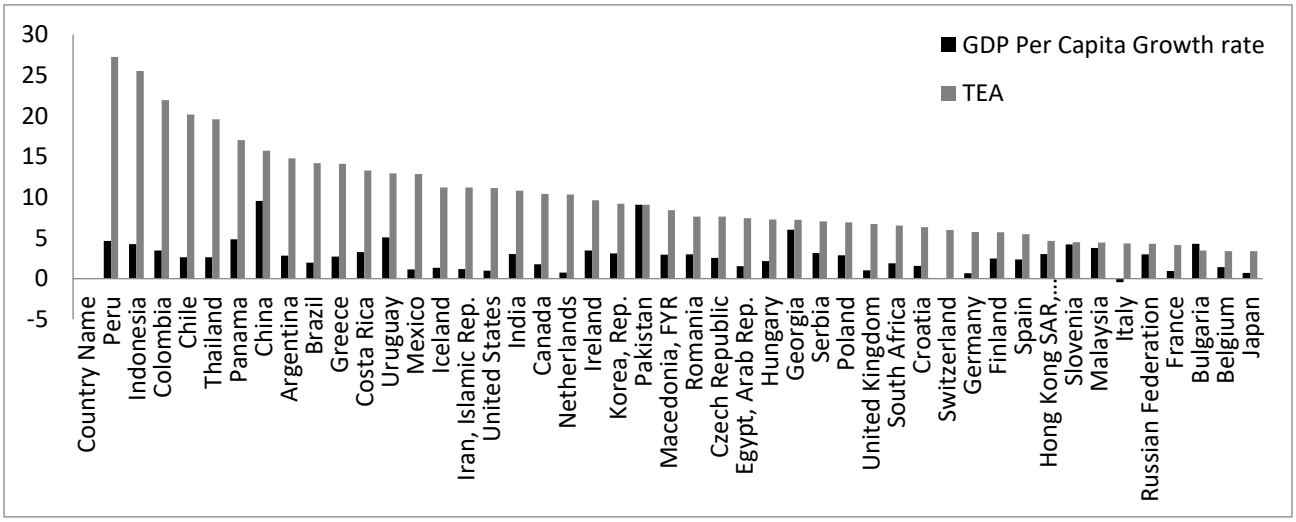

Figure 3: TEA and Economic Growth

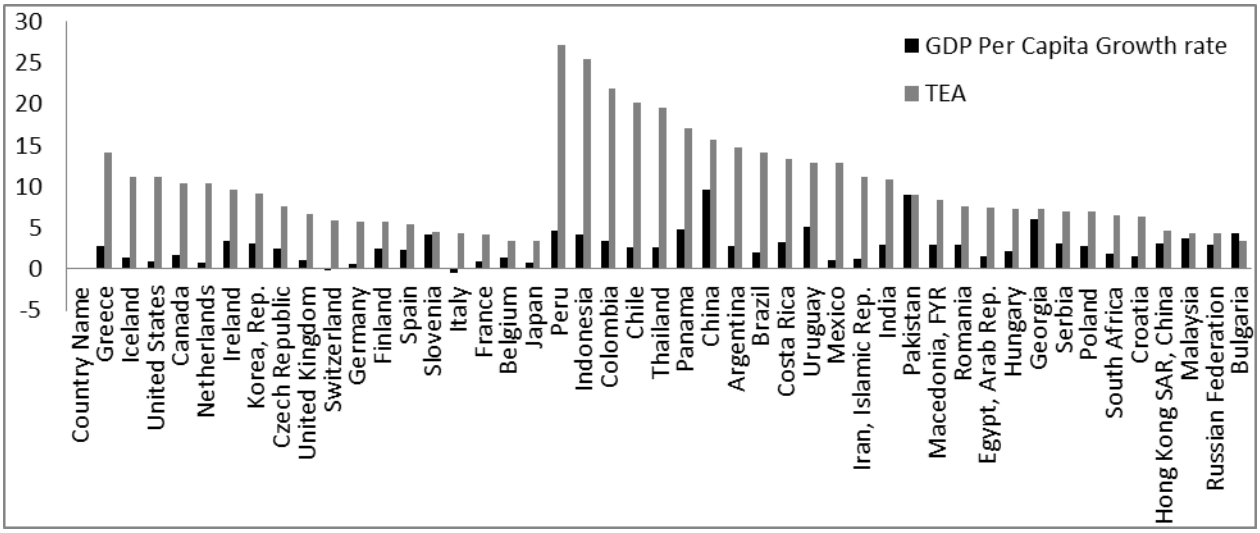

Figure 4: TEA and Economic Growth (Ranking by stage of development)

Despite that the result might be interesting; however, it is in line with several previous studies and discussions. The GEM report categorizes nations as factor-driven, efficiency driven and innovation-driven and elucidates that entrepreneurship is more prevalent in less developed countries. Several researchers have interpreted these findings through the Push (dissatisfaction with available opportunities) and pull (desire for better income or higher status) explanation (Wennekers et al, 2007). Thus, entrepreneurs in developing countries don't choose such career path willingly but they are driven by the lack of career opportunities which also suggest that the effects of entrepreneurial activity are less positive than that in the developed countries and are less favorable for economic growth.

4.3 Panel Data Analysis

Panel data estimation methods have the advantage of allowing us to control for individual heterogeneity; in other words, each country has specific characteristics (unobservable country-specific effects) that we are not capable of measuring it with the set of variables adopted in the empirical model. These unobservable country-specific effects can be either random or fixed. The selection between a random and a fixed effects model is determined by the nature of the data (Baltagi 2001) and supported by the Hausman that suggested adopting the fixed-effects specifications for all models which is in line with the majority of the empirical studies that tested the effect of entrepreneurial factors on economic growth. In order to avoid spurious relationships between the variables, the variables used in the study should be stationary. There are several types of unit root tests that differ generally in the assumptions underlying the nature of the hypotheses tested where certain test for a common unit root process (Levine Lin test) and others for individual unit root process (Im Pesaran and Shin test). All the economic variables previously adopted in the models and previously presented were tested for stationarity using the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979). However, since we have a panel dataset, the ADF Panel Unit Root test was applied instead of the usual ADF test. All series have shown to be stationary.

4.3.1 Empirical Results : Business Density

First, results for the baseline regression will be presented and discussed, followed by the results on the extended model embedding the entrepreneurial variable and the interaction terms with several institutional variables.

4.3.1.1 Baseline Regression

The results obtained from the baseline regression will be presented first followed by the extensions of the baseline regression.

Table 6: Results of Baseline Regression

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.232	0.049	<0.0001***
Constant	16.329	7.192	0.0237**	0.251	0.198	0.206
GDP	−1.213e-04	6.71e-05	0.0713*	0.00006	0.0002	0.0685*
POP	−1.561	0.514	0.0025***	−2.290	0.637	0.0003***
CAP	0.794	0.065	<0.0001***	1.329	0.129	<0.0001***
EDU	-0.0192	0.026	0.4554	−0.009	0.028	0.735
ENT	0.093	0.081	0.2552	0.245	0.156	0.117
LAB	−0.211	0.061	0.0006***	−0.353	0.191	0.065*
RD	−0.842	0.866	0.3315	−2.681	2.113	0.204
EXP	0.171	0.029	<0.0001***	0.200	0.055	0.0003***
EXPEND	−0.263	0.058	<0.0001***	−0.369	0.116	0.0015***

Note: p< 0.1, **p< 0.05; *** p<0.01*

By comparing the fixed and the dynamic model (Table 6); the coefficients differs significantly, however, they are in the same direction. The lagged GDP per capita growth rate variable in the dynamic model is strongly significant at 1% level. The magnitude of the coefficient is in line with prior studies (Wong et al., 2005) arguing that economic fluctuations have a negative impact on economic growth. The GDP per capita variable values have small coefficients; and both are significant at 10% level with p values of 0.0713 and 0.0685 respectively for the fixed and dynamic estimators. The coefficient of the GDP is negative confirming the catch up effect, however, turns positive in the dynamic model. POP (population growth) variable values are also negative and significant with p values of 0.0025 and 0.0003 respectively for both estimators. Gross capital formation variable values are positive and significant with p values of <0.00001 for both estimators. EDU (Secondary school enrollment) variable is not significant, however both values are negative. Labor force participation rate has negative coefficients for both estimator and significant at 1% for the fixed effect model and 10% level for the dynamic model. Research and Development variable values are negative and insignificant for both estimators. The Export as a percent of GDP variable values is positively signed and significant for both estimators at 1% level.Gross national expenditure variable is negatively signed and significant for both estimators.

Entrepreneurship variable is not significant; however the magnitude of both coefficients are positive and in the expected direction. This result is consistent with previous empirical outcomes reported by Audretsch et al. (2006) and opposes with the significant outcomes reported by Wong et al. (2005). The R-square value registered 46% which implies that 46% of the variation in dependent variable is explained by the independent variables existing in the model. The value of the R-square improves after adding the institutional variables and interaction term to reach 60% knowing that the R-square value in previous studies such as Wong et al. (2005), or Feki and Mnif (2016) is around 50%.

Adjusted R-square registers 37% indicating the fact that the percentage of variation is clarified by the independent variables that significantly affect the dependent variable. The overall regression has strong significance with Prob (F-statistic)=0.000. However, it is to note that in panel data analysis the R-square is note very explanatory. In general, R square is low in cross sectional data compared to time series data because of the heterogeneity of the cross sections. If the data is time dominant, R-square should be higher compared to the case when the data is cross section dominant which is the case in this research. The Durbin Watson statistics values are positive registering 1.8 indicating that there is no statistical evidence that the error terms are positively auto correlated. To control for persistency between entrepreneurship and economic growth, we include a lagged entrepreneurship variable. Moreover, as discussed by Wennekers et al. (2005), the relationship between entrepreneurship and economic growth might be non-linear. Thus, the results of the regressions after including a lagged and squared entrepreneurship are presented in table 7 below that do not include the results from all independent and control variables;

Full regression output can be found in appendix A for squared entrepreneurship (table 27, table 28) and lagged entrepreneurship (table 29, table 30).

Table 7: Results of Non Linear and Lagged Effect of Baseline Regression

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
ENT	0.093	0.081	0.2552	0.245	0.156	0.117
ENT^2	0.0004	0.002	0.819	0.002	0.003	0.382
ENT(-2)	0.330	0.086	0.0002***	0.440	0.119	0.0002***

Note: p< 0.1, **p< 0.05; *** p<0.01*

As per the above results, the squared entrepreneurship variable does not demonstrate a nonlinear relationship between entrepreneurial activity and economic growth. On the other side, there exists a time delay for entrepreneurial activity to translate into economic growth. The lagged business density is significant at 1% level for both model specifications. In addition, the lagged variable has a larger effect on economic growth

4.3.1.2 Distance to frontier

Table 8: Results of the Regression with Distance to frontier (DTF)

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.085	0.252	0.737
Constant	44.01	14.59	0.0046***	−0.833	0.532	0.117
GDP	−0.00016	0.00018	0.382	0.0016	0.0004	0.0003***
POP	−0.960	1.095	0.387	0.107	1.385	0.938
CAP	0.555	0.181	0.004***	0.441	0.147	0.003***
EDU	−0.036	0.013	0.007***	−0.056	0.051	0.273
ENT	−0.799	0.530	0.140	−1.713	0.803	0.033**
LAB	−0.407	0.190	0.039**	−0.325	0.377	0.389
RD	−0.286	1.099	0.796	−5.914	4.327	0.172
EXP	0.0626	0.077	0.422	0.132	0.117	0.261
EXPEND	−0.202	0.125	0.115	−0.214	0.102	0.036**
INST	−0.156	0.082	0.066*	−0.125	0.134	0.353
INTER	0.008	0.007	0.27	0.017	0.0076	0.026**

Note: p< 0.1, **p< 0.05; *** p<0.01*

In order to explore the effect of entrepreneurship on economic growth conditioned by institutional quality; an interaction term was created following Audretsch et al., (2006). Table 8 reports the findings of the empirical model after adding the institutional factor and the interaction term between institutions and entrepreneurship (i.e. business density and distance to frontier) in the baseline model. Compared to the baseline regression, the variables have maintained their coefficient signs except for entrepreneurship that turned negative. In the fixed effect model, GDP, Population growth, exports and Gross national expenditure are no longer significant. Despite that entrepreneurship remains insignificant; however, the institutional factor (Distance to frontier) has a negative and significant effect on economic growth at 10% level.

After adding the one-year lag of economic growth into the regression, the results have changed. GDP and gross national expenditure are significant but most importantly, entrepreneurship and interaction term have significant effect on economic growth at 5% level. Institutions have negative and insignificant effect on economic growth. Running the same model using 2 year-lagged entrepreneurship will yield similar results in terms of the significance and direction if the coefficients. In order to capture the long run effect and if we consider three periods lagged, the results are more indicative and summarized as follows:

Table 9: Results of the Dynamic Regression with Distance to frontier (3-year Lagged)

	Dynamic Model (1-year lag)			Dynamic Model (3-year lag)		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)	−0.085	0.252	0.737	−0.739	0.114	<0.0001***
GDPG(-2)				−0.261	0.118	0.026**
GDPG(-3)				−0.281	0.072	<0.0001***
Constant	−0.833	0.532	0.117	0.465	0.681	0.495
GDP	0.0016	0.0004	0.0003***	0.0016	0.0005	0.0009***
POP	0.107	1.385	0.938	1.555	0.447	0.0005***
CAP	0.441	0.147	0.003***	0.832	0.118	<0.0001***
EDU	−0.056	0.051	0.273	−0.227	0.099	0.022**
ENT	−1.713	0.803	0.033**	2.230	0.575	0.0001***
LAB	−0.325	0.377	0.389	−0.936	0.262	0.0004***
RD	−5.914	4.327	0.172	−2.712	5.079	0.593
EXP	0.132	0.117	0.261	0.259	0.133	0.052*
EXPEND	−0.214	0.102	0.036**	0.275	0.148	0.063*
INST	−0.125	0.134	0.353	0.164	0.141	0.0243**
INTER	0.017	0.0076	0.026**	0.018	0.005	0.0009***

Note: p< 0.1, **p< 0.05; *** p<0.01*

As per table 9, Entrepreneurship, institutions and the interaction term have positive and highly significant effect on economic growth; thus, the impact of entrepreneurship and institutions on growth is mostly limited and sometimes insignificant in short-term, but it is positive and significant in the long-term; consequently, the benefits of the entrepreneurial activities and the effect of institutional factors namely Distance to frontier in long-term compensate for the temporary losses in short-term.

4.3.1.3 Global Competitiveness Index

Table 10: Results of the Dynamic Regression with Global Competitiveness Index (GCI)

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.293	0.064	<0.0001***
Constant	−12.051	16.265	0.460	−0.077	0.312	0.804
GDP	−0.00016	0.00015	0.282	0.001	0.0002	<0.0001***
POP	−0.162	0.973	0.868	−2.341	1.134	0.039**
CAP	0.673	0.107	<0.0001***	1.008	0.131	<0.0001***
EDU	−0.044	0.046	0.340	−0.094	0.043	0.030**
ENT	3.665	1.366	0.008***	4.384	1.966	0.026**
LAB	−0.067	0.095	0.481	−0.315	0.108	0.0035***
RD	−2.559	1.527	0.095*	−6.814	1.745	<0.0001***
EXP	0.214	0.051	<0.0001***	0.260	0.055	<0.0001***
EXPEND	−0.187	0.088	0.034**	−0.197	0.075	0.0092***
INST	3.111	2.547	0.223	3.221	3.552	0.365
INTER	−0.716	0.266	0.008***	−0.935	0.379	0.014**

Note: p< 0.1, **p< 0.05; *** p<0.01*

Similar to the previous analysis, same tests models been estimated and the results will be correspondingly analyzed. According to table 10, in the fixed effect model, gross capital formation and exports have a positive and significant effect on economic growth at 1% level while R&D and gross national expenditure has a negative and significant effect on economic growth at 10% and 5% level respectively. Institutional variable has a positive coefficient, however, insignificant. Entrepreneurship has a high positive coefficient significant at the 1% level while the interaction term is also significant at

the 1% level; however, has a negative effect on economic growth. After adding the lagged GDP per capita growth rate, all variables become highly significant except for the institutional variable. Similar to the fixed effect model, entrepreneurship has a positive effect on economic growth while the interaction term has a negative effect.

We estimated a dynamic model including the Global Competitiveness Index only compared to the model including Global Competitiveness Index and the interaction term (GCI times Entrepreneurship). Before the addition of the interaction term, in both fixed model effect and dynamic model, new business density was not significant (results in Appendix B: Table 31 and table 32). The addition of the interaction term increased the adjusted R^2, and despite having a negative coefficient, business density and the interaction term turned significant at 5% level in both models. This suggests that the relation between entrepreneurship and economic growth is affected by the presence of institutions measured by Global Competitiveness Index. The Global Competitiveness Index has been historically proven to capture factors that are deterministic for economic growth. In a sample of 75 countries, McArthur and Sachs (2002) demonstrate that global competitiveness index is positively related to economic growth for the period of 1992-2000 while controlling for the catch-up effect measured by initial income level. To note that a 2-year lagged entrepreneurship variable generate similar results, however, the coefficients differ.

4.3.1.4 Dimensions of Composite Governance Index

Table 10: Results of the Regression with Voice accountability

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.236	0.076	0.0019***
Constant	17.445	9.733	0.080*	−0.314	0.362	0.386
GDP	−0.00018	0.0001	0.167	0.0006	0.0002	0.020**
POP	−0.820	0.904	0.369	−1.877	1.239	0.130
CAP	0.642	0.091	<0.0001***	0.981	0.194	<0.0001***
EDU	−0.019	0.045	0.668	−0.003	0.0426	0.950
ENT	0.339	0.344	0.330	0.769	0.452	0.089*
LAB	−0.163	0.071	0.026**	−0.201	0.150	0.179
RD	−1.502	1.362	0.276	−7.462	2.346	0.0015***
EXP	0.152	0.045	0.0017*	0.180	0.077	0.020**
EXPEND	−0.215	0.078	0.0089*	−0.180	0.129	0.163
INST	2.807	2.437	0.256	4.841	5.628	0.390
INTER	−0.257	0.323	0.431	−0.513	0.408	0.208

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 11: Results of the Regression with Political Stability

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.248	0.082	0.003***
Constant	18.70	9.623	0.053*	−0.190	0.376	0.613
GDP	−0.00016	0.000	0.203	0.006	0.0002	0.036**
POP	−0.711	0.938	0.449	−2.081	1.183	0.079*
CAP	0.633	0.094	<0.0001***	1.022	0.184	<0.0001***
EDU	−0.031	0.044	0.487	−0.033	0.043	0.450
ENT	0.220	0.240	0.360	0.333	0.345	0.336
LAB	−0.166	0.072	0.021**	−0.214	0.175	0.222
RD	−1.732	1.356	0.203	−8.148	2.549	0.001***
EXP	0.154	0.045	0.0007***	0.172	0.069	0.013**
EXPEND	−0.205	0.079	0.0097***	−0.225	0.136	0.097*
INST	0.309	1.211	0.7987	2.682	1.489	0.072*
INTER	−0.132	0.238	0.5799	−0.019	0.294	0.949

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 12: Results of the Regression with Government Effectiveness

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.280	0.072	0.0001***
Constant	15.785	9.615	0.102	−0.437	0.304	0.151
GDP	−0.00014	0.000	0.268	0.001	0.000	0.011**
POP	−0.339	0.932	0.716	−1.565	1.169	0.181
CAP	0.635	0.090	<0.0001***	0.979	0.158	<0.0001***
EDU	−0.024	0.043	0.579	-0.010	0.045	0.825
ENT	0.790	0.322	0.015**	1.254	0.484	0.009***
LAB	−0.192	0.071	0.007***	−0.236	0.134	0.078*
RD	−2.063	1.340	0.125	−6.675	2.678	0.013**
EXP	0.162	0.045	0.000***	0.182	0.067	0.006***
EXPEND	−0.196	0.078	0.013**	−0.133	0.111	0.229
INST	3.891	2.025	0.056*	9.676	2.981	0.001***
INTER	−0.494	0.202	0.015**	−0.798	0.373	0.032**

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 13: Results of the Regression with Regulatory Quality

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.242	0.078	0.002***
Constant	16.108	10.040	0.110	−0.1918	0.351	0.586
GDP	−0.0001	0.000	0.347	0.001	0.000	0.045**
POP	−0.652	0.912	0.475	−2.073	1.049	0.048**
CAP	0.619	0.093	<0.0001***	0.992	0.172	<0.0001***
EDU	−0.026	0.044	0.548	−0.014	0.038	0.717
ENT	0.523	0.352	0.139	0.841	0.488	0.085*
LAB	−0.174	0.071	0.015**	−0.244	0.165	0.139
RD	−2.223	1.407	0.116	−8.208	2.344	0.001***
EXP	0.159	0.046	0.001***	0.186	0.071	0.009***
EXPEND	−0.191	0.081	0.020**	−0.173	0.125	0.168
INST	1.193	2.361	0.614	7.127	5.189	0.170
INTER	−0.272	0.213	0.201	−0.370	0.338	0.274

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 14: Results of the Regression with Rule of Law

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDP (-1)				−0.250	0.080	0.002***
Constant	17.087	9.584	0.076*	−0.350	0.341	0.304
GDP	−0.00009	0.000	0.464	0.001	0.000	0.007***
POP	−0.421	0.922	0.648	−1.789	1.234	0.147
CAP	0.622	0.091	<0.0001***	0.952	0.179	<0.0001***
EDU	−0.029	0.044	0.502	−0.020	0.039	0.609
ENT	0.572	0.293	0.052*	0.891	0.472	0.059*
LAB	−0.177	0.071	0.013**	−0.220	0.148	0.138
RD	−2.082	1.358	0.126	−7.606	2.323	0.001***
EXP	0.150	0.045	0.001***	0.171	0.074	0.022**
EXPEND	−0.197	0.078	0.012**	−0.169	0.124	0.174

INST	0.021	2.559	0.993	2.793	5.314	0.599
INTER	−0.327	0.180	0.071*	−0.450	0.274	0.101

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 15: Results of the Regression with Control of corruption

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.517	0.069	<0.0001***
Constant	16.910	9.766	0.085*	0.504	0.383	0.188
GDP	−0.0001	0.000	0.209	0.001	0.000	0.028**
POP	−0.479	0.936	0.609	−2.139	1.057	0.043**
CAP	0.626	0.092	<0.0001***	0.723	0.163	<0.0001***
EDU	−0.025	0.044	0.573	−0.024	0.037	0.514
ENT	0.490	0.280	0.081*	1.389	0.430	0.001***
LAB	−0.169	0.071	0.018**	−0.271	0.320	0.396
RD	−1.758	1.345	0.193	−7.579	2.459	0.002***
EXP	0.156	0.046	0.001***	0.199	0.070	0.004***
EXPEND	−0.201	0.079	0.011**	−0.017	0.144	0.905
INST	2.848	1.952	0.146	1.760	2.720	0.518
INTER	−0.299	0.177	0.093*	0.463	0.231	0.045**

Note: p< 0.1, **p< 0.05; *** p<0.01*

Similar to Table 9, the entrepreneurial activity variable appears to be in line with the theoretical hypothesis where entrepreneurship is positively associated with economic growth (table 10 to table 15); however; the magnitude of the coefficient differs among the dimensions of governance index and so their significance. In the fixed effect model, entrepreneurship appears to be significant at 5% level when considering government effectiveness variable (Table 12) while the level of significance decreases to 10% level when considering rule of law and control of corruption ((Table 14 and Table 15). Among the institutional variables, only government effectiveness appears to be significant at 1% level. As for the interaction term, according to the theory, entrepreneurial effect on economic growth should be conducted through institutions; however, the estimated results reflects the fact that entrepreneurship conditional on institutions has a negative on economic growth. The interaction term between entrepreneurship (measured by business density) and government effectiveness is significant at 5% level while interaction terms between entrepreneurship and both rule of law and control of corruption are significant at the 10% level.

When considering lagged value of economic growth as endogenous variable (Dynamic model); results are similar despite the difference in the magnitude and significance of the variables. Entrepreneurship is significant at 1% level when estimating the model by adding Government effectiveness and control of corruption while significant at the 10% level when considering Voice and accountability, regulatory quality and rule of law. Moving to the institutional variables, political stability is positively significant at the 10% level and government effectiveness is significant at 1% level. As for the interaction terms; only entrepreneurship conditional on Government effectiveness and control of corruption are significant at 1% level.

These results are consistent with several previous empirical findings. Baumol et al. (1996), recognized different cases where the institutional environment diverge the entrepreneurial activity to unproductive directions and consequently affecting economic growth; De Clercq et al. (2010) proves that in certain countries, entrepreneurship is not always perceived as a positive phenomenon which negatively affect new business activities. In economies with limited economic freedom, entrepreneurship is driven into the informal sector. In 2011, Troilo considered the relationship between institutions measured as property rights, market expansion, rule of law, and job growth and concluded that “the number of procedures to enforce contracts, the number of procedures to start a business, and the number of days to start a business is negatively correlated with entrepreneurship, and that a common law legal system is negatively related to entrepreneurship”, (Troilo, 2011, p. 158).

The control and independent variables considered show a robust result to earlier models in Table 8 and 9; variables that were significant in the previous models still show significant results.

4.3.2 Empirical Results: Total Early Stage Entrepreneurial Activity (TEA)

Similar to the previous methodology adopted for Business Density, results for the baseline regression will be presented and discussed, followed by the results on the extended model.

4.3.2.1 Baseline Regression

Table 16: Results of the Baseline Regression

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.110	0.050	0.027**
Constant	0.516	11.514	0.964	0.061	0.143	0.669
GDP	−0.0001	0.000	0.095*	0.0001	0.000	0.316
POP	−1.245	0.792	0.117	−3.853	1.164	0.001***
CAP	0.629	0.097	<0.0001***	1.293	0.174	<0.0001***
EDU	−0.038	0.031	0.227	0.025	0.030	0.414
ENT	0.019	0.059	0.755	0.001	0.054	0.981
LAB	−0.032	0.107	0.764	−0.076	0.094	0.417
RD	−2.805	1.135	0.014**	−8.248	2.095	<0.0001***
EXP	0.121	0.043	0.005***	0.287	0.100	0.004***
EXPEND	−0.055	0.096	0.565	−0.583	0.157	0.000***

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 16 demonstrates the results from estimating the baseline regression in fixed effect model and dynamic model. The first thing to note is that entrepreneurship measured by Total Early Stage Entrepreneurial Activity has a positive coefficient which is in line with the initial expected direction, however, insignificant similarly to the case of business density. The control and independent variables have the same direction as the variables in the baseline regression for the entrepreneurship measured by business density however, the magnitude of the coefficients differ, i.e. GDP, Population growth, Education, labor force participation rate, R&D, and Gross national expenditure have negative coefficient while Gross capital formation and exports are significantly positive. Furthermore, in order to control for economic fluctuations, a lagged GDP per capita growth rate is included through the dynamic model and appears to be significant at 5% level. The magnitude of the coefficient reflects the fact that economic fluctuations have a negative impact on economic growth.

Exploring the non-linear relationship between Total Early Stage Entrepreneurial Activity and economic growth and including a lagged variable of entrepreneurship (Table 17) delivers a result signifying that entrepreneurship requires time in order to generate economic growth (consistent with previous findings when business density is considered); however, a non-linear relationship doesn't appear to be significant, also in line with previous findings in table 7. Full regression output can be found in appendix C.

Table 17: Results of Non Linear and Lagged Effect of Baseline Regression

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
TEA	0.019	0.059	0.755	0.001	0.054	0.981
TEA^2	0.001	0.002	0.418	0.001	0.002	0.592
TEA(-2)	0.120	0.0812	0.0411**	0.133	0.066	0.045**

Note: p< 0.1, **p< 0.05; *** p<0.01*

4.3.2.2 D Distance to frontier

Table 18: Results of the Regression with Distance to frontier

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.250	0.222	0.259
Constant	58.629	29.280	0.051*	0.006	0.555	0.992
GDP	−0.001	0.000	0.616	0.001	0.001	0.413
POP	−1.313	1.504	0.387	−0.116	0.379	0.760
CAP	0.572	0.214	0.010***	1.542	0.159	<0.0001***
EDU	−0.018	0.039	0.653	−0.057	0.030	0.061**
ENT	−0.158	0.982	0.873	3.926	0.654	<0.0001***
LAB	−0.052	0.335	0.877	−1.203	0.302	<0.0001***
RD	−3.167	2.694	0.246	0.788	3.119	0.801
EXP	0.137	0.093	0.146	0.278	0.080	0.001***
EXPEND	−0.581	0.155	0.001***	−1.012	0.116	<0.0001***
INST	−0.073	0.185	0.695	0.515	0.135	0.000***
INTER	0.003	0.014	0.822	−0.053	0.010	<0.0001***

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 18 summarizes the outcome of the regressions models after considering the effect of institutions and the interaction term between institutions and entrepreneurship (in the baseline model). In the fixed effect model, a comparison with the baseline regression shows that the variables have maintained their coefficient signs except for entrepreneurship that have an unexpected negative effect. Institutional variable is also non-significantly negative. Such negative effect suggests that there is a decline in economic growth when there is an improvement in entrepreneurial activity and institutional quality. In the dynamic model, entrepreneurship and institutions have a strong positive effect on economic growth with the variables being significant at the 1% level in line with the initial hypothesis. The effect of institutions through entrepreneurship conditional on institutions has a negative effect on economic growth with the interaction term significant at the 1% level. However, one standard deviation of entrepreneurship conditional on institutions will decrease economic growth by 0.053 which is noticeably a weak effect.

4.3.2.3 Global Competitiveness Index

Table 19: Results of the Regression with Global Competitiveness Index (GCI)

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.377	0.073	<0.0001***
Constant	23.155	24.072	0.338	0.033	0.310	0.914
GDP	−0.001	0.000	0.322	0.001	0.000	0.022**
POP	−0.423	1.054	0.689	−6.159	2.841	0.030**
CAP	0.886	0.151	<0.0001***	1.321	0.160	<0.0001***
EDU	−0.017	0.044	0.694	−0.112	0.077	0.144
ENT	−0.404	0.885	0.649	0.369	1.243	0.766
LAB	−0.075	0.172	0.665	−0.183	0.161	0.255
RD	−4.121	2.048	0.046**	−9.600	2.854	0.001***
EXP	0.309	0.080	0.000***	0.392	0.081	<0.0001***
EXPEND	−0.180	0.141	0.205	−0.547	0.150	0.000***
INST	−6.221	3.759	0.100*	0.428	6.001	0.943
INTER	0.093	0.193678	0.630	−0.078	0.254	0.758

Note: p< 0.1, **p< 0.05; *** p<0.01*

When accounting for Global Competitiveness Index (GCI) as proxy for institutions, entrepreneurship does not appear to be significant in both regressions despite that the sign is in the expected direction in the dynamic model (Table 19). Also, both institutions and the interaction term are not significant as per the above results. The countries of the study sample have an average GCI of 4.5 knowing that GCI values range between 1 and 7; this index defines the capacity of a nation's economic growth since it mirrors its institutions, policies, and factors determining the level of productivity. Thus, countries under study have limited level of competitiveness and institutional structure that might not provide the adequate environment for entrepreneurship measured as Total Early Stage Entrepreneurial Activity to thrive and consequently lead to economic growth. Despite the fact that the role of entrepreneurship is very crucial for economic development but it is not sufficient since it requires the suitable institutional framework.

4.3.2.4 Dimensions of Composite Governance Index

Table 20: Results of the Regression with Voice accountability

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.120	0.050	0.016
Constant	1.871	12.068	0.877	0.166	0.261	0.524
GDP	−0.001	0.000	0.071*	0.001	0.000	0.502
POP	−1.145	0.848	0.178	−3.849	1.168	0.001***
CAP	0.661	0.102	<0.0001***	1.348	0.188	<0.0001***
EDU	−0.030	0.033	0.376	0.058	0.041	0.160
ENT	0.055	0.070	0.433	−0.115	0.053	0.029**
LAB	−0.020	0.113	0.861	−0.049	0.101	0.624
RD	−2.919	1.275	0.023**	−9.965	2.724	0.000***
EXP	0.118	0.045	0.010***	0.361	0.100	0.000***
EXPEND	−0.098	0.105	0.350	−0.618	0.160	0.000***
INST	1.858	2.149	0.388	8.419	2.755	0.002***
INTER	−0.015	0.073	0.831	0.025	0.048	0.599

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 21: Results of the Regression with Political stability

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.094	0.051	<0.0001***
Constant	3.648	12.18	0.765	0.158	0.238	0.825
GDP	−0.001	0.00	0.041**	0.001	0.000	0.129
POP	−1.135	0.85	0.181	−3.967	1.242	0.001***
CAP	0.661	0.10	<0.0001***	1.306	0.185	<0.0001***
EDU	−0.036	0.03	0.272	0.025	0.035	0.877
ENT	0.054	0.06	0.403	−0.079	0.057	0.526
LAB	−0.039	0.11	0.731	−0.100	0.103	0.321
RD	−3.033	1.27	0.018**	−10.366	2.750	<0.0001***
EXP	0.123	0.05	0.01***	0.322	0.097	0.061*
EXPEND	−0.086	0.10	0.391	−0.583	0.165	<0.0001***
INST	1.156	1.37	0.400	2.113	2.168	0.030**
INTER	0.004	0.07	0.957	−0.025	0.090	0.111

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 22: Results of the Regression with Government Effectiveness

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.107	0.053	0.044**
Constant	3.899	11.944	0.744	0.144	0.226	0.525
GDP	−0.001	0.000	0.047**	0.001	0.000	0.323
POP	−1.102	0.835	0.188	−3.884	1.213	0.001***
CAP	0.657	0.100	<0.0001***	1.320	0.188	<0.0001***
EDU	−0.037	0.032	0.248	0.032	0.036	0.378
ENT	0.021	0.072	0.775	−0.114	0.061	0.061*
LAB	−0.042	0.111	0.708	−0.071	0.089	0.426
RD	−3.208	1.258	0.011**	−10.664	2.832	0.000***
EXP	0.124	0.045	0.006***	0.337	0.100	0.001***
EXPEND	−0.097	0.099	0.326	−0.572	0.170	0.001***
INST	2.267	1.295	0.082*	1.426	1.236	0.249
INTER	0.033	0.071	0.645	0.051	0.053	0.339

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 23: Results of the Regression with Regulatory Quality

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.083	0.066	<0.0001
Constant	3.541	12.132	0.770	0.277	0.266	0.904
GDP	−0.001	0.000	0.085	0.001	0.000	0.214
POP	−1.269	0.846	0.135	−3.794	0.969	0.091
CAP	0.637	0.102	<0.0001	1.330	0.172	<0.0001
EDU	−0.040	0.033	0.224	0.029	0.041	0.386
ENT	0.019	0.082	0.818	−0.075	0.082	0.445
LAB	−0.053	0.115	0.643	−0.091	0.130	0.285
RD	−3.069	1.270	0.016	−10.837	2.128	0.004
EXP	0.117	0.045	0.010	0.314	0.072	0.012
EXPEND	−0.075	0.100	0.452	−0.580	0.151	0.001
INST	1.308	1.754	0.456	2.247	2.605	0.045
INTER	0.048	0.079	0.548	−0.023	0.087	0.112

Note: p< 0.1, **p< 0.05; *** p<0.01*

Table 24: Results of the Regression with Rule of Law

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.108	0.057	0.155
Constant	2.274	12.069	0.851	0.159	0.255	0.533
GDP	−0.001	0.000	0.052**	0.000	0.000	0.339
POP	−1.187	0.846	0.162	−3.862	1.184	0.001***
CAP	0.653	0.101	<0.0001***	1.317	0.197	<0.0001***
EDU	−0.035	0.033	0.295	0.029	0.036	0.422
ENT	0.019	0.069	0.787	−0.105	0.042	0.013**
LAB	−0.029	0.113	0.794	−0.086	0.108	0.423
RD	−2.836	1.378	0.041**	−10.526	2.833	0.000***
EXP	0.120	0.045	0.008***	0.317	0.104	0.002***
EXPEND	−0.070	0.100	0.484	−0.574	0.167	0.001***
INST	−1.282	1.346	0.342	1.325	3.362	0.693
INTER	0.061	0.067	0.367	0.044	0.057	0.445

Table 25: Results of the Regression with Control of corruption

	Fixed effect Model			Dynamic Model		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
GDPG (-1)				−0.108	0.058	<0.0001***
Constant	2.836	11.937	0.813	0.325	0.279	0.525
GDP	−0.001	0.000	0.105	0.000	0.000	<0.0001***
POP	−1.140	0.843	0.178	−3.640	1.355	<0.0001***
CAP	0.654	0.101	<0.0001***	1.328	0.189	0.001***
EDU	−0.032	0.033	0.320	0.033	0.036	0.9034
ENT	0.058	0.068	0.400	−0.064	0.050	0.7949
LAB	−0.023	0.112	0.836	−0.135	0.099	0.5517
RD	−2.909	1.265	0.022**	−10.606	2.579	0.0012***
EXP	0.115	0.045	0.012**	0.348	0.105	0.0019***
EXPEND	−0.108	0.101	0.286	−0.594	0.175	<0.0001***
INST	2.450	1.535	0.112	7.480	2.351	0.0041***
INTER	0.019	0.061	0.760	−0.015	0.059	0.0107**

Note: p< 0.1, **p< 0.05; *** p<0.01*

The directions of the variables vary significantly between the fixed effect and the dynamic effect (table 20 to Table 25). In each of the models related to the dimensions of Composite Governance Index, we have found a positive effect of Total Early Stage Entrepreneurial Activity on economic growth, however, insignificant results. Based on the fact that an important amount of prior empirical studies modeled the relationship between entrepreneurship and economic growth so as to allow for a dynamic relationship since the effect of changes in economic growth on entrepreneurial activities cannot be neglected; the study in the section will be focused on the dynamic model. In the dynamic effect, Total Early Stage Entrepreneurial Activity has a negative effect on economic growth in all above regressions. Entrepreneurial variables in the presence of voice accountability, rule of law, and government effectiveness appears to be significant despite that these institutional variables along with the interaction terms have positive and insignificant coefficients. In fact, the results are not surprising and are coherent with previous empirical studies. A more organized and rigid governance indicates firmer rules and regulations and could discourage business formation. As for the institutional variables, voice accountability, political stability, regulatory quality and control of corruption appear to be significant at 5% level and have a positive effect on economic growth. Entrepreneurship conditional on institutions has no effect on economic growth.

The control and independent variables considered show a robust result to earlier models:

1. The lagged GDP per capita growth rate variable in the dynamic model is strongly significant at 1% and 5% level except in the case of the model including the rule of law.
2. POP (population growth) variable coefficients are also negative; they are significant at the 1% level except for the model of regulatory quality where it is significant at the 10% level.
3. Gross capital formation variable values are positive and significant with p values of <0.00001 for all models.
4. EDU (Secondary school enrollment) variable is positively related to economic growth; however, insignificant in all models.
5. Labor force participation rate has negative coefficients for all models, however, not significant
6. Research and Development variable values are negative and highly significant at the 1% level
7. The Export as a percent of GDP variable values is positively signed and highly significant at 1% level in all regressions except in the model including political stability where it is significant at 10% level.
8. Gross national expenditure variable is negatively signed and significant at 1% level for all the regressions.

Several previous empirical studies have adopted lagged entrepreneurial variables in different dynamic models (Wennekers et al., 2005 and Blanchower, 2000, Wong et al., 2005). Researchers have discussed the fact that there exists a lag between the period where entrepreneurial activity was initiated and the period of attaining economic growth. Therefore, it is important

to examine and deliberate a possible delay effect between entrepreneurship and economic growth.

Similar to the extension of the baseline regression where 2-year lag was considered; the following table summarized the regression results after including a two-year period lagged entrepreneurial variable.

Table 26: Results of the regression of the dimensions of Composite Governance Index with 2-Year Lagged Entrepreneurship

	Fixed effect Model			**Dynamic Model**		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
	Voice Accountability					
TEA(-2)	0.156	0.088	0.079	0.167	0.067	0.013
INST	8.911	3.635	0.016	9.726	3.329	0.004
INTER	−0.018	0.086	0.832	0.002	0.056	0.974
	Political Stability					
TEA(-2)	0.159	0.090	0.079	0.174	0.063	0.006
INST	0.746	2.070	0.719	0.168	1.881	0.929
INTER	0.074	0.105	0.482	0.087	0.103	0.394
	Government Effectiveness					
TEA(-2)	0.143	0.091	0.119	0.181	0.074	0.014
INST	1.513	1.741	0.387	2.022	1.407	0.151
INTER	0.032	0.083	0.699	0.019	0.048	0.695
	Regulatory Quality					
TEA(-2)	0.118	0.094	0.212	0.142	0.056	0.012
INST	0.754	2.659	0.777	3.502	2.909	0.229
INTER	0.094	0.082	0.250	0.045	0.050	0.371
	Rule of Law					
TEA(-2)	0.119	0.091	0.191	0.125	0.053	0.019
INST	1.323	2.694	0.624	1.479	2.308	0.522
INTER	0.094	0.081	0.248	0.054	0.050	0.278
	Control of Corruption					
TEA(-2)	0.155	0.088	0.082	0.143	0.047	0.002
INST	4.146	1.902	0.031	7.129	1.807	<0.0001
INTER	0.039	0.072	0.590	0.011	0.046	0.806

According to table 26; the coefficients of Entrepreneurship, institutional variables, and entrepreneurship conditional on institutions turn positive in line with the initial hypothesis. The entrepreneurial variable is positively significant at 1% and 5% level of confidence. Initially, entrepreneurship did not have any effect on economic growth; however, after introducing the institutional and interaction variables, entrepreneurship appears to negatively affect economic growth despite that the institutional variables themselves might not have any significant direct effect. Thus, regulations might produce alterations in distribution between formal and informal activities and consequently hinder economic growth on the short run. After considering the lagged values of entrepreneurship, the latter turns significantly positive indicating that the effect of institutions requires a certain period of time before it materialized into economic growth.

5. CONCLUSIONS AND RECOMMENDATIONS

According to several researchers, despite the increased number of studies conducted on the relationship between entrepreneurship and economic growth, there is still a lacuna in the literature that comprises the antecedents with emphasis on institutions, and effects of entrepreneurship with economic growth being the final consequence. In addition, empirical studies concentrated on small country samples mainly developed ones and are limited in time periods. Entrepreneurship did not prove to be a well-documented factor in empirical growth studies due to difficulties encountering its definition and measurement.

This study has underlined specific objectives such as analyzing the effect of two main measures of entrepreneurship on economic growth and the investigation of the institutional factors that determines the relationship between entrepreneurship and economic growth. The latter has been evaluated using unbalanced panel data for 86 developed and developing countries for the period 1996-2015. Fixed and dynamic models were analyzed for comparative purposes knowing that the dynamic model is more relevant since it captures the effect of business cycle on entrepreneurship. The main results attained through the dynamic model suggest strong evidence for the positive effect of entrepreneurship measured as business density on economic growth conditioned by the presence of institutions. The baseline regression demonstrated a positive effect of entrepreneurship on growth only when a 2-year lagged entrepreneurship variable is considered which implies that there is a time delay between the initiation of the entrepreneurial activity and the realization of economic growth. The results hold for the majority of institutional variables at the exception of political stability where the relationship does not appear to be significant.

When Total Early Stage Entrepreneurial Activity is considered, entrepreneurship conditioned by the dimensions of composite governance indicators appears to have a negative effect on economic growth which turns positive after considering 2-year lagged entrepreneurial variable. Thus, rigid governance indicates firmer rules and regulations and present barriers to entry on the short run, and thus, could discourage business formation and consequently hinders economic growth. Despite the fact that the present study has provided some implications, there is still much to unveil. Several theoretical and empirical limitations were beyond our control. The limitations are mainly related to the definition and measures of entrepreneurship that still lacks a universal consensus. Nevertheless, this study has adopted the two main measures of entrepreneurship in order to explore if the results diverge. The data by itself represented a limitation. The entrepreneurial field is somehow recent, thus, all databases do not offer complete information for all countries in the same time period

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APPENDICES

Appendix A:

1. Squared Business Density

Table 27. Fixed effect

Fixed-effects, using 527 observations Included 68 cross-sectional units Time-series length: minimum 2, maximum 10 Dependent variable: GDPG					
	Coefficient	Std. Error	t-ratio	p-value	
Const	14.6694	7.20227	2.037	0.0423	**
GDP	−0.000104642	6.65336e-05	−1.573	0.1165	
POP	−1.44420	0.512278	−2.819	0.0050	***
CAP	0.802253	0.0645676	12.43	<0.0001	***
EDU	−0.0206657	0.0257371	−0.8030	0.4224	
ENT^2	0.000456173	0.00199789	0.2283	0.8195	
LAB	−0.209948	0.0610747	−3.438	0.0006	***
RD	−0.897513	0.868237	−1.034	0.3018	
EXP	0.180278	0.0293527	6.142	<0.0001	***
EXPEND	−0.254855	0.0583663	−4.366	<0.0001	***

Table 28. Dynamic Model

1-step dynamic panel, using 362 observations Included 55 cross-sectional units Time-series length: minimum 1, maximum 8 Dependent variable: GDPG					
	Coefficient	Std. Error	z	p-value	
GDPG (-1)	−0.234137	0.0490435	−4.774	<0.0001	***
Const	0.232459	0.200297	1.161	0.2458	
GDP	0.000119409	0.000170052	0.7022	0.4826	
POP	−2.25304	0.644697	−3.495	0.0005	***
CAP	1.33228	0.125778	10.59	<0.0001	***
EDU	−0.0113075	0.0277954	−0.4068	0.6841	
ENT^2	0.00243719	0.00279012	0.8735	0.3824	
LAB	−0.355900	0.190923	−1.864	0.0623	*
RD	−2.66317	2.13080	−1.250	0.2114	
EXP	0.208571	0.0562633	3.707	0.0002	***
EXPEND	−0.355068	0.113999	−3.115	0.0018	***

2. 2-Year Lagged Business Density

Table 29: Fixed Effect

Fixed-effects, using 376 observations Included 59 cross-sectional units Time-series length: minimum 1, maximum 8 Dependent variable: GDPG					
	Coefficient	Std. Error	t-ratio	p-value	
C	−7.17481	12.1542	−0.5903	0.5554	
GDP	0.000349459	8.64119e-05	4.044	<0.0001	***
POP	−2.28036	0.611710	−3.728	0.0002	***
CAP	0.619456	0.0843062	7.348	<0.0001	***
EDU	−0.0284619	0.0275197	−1.034	0.3018	
ENT(-2)	0.329573	0.0861087	3.827	0.0002	***
LAB	−0.270722	0.141230	−1.917	0.0562	*
RD	−0.943464	1.04012	−0.9071	0.3651	
EXP	0.189193	0.0321458	5.885	<0.0001	***
EXPEND	−0.0853763	0.0717307	−1.190	0.2349	

Table 30: Dynamic Model

1-step dynamic panel, using 297 observations Included 54 cross-sectional units Time-series length: minimum 1, maximum 7 Dependent variable: GDPG					
	Coefficient	Std. Error	z	p-value	
GDPG(-1)	−0.309571	0.0396735	−7.803	<0.0001	***
const	0.163710	0.199711	0.8197	0.4124	
GDP	0.000542494	0.000183600	2.955	0.0031	***
POP	−2.41772	0.604841	−3.997	<0.0001	***
CAP	1.09108	0.100322	10.88	<0.0001	***
EDU	−0.0328132	0.0266400	−1.232	0.2181	
ENT(-2)	0.440019	0.118932	3.700	0.0002	***
LAB	−0.485256	0.131914	−3.679	0.0002	***
RD	−0.966319	2.01661	−0.4792	0.6318	
EXP	0.213260	0.0554268	3.848	0.0001	***
EXPEND	−0.230571	0.0962525	−2.395	0.0166	**

Appendix B:

Table 31: Fixed Effect

Fixed-effects, using 245 observations
Included 43 cross-sectional units
Time-series length: minimum 1, maximum 9
Dependent variable: GDPG

	Coefficient	Std. Error	t-ratio	p-value	
const	0.798759	15.7956	0.05057	0.9597	
GDP	8.74018e-05	0.000153110	0.5708	0.5688	
POP	−0.669593	0.969814	−0.6904	0.4908	
CAP	0.680998	0.108512	6.276	<0.0001	***
EDU	−0.0470216	0.0462729	−1.016	0.3108	
ENT	0.0310126	0.193874	0.1600	0.8731	
LAB	−0.0690259	0.0967261	−0.7136	0.4763	
RD	−1.68238	1.51570	−1.110	0.2684	
EXP	0.177942	0.0497902	3.574	0.0004	***
EXPEND	−0.186116	0.0889814	−2.092	0.0378	**
CGI	1.10159	2.47426	0.4452	0.6567	

Table 32: Dynamic Model

1-step dynamic panel, using 142 observations
Included 29 cross-sectional units
Time-series length: minimum 1, maximum 7
Dependent variable: GDPG

	Coefficient	Std. Error	z	p-value	
GDPG(-1)	−0.278113	0.0589918	−4.714	<0.0001	***
const	−0.0346953	0.309884	−0.1120	0.9109	
GDP	0.00104230	0.000229633	4.539	<0.0001	***
POP	−2.73988	1.17769	−2.326	0.0200	**
CAP	1.08648	0.138673	7.835	<0.0001	***
EDU	−0.0925079	0.0455644	−2.030	0.0423	**
ENT	0.324372	0.350754	0.9248	0.3551	
LAB	−0.355198	0.130174	−2.729	0.0064	***
RD	−6.71166	1.89446	−3.543	0.0004	***
EXP	0.217678	0.0492679	4.418	<0.0001	***
EXPEND	−0.255674	0.0852724	−2.998	0.0027	***
CGI	0.611126	3.33865	0.1830	0.8548	

Appendix C:

1. Squared Total Early Stage Entrepreneurial Activity (TEA)

Table 33. Fixed effect

Fixed-effects, using 289 observations Included 48 cross-sectional units Time-series length: minimum 1, maximum 15 Dependent variable: GDPG					
	Coefficient	***Std. Error***	***t-ratio***	***p-value***	
const	0.964641	11.5156	0.08377	0.9333	
GDP	−0.000107695	6.30700e-05	−1.708	0.0891	*
POP	−1.22934	0.790833	−1.554	0.1214	
CAP	0.636193	0.0972203	6.544	<0.0001	***
EDU	−0.0379136	0.0308080	−1.231	0.2197	
ENT^2	0.00148839	0.00183380	0.8116	0.4178	
LAB	−0.0286871	0.106765	−0.2687	0.7884	
RD	−2.79274	1.12123	−2.491	0.0134	**
EXP	0.122361	0.0424574	2.882	0.0043	***
EXPEND	−0.0635382	0.0962361	−0.6602	0.5098	

Table 34. Dynamic Model

1-step dynamic panel, using 167 observations Included 28 cross-sectional units Time-series length: minimum 1, maximum 13 Dependent variable: GDPG					
	Coefficient	Std. Error	z	p-value	
GDPG(-1)	−0.111142	0.0492679	−2.256	0.0241	**
const	0.0432682	0.139664	0.3098	0.7567	
GDP	−0.000152592	0.000156471	−0.9752	0.3295	
POP	−3.86232	1.17864	−3.277	0.0010	***
CAP	1.29535	0.175080	7.399	<0.0001	***
EDU	0.0244856	0.0308778	0.7930	0.4278	
ENT^2	0.00106314	0.00198442	0.5357	0.5921	
LAB	−0.0811793	0.0941652	−0.8621	0.3886	
RD	−8.11593	2.09444	−3.875	0.0001	***
EXP	0.286378	0.0990636	2.891	0.0038	***
EXPEND	−0.586927	0.157547	−3.725	0.0002	***

2. 2-Year Lagged Total Early Stage Entrepreneurial Activity (TEA)

Table 35. Fixed Effect

Fixed-effects, using 179 observations
Included 34 cross-sectional units
Time-series length: minimum 1, maximum 13
Dependent variable: GDPG

	Coefficient	Std. Error	t-ratio	p-value	
const	12.5484	16.8827	0.7433	0.4586	
GDP	−7.24326e-05	9.43003e-05	−0.7681	0.4438	
POP	1.73901	1.22632	1.418	0.1585	
CAP	0.826196	0.153457	5.384	<0.0001	***
EDU	−0.0331670	0.0449306	−0.7382	0.4617	
ENT(-2)	0.120239	0.0812187	1.480	0.1411	
LAB	−0.0130147	0.154418	−0.08428	0.9330	
RD	−3.89749	2.26877	−1.718	0.0881	*
EXP	0.109047	0.0708607	1.539	0.1262	
EXPEND	−0.314554	0.140354	−2.241	0.0266	**

Table 36. Dynamic Model

1-step dynamic panel, using 122 observations
Included 22 cross-sectional units
Time-series length: minimum 1, maximum 12
Dependent variable: GDPG

	Coefficient	Std. Error	z	p-value	
GDPG(-1)	−0.277306	0.0477644	−5.806	<0.0001	***
const	0.0706613	0.215475	0.3279	0.7430	
GDP	−0.000170377	0.000191601	−0.8892	0.3739	
POP	−3.54894	1.33281	−2.663	0.0078	***
CAP	1.41053	0.193056	7.306	<0.0001	***
EDU	0.0664003	0.0325055	2.043	0.0411	**
TEA_2	0.132619	0.0663190	2.000	0.0455	**
LAB	0.0635857	0.115792	0.5491	0.5829	
RD	−9.09793	3.07602	−2.958	0.0031	***
EXP	0.330926	0.0839754	3.941	<0.0001	***
EXPEND	−0.557455	0.178152	−3.129	0.0018	***