

Salman, Doaa Mohamed

## Article

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Full Length Article

# What is the role of public policies to robust international entrepreneurial activities on economic growth? Evidence from cross countries study

Doaa Mohamed Salman\*

*Economics Department, MSA University, Egypt*

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## Abstract

This paper contributes to the development of the field of international entrepreneurial activities by providing answers to the following questions. Does higher human development generates opportunities to entrepreneurial activities that yield economic growth? Do economic policies generate opportunity that yields higher international entrepreneurial activities? This research employed Generalized Method of Moments (GMM) estimation methodology is selected based on the long term dynamic of the entrepreneurial activities. Analysis is employed using panel data among a group of efficient countries and innovative countries during the period 2004–2008. Empirical results provide a positive significant evidence for the role of human development to accelerate entrepreneurial activities and growth in innovative driven countries. The outcomes point towards the role of policies supporting entrepreneurial activities as a vital tool to accelerate development and growth via channels such as: better education levels, enhancing research and development, attractive taxes policies and stable monetary policy. This paper provides a comparative analysis of the empirical results and presents prospective explanations for the observed relationships between different groups of countries to study the dynamics of change with relative short time series.

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*Keywords:* International entrepreneurial activities; Economic growth; Development

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## 1. Introduction

Entrepreneurial activities have been studied and explained by prominent researchers making the notion even more (e.g., [Baron & Ward, 2004](#); [Markman & Baron, 2003](#); [Mitchell et al., 2004](#)). According to [Schumpeter \(1934\)](#), [Kirzner \(1973\)](#), an entrepreneur's role can be explained as an innovator, risk-taker and arbitrageur who participates to economic growth through creativity, new products and services, ability to compete at the international level. In social sciences, entrepreneurship is the creation of a new organization. However, the entrepreneur's role still remains

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\*Tel.: +20 2 0100 6179 666; fax: +20 2 3760 380.

E-mail addresses: [dsalman@msa.eun.eg](mailto:dsalman@msa.eun.eg), [dr.doaasman@gmail.com](mailto:dr.doaasman@gmail.com).

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uncertain as it is based on the human behaviour which is complicated and depends on the entrepreneur cognitive abilities, the surrounding environment that affects personality and the economic policies implemented in the country.

Existing literature has investigated the spillover factors to entrepreneur's activities and the constraints that hinder its dynamics and outcomes. But this might not tell the full story. Awareness has begun to shift to develop entrepreneur capital skills (see, e.g., [Bloom, Mahajan, McKenzie, & Roberts, 2010](#), [Bruhn, Karlan, & Schoar, 2010](#)). This paper is assessing whether the human capital development can drive entrepreneurial activities to enter markets and what its dynamic role to growth? Finding an answer can be a good advice for developing countries and policy makers.

Empirical studies attempt to assess the relationship between entrepreneurial activities and economic growth which is ambiguous across countries. This vague relation attracts researchers to uncover these direct and indirect factors affecting entrepreneurial activities, via adding the role of human capital development. To accelerate entrepreneurs' role, researchers urge policy makers to adopt new tools that can increase human capital ([Audretsch, Caree, & Thurik, 2001](#); [Shane & Eckhardt, 2003](#); [Mueller, 2007](#); [Henrekson & Johansson, 2010](#)). This research investigates these missing links across countries and the spill over factors responsible for the growth. The extensive differences in economic performance across countries are considered a lucrative arena for research and policy makers for determining the main factors that develop these countries and help in enhancing their growth. I think that the differences between countries are rooted in the policies and regulations that encourage firms to operate successfully not only in the local but in the international market. The paper tries to answer whether technological innovation, economic growth, and improvements in productivity is correlated with human development using different groups of countries. The study's contribution is based on finding the links between entrepreneur's activities, economic growth across countries based on classifying countries according to their human development index.

The study is of value to policy maker as it highlights the important role of human capital development. Moreover, the findings provide a set of policies for governments to undertake tenable actions to accelerate the effectiveness of the institutional setting. The structure of the paper is designed as follows: [Section 2](#) provides an overview of literature. [Section 3](#) describes the model, data and variables used in this study; [Section 5](#) presents the empirical results and analyses and finally [Section 6](#) concludes the main points of the paper.

## 2. Literature review

Scholars from different fields are investigating the multiple impacts of entrepreneurship through different channels either operational, functional, production, per capita income, employment, standard of living and innovation to help decision makers to robust their economies. This section tries to focus on the hypothesis of the changing role of the entrepreneurship across literature. It starts by defining the relation between human capital and entrepreneurship, entrepreneurship, followed by the role of entrepreneurial activities on economic growth.

### 2.1. Human capital development and international entrepreneurship

Differences in human capital is based on the type of investment that the individual can acquire through education, knowledge, skills and experience through formal and informal learning that increase individual impact on different levels ([Becker, 1964, 2009](#)). The increase of investment in human capital increase individual wage, firms' productivity, and national economic growth, an evidence that shows the strong relationship between entrepreneurs and human capital ([Schultz, 1961](#); [Romer, 1989](#)). Later, [Burton-Jones and Spender \(2011\)](#) suggests the existing of a strong relation between entrepreneurship and human capital, and argue the importance of a well-educated individual in the reformation of the economy. The role of human capital can be perceived across countries through measuring its impact on the national level. Measuring human capital is a vital starting point in terms of designing and implementing policies regarding human resources. Measurements are classified into conventional and non conventional.

The human capital stock has been measured via: Output-, Cost-, and Income-based approach. First, the output approach is adopted by [Romer \(1990\)](#) as he proposes the ratio between skilled-adults and total adults to measure the stock of human capital at the national level. Later, [Romer \(1990\)](#) and [Barro and Lee \(1993\)](#) measure the stock of human capital using "school enrolment rates" as a proxy. Moreover, the importance of education and training in the human capital field enhance the entrepreneurs' qualities and help in creating new ventures depending on their

education and experience (Jones, Macpherson, & Thorpe, 2010; Mosey & Wright, 2007). Later, Von Krogh and Wallin (2011) suggest that there is a relationship between time spent in schooling and lifetime earning as a result of opportunity costs. Despite the drawback of this approach, the students' effectiveness cannot be achieved except after enrolment in the production activities.

Second, Cost- based approach is based on the total amount of money invested in human capital. Jorgenson and Fraumeni (1989) employed a discounted income analysis, but this approach face difficulties in splitting what is for investment and what is for consumption. But the third approach which is the Income-Based Approach, provide a link between the stocks of human capital utilizing an individual's income (Mulligan & Sala-i-Martin, 2000). They show that individual with higher stocks of human capital and various skills are able better to make use of their resources in entrepreneurship activities than in a salaried job (Williams, 2004). However, this approach face a drawback as it ignores other factors that can affect the individual income, such as social security, pension fund, and family support programmes.

To overcome the drawback of the conventional measures, in 1990, a new Human Development Index (HDI) by the United Nations Development Programme (UNDP) has been developed. The index is based on health, knowledge, and standard living with many sub-variables such as life expectancy at birth, adult literacy rate, gross enrolment ratio, and GDP per capita. In September 2006, the OECD launched a new Entrepreneurship Indicators Programme (EIP) to build internationally comparable statistics on entrepreneurship and its determinants. This indicator is closely attached to education-related factors such as high-level qualification, graduation and enrolment rates, invested time in education, and investment in education. These non conventional measures encourage researcher and policy makers to recognize the driving force to growth.

Furthermore, Porter (1990, 2003) classified countries according to their competitive advantage, as the country transfer between the following stages of competitiveness: (1) factor-driven stage; a stage that depend on the inherited natural resources factors and the created factors by the human; (2) investment/efficiency-driven stage and (3) innovation-driven stage; (4) wealth driven stage. First, countries in factor-driven stage compete through producing products depending on its low cost. Almost countries with abundant natural resources practice this stage, as they neither develop knowledge for innovation nor use knowledge for trading. In the second stage, countries must increase their production efficiency and educate the labour force to be able to adapt in the preceding technological development phase. Countries in this second stage (investment/efficiency) must use their efficient productive practices and be able to compete in the international markets relying on their economies of scale (Acs, O'Gorman, Szerb, & Terjesen, 2007; Acs, Desai, & Hessels, 2008). Emerging markets are opt to lower barriers to entry, deregulation and trade liberalisation, and change their institutions and enforce encouraging business laws (Chang, 2011; Yamakawa, Peng, & Deeds, 2008). While, the innovation-driven stage, countries in this stage are very sensitive to the international changes such as exchange rate, price level, countries opt to compete depending on their high level in technology and economies depend on the private sector. Finally, the innovative driven stage is characterised by the ability of the countries to keep the previous achievements and explore new markets.

In table one countries are classified according to their entry density and number of new firms, the table shows group of efficiency driven countries and innovative driven countries, the innovative driven countries are characterised with offshore financial centres, sound economic policies and qualified labour deepen the entrepreneurial activities and increase entry density through creating more competitive advantages. In efficiency driven stage countries which are endowments with resources and they are adopting sound economic policies and attractive investment environment these factors enhance countries potentiality to compete internationally. The fast technological development plays a major role to enhance the performance of international entrepreneurship. The international entrepreneurship concept is better defined as "...a combination of innovative, proactive, and risk-seeking behaviour that cross national borders and is intended to create value in organizations" (McDougall & Oviatt, 2000; Oviatt & McDougall, 2005). Emerging countries discourse to internationalisation and venturing need to consider entrepreneurship as a key driver of economic development (Song, Wang, & Parry, 2010). Entrepreneurs may have an extraordinary role in sustaining national growth and development. However, national differences still exist due to the stage of development inside the country. Researchers investigate the key reasons of these differences and they refer it to national political/legal, economic, and social contexts (Baughn & Neupert, 2003; Lee & Peterson, 2001).

The more transparent and accountable policies the more efficient the performance of the business as it attracts more entrepreneurs.

## 2.2. Economic growth and international entrepreneurship

International entrepreneurship has been defined as the “discovery, enactment, evaluation, and exploitation of opportunities—across national borders—to create future goods and services”, [Baughn and Neupert \(2003\)](#). Historical views link entrepreneurship and economic growth with various fields of economics and management study, including economic history, industrial economics and management theory. The interrelation between various sciences fields attracts researchers to uncover these relations. [Schumpeter \(1934\)](#) in his seminal book *The Theory of Economic Development* argued that not all businessmen are entrepreneurs; they must be innovators and a catalyst to the production process by adopting new technology. Furthermore, researchers have begun to study the endogenous factor affecting growth through technical change resulting from decisions of profit-maximizing agents. The latest class of models developed in this tradition has risen from the works of [Romer \(1986, 1990\)](#), and [Lucas \(1978\)](#). Later, endogenous growth models highlight the importance of knowledge as determinant to economic growth, while the new class of endogenous growth model pioneered by [Romer \(1990\)](#) identified some attributes of entrepreneurship by modelling the process of invention and deriving the motives for invention from the microeconomic level.

Researchers on pre-20th century economic history show that entrepreneurs adopted new production techniques, reallocated resources to new opportunities, diversified output and penetrated new markets via competition. In the mid-20th century, entrepreneurship role declined in the light of the production large-scale and efficiency. In the last two decades, the knowledge and information revolution has renewed theoretical thinking linking entrepreneurship to growth with new theories emerging from the field of industrial evolution or evolutionary economics, [Jovanovich \(1982\)](#). The evolutionary economics view entrepreneurs as agents of change, bring new ideas to markets and accelerate growth through a process of competitive firm selection. [Wennekers and Thurik \(1999\)](#) showed that the general innovative role of entrepreneurs includes not only newness (implementing inventions), but also new entry (start-ups and entry into new markets). They emphasised on the importance of creating new business that based on innovation and penetrating new markets as this strategy created more value added and provide good opportunities to successes.

Empirical studies of entrepreneurship and its relationship to economic growth are all relatively recent. [Carree and Thurik \(1999\)](#), followed by [Audretsch and Thurik \(2002\)](#), concluded that those OECD countries present an evidence for higher increases in entrepreneurship, exhibited through business ownership rates, and they are the ones that have enjoyed lower unemployment and greater rates of economic growth. In most of these studies, the commonly used proxy for measuring entrepreneurship was business start-up rate. [Acs and Armington \(2002\)](#) have investigated the relative contribution of new start-ups to job creation. Their findings suggest that new firms may have a far greater role in new job creation than previously thought. Creating jobs can be directly linked to economic growth and supporting entrepreneurial activities is a powerful force driving innovation, productivity, job creation and economic growth. The effect of entrepreneurial activity on economic growth depends upon the level of per capita income and economic growth. Depending on macro data available, one could use proxies capturing a single feature and its level as a measurement of entrepreneurship. However, “recent empirical studies suggest that entrepreneurship – measured as start-up rates, the relative share of SMEs, self-employment rates, etc. – is instrumental in converting knowledge into products and thereby propelling growth”, [Braunerhjelm \(2010\)](#). The relation between entrepreneurial activities and economic growth has received increased attention of researchers and policy makers, particularly in developing countries as they endure high unemployment rate. Entrepreneurship has been a solution to high unemployment and stagnant economic growth ([Carree, Van Stel, Thurik, & Wennekers, 2002](#); [Van Stel, Carree, & Thurik, 2005](#); [Thurik, Verheul, Baljeu, & Van Stel, 2007](#)). Later, [Acs et al. \(2007\)](#) measure the relation between the entrepreneurial activity and economic growth in poorer countries and show the negative impact between them. It is important to assess the relationship between economic growth and entrepreneurship across countries, in particular since the ambiguities within this relationship can insight policy makers. In countries that witness economic imbalances and their economic policies suffers from transparency and accountability their way out to growth starts from developing incentives policies to attract entrepreneurs. Creating attractive instruments such as simplifying financing channels, exempting taxes, providing social security and pension develop the entrepreneurship activities as it will be a pull factors to growth.

The importance of economic growth attributes to set a sound governmental policies, transparent institutional structure, and wealth to generate entrepreneurial activities which are the sources of development and economic growth. Thus, adopting policies to promote knowledge and improve labour skills to encourage entrepreneur activities, particularly through fiscal policies, is a long term plan. Entrepreneurship determinants on the macro level are explained by demand side determinants (named push factors), representing technological developments, the industrial structure of the economy, government regulation, and the stage of development (Wennekers & Thurik, 1999; Wennekers, Noorderhaven, Hofstede, & Thurik, 2001). While, the supply side determinants (named pull factors), represents demographic characteristics of the population, income levels, educational attainment, unemployment level, cultural norms, access to finance, and the degree of taxation. Recent studies by Blanchflower (2000) found that the level of education has a negative effect on the probability of an individual selecting self-employment. They reasoned this as the highly educated people may not be willing to be risk taker, and this result is supported by Van der Sluis, Van Praag, and Vijverberg (2005). Consequently, innovation and entrepreneurial activity are the drivers of long-run economic growth.

### 3. Methodology and data

The purpose of this paper is to shed some light on the possibility of obtaining a better understanding of causal linkages between the entrepreneurial activities and economic growth by analysing the main tools that accelerate growth in a panel context. The countries under study are classified based on their economic strategies. The first group of countries utilize the abundant primary resources to increase its international competitiveness and to adjust to several institutional setting to become transparent, accountable, and creditable country. The more the economy develop its resources targeting more efficiency in utilizing resources the more it become able to gain competitive advantage, than they turn into efficiency driven economies. As for the innovative countries they creates new products and penetrate new markets based on their international competitiveness. The list of countries is grouped according to their average of entry density and average of new firms (2004–2008), see Table 1. Data shows a considerable variation in entry density across countries and time periods. In the efficiency driven countries Indonesia record the lowest average entry density with score 0.17, while a country such as Cyprus recorded the highest entry density and it score 26.71 new registrations per 1000 people within 4 years.

The econometric analysis of this kind should account for a number of specific steps. First, a non-stationarity of the time series variables must exist and appropriate panel unit root tests must be performed. Secondly, if the time series are non-stationary, a panel cointegration approach is needed to test if a long-run equilibrium relationship exists between non-stationary variables. Then there is a high probability that the included variables are endogenous so that the models should consider the existence of Granger causality.<sup>1</sup> The following are the steps followed in this paper:

#### 3.1. Unit root tests

Panel data techniques could also be preferable because of their weak restrictions; indeed, they capture country-specific effects and heterogeneity in the direction and magnitude of the parameters across the panel.<sup>2</sup> In this study, the considered tests employed five different unit root tests including LLC's test, Breitung's *t*-statistic, IPS-W-statistic, ADF-Fisher Chi-square, and PP-Fisher Chi-square tests, whereas a robustness check has been carried out on single cross section units to investigate the existence of structural breaks. The paper didn't perform a panel unit root tests with structural breaks because it is almost impossible to have homogeneous breaks in time series in a significantly heterogeneous panel like the one we have considered especially for variables such as firm density income and economic growth.

<sup>1</sup>From the advantage of using panel cointegration is that it allows for heterogeneity between countries. Moreover, the number of observations available while testing the stationarity of the residual series in a level regression is greatly increased in a panel framework and this can increase the power of the cointegration tests (Rapach & Wohar, 2004).

<sup>2</sup>One of the primary reasons for the utilization of a panel of cross section countries is important to tests them integration between variables involved in the research conducted.

### 3.2. Panel co-integration analysis

To determine whether the regressions are spurious, the results of the panel co-integration tests must be examined. Given the results, it is appropriate to test the co-integrating relationship between the three variables. In this study it employed Pedroni's co-integration tests that suggest two types of residual-based tests for the test of the null of no cointegration in heterogeneous panels.<sup>3</sup> These tests reject the null of no cointegration when they have large negative values except for the panel-v test which rejects the null of cointegration when it has a large positive value. However, according to Pedroni (2004), r and pp tests tend to under-reject the null in the case of small samples.

### 3.3. GMM technique

Generally, the GMM technique can be adapted to estimate the panel variables, using lags of the endogenous variables as instruments in order to arrive at unbiased and consistent estimates of the coefficients. In a panel of  $N$  countries covering  $T$  years, this approach estimates the model parameters directly from the moment conditions that are imposed by the model. GMM does not require distributional assumption, like normality, it can allow for heteroskedasticity of unknown form, and it can estimate parameters even if the model cannot be solved analytically from the first order condition.

In this study it utilize single equation approaches assuming there is homogeneity between cross section units for the long-run relationship whereas short-run dynamics are allowed to be cross-section specific. While this restriction may seem too severe for some variables, on the other hand, allowing all parameters to be panel-specific would considerably reduce the appeal of a panel data approach. The data collected information on 37 countries, divided into two groups: group one consist of 18 countries, and second group consist 19 countries, as listed in Table 1 in the Appendix A. The considered specification of the dynamic model for firm density is lagged endogenous model to reflect the entrepreneur activities with joint dynamics variables as follows:

$$\ln(ED_{i,t}) = \alpha_t + \lambda \ln(ED_{i,t-1}) + \beta_1 \ln(GDPG_{i,t}) + \beta_2 \ln(RD_{i,t}) + \beta_3 \ln(GDPD_{i,t}) + \beta_4 \ln(TAX_{i,t}) + \beta_5 \ln(Trade_{i,t}) + \beta_6 \ln(SES_{i,t}) + \epsilon_t \quad (1)$$

The following Table 2 (in Appendix A) summarizes the variables used in the estimation of the model, and the instrumental variable included in the estimation, with their respective to descriptive statistics.

## 4. Data set analysis

Unit root tests have been computed under two different specifications, represented by the inclusion of individual effects or individual effects and trends as reported in Table 3. The unit root hypothesis cannot be rejected when the variables are taken in levels and any causal inference from the series in levels would therefore be invalid. However, when using the first differences, the null of unit roots is strongly rejected at the 1% significance level for all series. Therefore, it is concluded that all the series are non-stationary and integrated of order one. This finding is confirmed by all the tests employed in all the three alternative country samples that are under examination. The variables properties need to avoid the possibility of spurious regressions. In order to assess the stationary of the variables employed, this paper employs five different unit root tests including LLC's test, IPS-W-statistic, ADF-Fisher Chi-square, and PP-Fisher Chi-square tests. The results of these tests are reported in Table 3 indicating the statistics significantly of the variables, as they are stationary at the level values especially for the LLC's test at the 10%.

The unit root hypothesis cannot be rejected when the variables are taken in levels and any causal inference from the series in levels would therefore be invalid. However, when using the first differences, the null of unit roots is

<sup>3</sup>For the first type, four tests are based on pooling the residuals of the regression along the within-dimension of the panel (panel tests); for the second type, three tests are based on pooling the residuals of the regression along the between-dimension of the panel (group tests). In both cases, the hypothesized cointegrating relationship is estimated separately for each panel member and the resulting residuals are then pooled in order to conduct the panel tests.

strongly rejected at the 1% significance level for all series. Therefore, it is concluded that all the series are non-stationary and integrated of order one. Therefore, a long-run relationship exists between economic growth and entrepreneurial activities.

An analysis of cointegration on multivariate models including economic growth for the three group of countries, which strongly supports the existence of a long-run relationship demonstrating that the inclusion of the relation between economic growth and entrepreneurial activities represented in the firm density and to reinforce the statistical robustness of the linkages between the variables are examined here. Tests conducted on the period 2004–2008 for multivariate models were with full heterogeneity results are presented in [Table 4](#). The panel cointegration tests revealed the existence of a long-run co integrating relationship between the economic and the energy dimensions in all the enrolment to secondary schools, research and development, ICT goods exports, trade and pricing policy in the innovative countries.

## 5. Empirical results

Empirical results provide the answer for the first question showing the direct and significant relation of entrepreneurs on economic growth and trade. Using panel fixed effects to test for main variables affecting the firm density, results for the countries under study presented in [Table 5](#) shows the positive significant relationships between ED and economic growth with the level of significance at 1%. The sign of the coefficients estimated support previous literature and previous empirical studies. In this study economic growth effect is more in the innovative stage than efficiency stage countries, as estimates of the coefficient of economic growth is (0.1) while efficiency stage countries estimates is (0.02) reflecting the relative contribution of ED on economic growth. In addition, the trade and entry density shows a positive and significant relationship, as estimates of the coefficient of trade is (0.13) in innovative stage countries while it is (0.05) in efficiency stage explaining the effect of ED on trade. Future more, taxes have a negative impact on entry density in innovate drive countries but it is insignificant, while efficiency driven countries it provide negative and significant relation at 1%. This reflects the sensitivity of each group to the tax policy as in efficiency driven countries tries to increase investment and provide more incentives.

Moreover, to assess the relation between school enrolment and entry density, as literature shows that countries that are characterized with higher human development, higher school enrolment, higher income level, and better health standards have direct effect on economic growth. Empirical results in the two groups provide the positive and significant effect of school enrolment and entry density in innovate driven countries as estimates of the coefficient of school is (0.4) while in the efficiency driven countries the relation is negative and its estimates of coefficient is weak. Such results reflects one of the reasons of reaching innovative driven stages and the important contribution of a qualified education increase the human capital investment and consequently increase the labour productivity.

In addition to the importance of entrepreneurial activities the economic policies participates to create an attractive business environment to increase entry density. Last model results presented in [Table 5](#) models 5 and 6 show the positive significant effect of inflation rate on entry density, as estimates of coefficient is (3.18) in innovative stage countries and (0.082) in efficiency driven countries.

## 6. Implication and limitation

This paper has analysed the factors explaining the role of entrepreneurial activities among countries in a dynamic panel data frame work in a macroeconomic using macroeconomic perspective. Three analyses are carried across innovative and efficiency driven countries, the study used a dataset of for the 39 countries, thus allowing a number of considerations on different results emerging from alternative subsamples.

Results shows how to develop an economy and shift it to innovation as requires a system based on skilled labour, a system that acquire knowledge, develop it, maximize its utilization and able to create competitive advantage in any sector. The ability of countries to invest and build their economic systems based on knowledge this gives them the advantage to create competitiveness within the global environment and accelerate their outcomes. Investing in education, R&D which led to the stage of efficiency in this stage country will be able to create competitive advantage and develop their economies to reach take off stage. Innovative stage countries, such as Finland, were able to shift

from intensive resource industries to an economy specialized in information technology during the period from 1970 to 1990. On the other side, Factor driven countries are suffering from the loss of skilled of labour, a problem that hinder development in these countries and create a loss in managerial skills and skilled labour.

Based on the finding and research implications, the following policy measures are recommended. Research and development, qualified education system, sound economic policies are important determinants in attracting entrepreneurship and increase economic growth. In this point of view, decision makers need to improve and increase the budget allocation to research and development that is channelled to increase technological advancement. Financial support programmes and grants are needed to support firms to develop new products. Moreover, monetary policy play a vital role in attracting entrepreneurship, as higher rate of inflation increases the cost to start a business, increases the country risk. Decision maker are required to control inflation as higher rate has a negative impact on economic growth and entrepreneurial activities.

Worth mentioning that this paper did not focuses on the other side of the picture by including factor driven countries but this limitation is refereed unavailability to source of macroeconomic variables. In the future, a similar study can be conducted with increased number of observations and extending the time frame and adding more control variables.

## Appendix A

See Appendix [Tables 1–5](#).

Table 1

List of countries according to their average entry density and the average of new firms during 2004–2008.

Source: World Bank Entrepreneurship Snapshots (WBGES), the data is available at: <http://econ.worldbank.org/research/entrepreneurship>.

Efficiency driven countries			Innovative driven countries		
Country	Average of new firms (2004–2008)	Average of entry density (2004–2008)	Country	Average of new firms (2004–2008)	Average of entry density (2004–2008)
Brazil	260,863	2.04	Belgium	28,230.4	4.12
Bulgaria	35,762	7.07	Canada	181,800	8.09
Chile	23,604	2.18	Costa Rica <sup>a</sup>	33,331.6	11.61
Czech Republic	17,707	2.43	Cyprus <sup>a</sup>	19,966	26.71
Hungary	28,323	4.1	Denmark	23,902.8	6.63
Indonesia	25,917	0.17	Finland	11,048.4	3.16
Kazakhstan	30,819	2.94	France	129,950	3.15
Korea, Rep.	53,690	1.56	Germany	64,698.2	1.18
Latvia	9685	6.13	Hong Kong, China <sup>a</sup>	74,211.4	14.46
Lithuania	5117	2.07	Iceland	2977.6	14.96
Malaysia	39,901	2.61	Ireland <sup>a</sup>	17,066	6.23
Netherlands	32,660	2.92	Israel	19,824	4.66
Peru	36,957	2.03	Italy	73,827	1.91
Romania	95,722	6.17	Japan	119,392	1.43
Russian Federation	441,669	4.38	New Zealand	65,207	24
Slovak Republic	13,831	3.57	Panama <sup>a</sup>	7277.8	3.59
South Africa	37,293	1.21	Singapore <sup>a</sup>	21,874.6	6.39
Thailand	29,217	0.65	Spain	134,399	4.9
Turkey	49,039	1.01	Sweden	23,858.4	4.03
			Switzerland <sup>a</sup>	15,797.2	3.08
			United Kingdom	383,600	9.48

[1] New firms: Is the number of newly registered limited-liability firms during the calendar year.

[2] New density: Is the number of newly registered limited liability firms per 1,000 working-age people (those ages 15–64).

<sup>a</sup>Countries categorized as offshore financial centres by the IMF and the Financial Stability Forum (FSF) are marked in red.

Table 2  
Variables with description and source.

Variables	Descriptive	Source/database
<b>Dependent</b>		
ED	Entrepreneur index (Entry Density)	World bank
<b>Macroeconomic measures</b>		
Internal factors		
GPDG	GDP growth (annual %)	World development Indicator
GDPD	GDP deflator (base year varies by country)	
ICTGEXP	ICT goods exports (% of total goods exports)	
RD	Research and development expenditure (% of GDP)	
UNEMPL	Unemployment, total (% of total labour force)	
SES	School enrolment, secondary (% gross)	
TAXR	Total tax rate (% of commercial profits)	

Table 3  
Panel unit root results for entrepreneur entry density during 2004–2008.

Innovative driven countries	Dependent variable LOGED	Independent variables						
		LOGGDPG	LOGGDPD	LOGSES	LOGPOP	LOGUNEMP	LOGICTGEXP	LOGTRADE
<b>Method LLC-t*</b>								
Level	1.84829	0.426	19.94	4.33	9.89	10.96	0.715	−1.73
First difference	−13.27***	−8.28***	−5.31***	−8.98***	−14.58***	−6.40***	−8.23***	−7.78***
<b>IPS-W-Stat</b>								
Level	3.80114	−1.7*	1.83	4.12	7.94	6.95	3.12	2.6
<b>ADF-Fisher Chi-square</b>								
Level	5.17774	45.65	6.33	4.12	0.64	1.03	7.33	9.35
First difference	67.0011**	91.48***	62.22*	43.76	62.15*	23.1	65.34*	47.71
<b>PP-Fisher Chi-square</b>								
Level	4.31069	27.87	0.47	4.42	0.44	0.75	6.38	9.64
First difference	97.5165***	84.69***	85.41***	76.28***	115.4***	29.14	73.39**	74.15**
<b>Efficiency Driven countries</b>								
<b>Method LLC-t*</b>								
level	11.08	−1.68*	1.29	−2.27	42.26	7.52	1.73	5.92
First difference	−2.34**	−13.23***	−12.18***	18.09***	−57.48***	−18.93***	−8.25***	−6.69***
<b>IPS-W- Stat</b>								
level	4.86	8.35	1.33	−1.00	22.53	4.95	1.38	2.98
<b>ADF-Fisher Chi-square</b>								
Level	2.39	26.96	13.54	29.70	0.0036	2.28	13.27	2.08
First difference	13.514	133.3***	56.73*	44.69**	162.12***	70.745***	87.31***	71.65***

Table 3 (continued)

Innovative driven countries	Dependent variable LOGED	Independent variables						
		LOGGDPG	LOGGDPD	LOGSES	LOGPOP	LOGUNEMP	LOGICTGEXP	LOGTRADE
PP-Fisher Chi-square								
Level	2.39	26.96	14.77	46.03	0.001	0.179	13.27	0.05
First difference	8.31	133.3***	92.95***	53.29***	251.68***	76.25***	87.31***	71.27***

Selection of lags based on Modified Akaike Information Criterion; Newey-West automatic bandwidth selection and Bartlett kernel; Probabilities for Fisher tests are computed using an asymptotic Chi square distribution. All other tests assume asymptotic normality; null: Unit root (assumes common unit root process).

\*Significant at 10%.

\*\*Significant at 5% level.

\*\*\*Significant at 1% level.

Table 4

Heterogeneous panel Co integration tests for multivariate models.

Series: LOGED LOGTPOP LOGSEP				
Panel v-Statistic	−2.58	Group rho-Statistic	3.232525	
Panel rho-Statistic	0.610	Group PP-Statistic	−6.93***	
Panel PP-Statistic	−5.69***	Group ADF-Statistic	−6.26***	
Panel ADF-Statistic	−5.25***			
Series: LOGED LOGTPOP LOGGDPD				
Panel v-Statistic	−1.36	Group rho-Statistic	2.15	
Panel rho-Statistic	−0.27	Group PP-Statistic	8.74***	
Panel PP-Statistic	−6.85***	Group ADF-Statistic	−8.75***	
Panel ADF-Statistic	−6.86***			
Series: LOGED LOGSEP LOGGDPG				
Panel v-Statistic	5.58***	Group rho-Statistic	1.93	
Panel rho-Statistic	−0.44	Group PP-Statistic	−6.61***	
Panel PP-Statistic	−6.61***	Group ADF-Statistic	−6.08***	
Panel ADF-Statistic	−6.08***			
Series: LOGED LOGTPOP LOGICTGEXP				
Panel v-Statistic	−2.025	Group rho-Statistic	0.82	
Panel rho-Statistic	−1.34*	Group PP-Statistic	16.88***	
Panel PP-Statistic	−12.11***	Group ADF-Statistic	14.49***	
Panel ADF-Statistic	10.56***			
Series: LOGED LOGGDPD LOGICTGEXP				
Panel v-Statistic	0.488	Group rho-Statistic	0.12	
Panel rho-Statistic	−1.90*	Group PP-Statistic	−22.31***	
Panel PP-Statistic	−15.60***	Group ADF-Statistic	−22.31***	
Panel ADF-Statistic	−15.60***			
Series: LOGED LOGGDPG LOGUNEMP				
Panel v-Statistic	−1.68	Group rho-Statistic	1.69	
Panel rho-Statistic	−0.64	Group PP-Statistic	−11.59***	
Panel PP-Statistic	−8.68***	Group ADF-Statistic	−10.49***	
Panel ADF-Statistic	−7.98***			
Series: LOGED LOGICTGEXP LOGTRADE				
Panel v-Statistic	−1.48*	Group rho-Statistic	0.63	
Panel rho-Statistic	−1.49*	Group PP-Statistic	−19.55***	
Panel PP-Statistic	−13.83***	Group ADF-Statistic	−25.65***	
Panel ADF-Statistic	−17.76***			

Table 4 (continued)

Series: LOGED LOGTPOP LOGSEP

Series: LOGED LOGSES LOGTRADE

Panel v-Statistic	3.34***	Group rho-Statistic	2.16
Panel rho-Statistic	−0.26	Group PP-Statistic	−16.57***
Panel PP-Statistic	−11.90***	Group ADF-Statistic	−10.57***
Panel ADF-Statistic	−8.03***		

Series: LOGED LOGTRADE LOGUNEMP

Panel v-Statistic	−0.66	Group rho-Statistic	0.34
Panel rho-Statistic	−1.63	Group PP-Statistic	−40.23***
Panel PP-Statistic	−27.11***	Group ADF-Statistic	−51.62***
Panel ADF-Statistic	−34.46***		

**Innovative driven countries**

Series: LOGED LOGGDPG LOGUNEMP

Panel v-Statistic	−1.019	Group rho-Statistic	2.18
Panel rho-Statistic	−0.14	Group PP-Statistic	−2.61**
Panel PP-Statistic	−2.84**	Group ADF-Statistic	−2.86**
Panel ADF-Statistic	−2.99**		

Series: LOGED LOGPOP LOGSES

Panel v-Statistic	−2.68	Group rho-Statistic	2.41
Panel rho-Statistic	−1.2	Group PP-Statistic	−4.17***
Panel PP-Statistic	−1.92*	Group ADF-Statistic	−4.01***
Panel ADF-Statistic	−2.04*		

Series: LOGED LOGSES LOGICTGEXP

Panel v-Statistic	0.49	Group rho-Statistic	1.58
Panel rho-Statistic	−0.21	Group PP-Statistic	−6.188***
Panel PP-Statistic	−4.59***	Group ADF-Statistic	−6.188***
Panel ADF-Statistic	−4.59***		

Series: LOGED LOGGDPD LOGICTGEXP

Panel v-Statistic	2.74	Group rho-Statistic	1.94
Panel rho-Statistic	−0.33	Group PP-Statistic	−7.02***
Panel PP-Statistic	−5.68***	Group ADF-Statistic	−7.018***
Panel ADF-Statistic	−5.68***		

Series: LOGED LOGUNEMP LOGICTGEXP

Panel v-Statistic	−1.15	Group rho-Statistic	2.07
Panel rho-Statistic	−0.23	Group PP-Statistic	−13.11***
Panel PP-Statistic	−9.61***	Group ADF-Statistic	−8.54***
Panel ADF-Statistic	−6.66***		

Series: LOGED LOGUNEMP LOGICTGEXP

Panel v-Statistic	−3.32	Group rho-Statistic	2.13
Panel rho-Statistic	−0.18	Group PP-Statistic	−13.36***
Panel PP-Statistic	−9.77***	Group ADF-Statistic	−8.31***
Panel ADF-Statistic	−6.52***		

Series: LOGED LOGTRADE LOGICTGEXP

Panel v-Statistic	−3.166	Group rho-Statistic	1.82
Panel rho-Statistic	−0.43	Group PP-Statistic	−39.08***
Panel PP-Statistic	−26.37***	Group ADF-Statistic	−21.01***
Panel ADF-Statistic	−14.71***		

Series: LOGED LOGTRADE LOGUNEMP

Panel v-Statistic	−0.17	Group rho-Statistic	1.18
Panel rho-Statistic	−0.94	Group PP-Statistic	−20.14***
Panel PP-Statistic	−14.15***	Group ADF-Statistic	−20.14***
Panel ADF-Statistic	−14.15***		

**Table 4** (continued)

Series: LOGED LOGTPOP LOGSEP

Series: LOGED LOGICTGEXP LOGTRADE

Panel v-Statistic	3.14 <sup>***</sup>	Group rho-Statistic	2.88 <sup>**</sup>
Panel rho-Statistic	0.38	Group PP-Statistic	−18.48 <sup>***</sup>
Panel PP-Statistic	−13.08 <sup>***</sup>	Group ADF-Statistic	−13.33 <sup>***</sup>
Panel ADF-Statistic	−9.76 <sup>***</sup>		

**Investment driven countries**

Heterogeneous assumptions: no intercept and no deterministic trend. Lag selection: based on Modified Akaike Information Criterion; Newey-West automatic bandwidth selection and Bartlett kernel. Alternative hypothesis: Alternative hypothesis: common AR coefs. (Within-dimension): Panel v-Statistic, Panel rho-Statistic, Panel ADF-Statistic. Alternative hypothesis: Alternative hypothesis: common AR coefs. (Between-dimension):

\*Significant at 10%.

\*\*Significant at 5% level.

\*\*\*Significant at 1% level.

Table 5

Estimation results.

Explanatory variables	Innovative countries 1	Efficiency countries 2	Innovative countries 3	Efficiency countries 4	Innovative countries 5	Efficiency countries 6
Lag firm density	0.089 <sup>***</sup> 0.0004	0.088 <sup>***</sup> 0.0004	0.288 <sup>***</sup> 0.00011	−1.82 <sup>***</sup> 0.000002	0.08 <sup>***</sup> 0.00003	0.19 <sup>***</sup> 0.000004
GDP growth	0.096 <sup>***</sup> 0.00004	0.016 <sup>***</sup> 0.000003	0.091 <sup>***</sup> 0.000012	−1.4 <sup>***</sup> 0.000009	0.035 <sup>***</sup> 0.000002	0.11 <sup>***</sup> 0.000001
R&D	3.16 <sup>***</sup> 0.00005	0.55 <sup>***</sup> 0.000001	3.04 <sup>***</sup> 0.00002	7.84 <sup>***</sup> 0.000005		
TRADE	0.13 <sup>***</sup> 0.00003	0.05 <sup>***</sup> 0.000002				
Taxes	−0.00007 0.0000007	−0.69 <sup>***</sup> 0.0000002			0.000001 <sup>***</sup> 0.000002	0.75 <sup>***</sup> 0.000002
CPI					3.18 <sup>***</sup> 0.00009	0.082 <sup>***</sup> 0.000007
High School enrolment			0.4 <sup>***</sup> 0.0002	−0.0000002 <sup>***</sup> 0.0000005		
Constant	−1.22 <sup>***</sup> −0.00012	−0.0068 <sup>***</sup> −0.00005	−2.98 <sup>***</sup> −0.00077	3.67 <sup>***</sup> −0.00003	−13.5 <sup>***</sup> 0.00003	−0.43 <sup>***</sup> 0.00003
No of observation	43	43	43	43	43	43
Hansen	24	37	24	37	25	31
J-test						

Note: numbers in ( ) are standardized errors, (\*) and (\*\*) indicate 10% and 5% level of significant, respectively.

\*\*\*Indicate 1% level of significant, respectively.

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