

THE IMPACT OF (OPPORTUNITY AND NECESSITY)  
ENTREPRENEURSHIP ON ECONOMIC GROWTH: DOES HUMAN  
CAPITAL MATTER?

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## **Biographic note**

Daniela Ribeiro Rodrigues was born in Vila Nova de Famalicão and raised in Santo Tirso. She obtained her BA in Economics from the School of Economics and Management of the University of Porto (FEP) in 2015. In the same year, she worked in a hotel in Bournemouth, United Kingdom, while she was taking an intensive English course.

After she get graduated, she started working in a multinational company called SONAE where she stayed 9 months learning how to be a stocks manager for the retail industry. In 2016, Daniela decided to start a Double Degree in Master in Management in FEP and Kedge Business School in Marseille. Additionally, in 2017 she started working in a multinational company called Deloitte as Analyst in the Global investment and Innovation Incentives team.

She is a proactive, versatile and self-motivated youth with a strong orientation towards teamwork and results. From an early age, she was passionate about the business world, enterprising and creative. Besides academic and professional world, she spends her time to charitable causes.

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## **Abstract**

Entrepreneurship is generally defined as the creation of new firms and according to literature, it is the process by which new enterprises are founded and become viable. Although considerable research has been devoted to the study of the impact of entrepreneurship on economic growth, fewer studies have analyzed the impact of the types (opportunity vs necessity) of entrepreneurship on economic growth. Moreover, the latter set of studies overlooked the relevance of human capital as mediating factor in the relation between (types of) entrepreneurship and economic growth.

The aim of the present study was to fill in the above mentioned gap, by assessing the extent to which the direct and indirect impact of (the types of) entrepreneurship, via human capital, matters for countries' economic growth.

In methodological terms, we resort to fixed effects panel data estimations, involving a large set of (OECD and non-OECD) countries, over a relatively long time span (1990-2016).

The results suggest that total entrepreneurship have a positive impact on economic growth. Distinguishing between types of entrepreneurship, there is clear evidence that opportunity entrepreneurship fosters economic growth, whereas necessity entrepreneurship inhibits it. Interestingly, human capital tends to mitigate the negative impact of necessity entrepreneurship on economic growth. In the case of opportunity entrepreneurship, the direct positive impact observed is reduced in contexts characterized by high levels of human capital, which might reflect increased opportunity costs.

**Keywords:** Human Capital; Economic Growth; Panel Data; Entrepreneurship; Impact.

**JEL Codes:** C23 J24 L26 O4

## Resumo

O empreendedorismo é geralmente definido como a criação de novas empresas e, de acordo com a literatura, é o processo pelo qual novas empresas são criadas e se tornam sustentáveis. Um considerável número de pesquisas estudou o impacto do empreendedorismo no crescimento económico. Contudo, poucos desses estudos analisaram o impacto dos tipos (oportunidade versus necessidade) de empreendedorismo no crescimento económico. Além disso, o último conjunto de estudos ignorou a relevância do capital humano como fator intermediário na relação entre o (tipo de) empreendedorismo e crescimento económico.

O presente estudo tem como objetivo ultrapassar a lacuna acima mencionada, avaliando até que ponto o impacto direto e indireto do (tipo de) empreendedorismo, via capital humano, é importante para o crescimento económico dos países.

Em termos metodológicos, recorreremos a estimações de dados em painel envolvendo um conjunto alargado de (OCDE e não-OCDE) países num extenso período de tempo (1990-2016).

Os resultados sugerem que o empreendedorismo global apresenta um impacto positivo no crescimento económico. Distinguindo os tipos de empreendedorismo, há claras evidências de que o empreendedorismo de oportunidade apresenta um impacto positivo no crescimento económico enquanto que o empreendedorismo de necessidade inibe o crescimento económico.

De forma interessante, o capital humano tende a mitigar o impacto negativo do empreendedorismo de necessidade sobre o crescimento económico. No caso do empreendedorismo de oportunidade, o impacto direto positivo fica reduzido em contextos caracterizados por elevados níveis de capital humano, o que pode ser influenciado pelo aumento dos custos de oportunidade.

**Palavras-chave:** Capital Humano; Crescimento Económico; Dados em Painel; Empreendedorismo; Impacto.

**Códigos JEL:** C23 J24 L26 O4

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## 1. Introduction

Entrepreneurship plays an increasingly important role throughout the world and it has been considered an important mechanism to achieve economic growth (Stam & van Stel, 2009; Urbano & Aparício, 2016). It promotes economic growth and development by enabling the introduction of innovations, by fostering competition and change, and by increasing rivalry (Wong, Ho & Autio, 2005; Vivarelli 2013). The impact of entrepreneurship on economic development has received considerable attention over the years by recognized and distinguished authors (e.g., Carree & Thurik, 2003; Valliere & Peterson, 2009; Ferreira, Fayolle, Fernandes & Raposo, 2017).

Taking into account the importance of entrepreneurship and despite the well-known challenges and risk involved in the entrepreneurial process, governments increasingly deploy incentives and support programs to encourage and stimulate individuals to become entrepreneurs (McConnell, McFarland, & Common, 2011; Stephan, Uhlaner, & Stride, 2015).

There is no generally accepted definition of entrepreneurship (Van Praag, 1999; Mahoney & Michael, 2004; Thurik & Wennekers, 2004; Reynolds, Camp, Bygrave, Autio & Hay 2005). It can be defined, in a stricter sense, as the creation of new enterprises (Reynolds, 1999; Wong et al., 2005), more rigorously, the process by which new enterprises are founded and become feasible (Szirmai, Naudé, & Goedhuys 2011; Acs, Audretsch, Braunerhjelm, & Carlsson, 2012; Vivarelli, 2013) or, in a broader understanding, as the process by which individuals take advantage and pursue opportunities (Szirmai et al., 2011).

Currently, some dispute exists on whether and which types of entrepreneurship (necessity vs opportunity) matters most for economic growth and development (Reynolds, Camp, Bygrave, Autio & Hay, 2002; Urbano & Aparicio, 2016). ‘Opportunity entrepreneurship’ occurs when individuals want to take advantage of a unique market opportunity and it is related to innovative entrepreneurship; in contrast, ‘necessity entrepreneurship’ results from market friction and it is generally related to non-innovative firms (Reynolds et al., 2005; Urbano & Aparicio, 2016). Analyzing a panel with 43 (25 OECD and 18 non-OECD) countries over the period from 2002 to 2012, Urbano & Aparício (2016) evidenced that both opportunity and necessity entrepreneurship are significantly related to high levels of economic growth; notwithstanding, the effect of necessity entrepreneurship is smaller than that of opportunity entrepreneurship. In contrast, other studies (e.g., Wong et al., 2005; Zali,

Faghieh, Ghotbi, & Rajaie, 2013) indicate that relationships between necessity-driven entrepreneurship and economic growth are insignificant or negative, while the relationship between opportunity-driven entrepreneurship and growth is positive.

Although many specific studies related to entrepreneurship and economic growth have been made (see Carree & Thurik, 2003; Wong et al., 2005; Valliere & Peterson, 2009; Acs et al., 2012), no evidence seems to exist on how, over time, the type of entrepreneurship, intermediated by human capital, impacts on a given country's economic growth. We content that the creation of new enterprises might not be in itself sufficient for fostering economic growth; rather, investment in human capital might be necessary to reap or is likely to enhance the benefits of entrepreneurship and, ultimately, create, maintain and ensure sustainable economic growth (Enayati, 2007; Acs et al., 2012; Čadil, Petkovová, & Blatná, 2014).

Using panel data econometric estimation techniques, the present study aims to assess the direct and indirect (through human capital) impacts of (the types of) entrepreneurship on economic growth.

This dissertation is organized as follows. In a first section, a comprehensive literature review is presented, including the definition of the concepts of entrepreneurship, types of entrepreneurship, and human capital. Then, we detail the mechanisms by which these determinants impact on economic growth and put forward the study's main hypotheses. Section 3 presents the methodology pursued, while in Section 4 it is discussed the empirical results. Finally, Section 5 presents the main conclusions and limitations of the study as well as some paths for future research.

## **2. The relation between (types of) entrepreneurship, human capital and economic growth: a literature review**

### **2.1. Defining the key concepts**

#### **2.1.1 Entrepreneurship and types of entrepreneurship**

Entrepreneurship is generally defined as the creation of new firms and according to literature, it is the process by which new enterprises are founded and become feasible (Reynolds, 1999; Wong et al., 2005; Valliere & Peterson, 2009; Braunerhjelm, Acs, Audretsch & Carlsson, 2010; Acs et al., 2012; Vivarelli, 2013). As result of new firms' formation, Urbano & Aparício (2016) state that entrepreneurship is the process of new jobs creation.

A broader definition of the term lead us to consider entrepreneurship as the discovery and exploitation of innovation and opportunities through the development of new products, new processes, new sources of supply, as well as the exploitation of new markets and economic activities (Davidsson et al. 2006; Santarelli & Vivarelli 2007; Audretsch & Keilbach, 2008, Bosma & Levie 2010; Braunerhjelm et al., 2010; Ferreira et al., 2017).

Distinguished authors presented in their studies two different types of entrepreneurship: the opportunity and necessity entrepreneurship (Carree & Thurik, 2003; Reynolds et al., 2005; Zali et al., 2013; Urbano & Aparicio, 2016; Ferreira et al., 2017).

Necessity entrepreneurship occurs when individuals set up a business because they have no better option for work. This type of entrepreneurship results from market friction and it is related to non-innovative firms (Urbano & Aparicio, 2016). In contrast, opportunity entrepreneurship occurs when adults set up a business or owning-managing a young firm that is motivated to pursue perceived business opportunities (Reynolds et al., 2005; Urbano & Aparicio, 2016; Ferreira et al., 2017).

Differently to necessity entrepreneurship, opportunity entrepreneurship is usually related to innovative firms (Urbano & Aparicio, 2016) being driven by pull motivations (Zali et al., 2013). According to Carree & Thurik (2003), the opportunity entrepreneur is an innovator that create entrepreneurial initiatives and, based on their knowledge, perceive a profit opportunity taking the risk that the product or venture may turn out to be a failure (Ferreira et al., 2017). On the other hand, necessity entrepreneurs tend to be more motivated by monetary rewards and driven by push motivations (Zali et al., 2013).

### **2.1.2. Human capital**

*"The most valuable of all capital is that invested in human beings."*

(Alfred Marshall (1920), Principles of Economics)

Human capital reveals itself as a vague and somewhat complex concept that is referred for a long period of time, and has been one of the most addressed issues in the current societies (Teixeira, 1999; Folloni & Vittadini, 2010).

The concept of human capital emerged in the 1960s, created by Theodore W. Schultz and it was developed and popularized by Gary Becker. For Schultz (1961), human capital is an indispensable factor for economic growth in organizations. It is composed by characteristics of the human being namely, their productive capacities that can result from the education/training they have acquired. Human capital is the set of knowledge, skills, attitudes and experiences, present in people that make up the organization and that in association, allows to provide a competitive differential, through creativity, innovation, motivation and resolution of possible conflicts (Bontis, 1998; Schultz, 1961). Also, according to Becker (1962), human capital should be understood as the skills that an individual acquires throughout his/her life, whose acquisition comes from experience, professional training, health and, above all, formal education.

Reinforcing the previous idea, Becker (1993) says that knowledge is implied in the characteristics and values of individuals. Therefore, education and training, in agreement with Schultz (1981), are the main sources of investment in human capital. Later, following Schultz's (1961) contributions, several authors showed that human capital is a critical driver of productivity and its accumulation is a requisite for economic growth (Benhabib & Spiegel, 1994; Enayati, 2007).

## **2.2. Entrepreneurship, human capital and economic growth: main theoretical mechanisms and hypotheses to be tested**

### **2.2.1. The direct impact of entrepreneurship and types of entrepreneurship on economic growth**

Entrepreneurship is important, especially in contemporary economies because it has high impact on their growth through innovation (Carree & Thurik, 2003; Mrożewski & Kratzer, 2017).

The neoclassical theory started to identify the investment in physical capital and labor as driving factors of economic growth, however it does not explicitly address the issue of entrepreneurship as a cause for technological innovation in a Schumpeterian context (Solow, 1956; Wong et al., 2005, Urbano & Aparicio, 2016). Besides, the endogenous growth theory, initially proposed by Romer (1990), underlined some aspects of entrepreneurship by highlighting that the process of invention and accumulation of knowledge is an additional critical driver to economic growth (Wong et al., 2005).

Schumpeter contributed for the study of entrepreneurship, when recovering the image of the entrepreneur in the economy as the main promoter of economic development, thanks to his/her innovation and ability to make new combinations of productive resources (Lambing & Kuehl, 2007; Fontenele, 2010). He put forward the idea that entrepreneur is at the center of the process of economic growth. According to Schumpeter (1934) the idea of social capacity, i.e. an entrepreneurial behavior, should be used as a key factor to drive economic development since an entrepreneurial activity leads to the process of creative destruction when being the cause of agitations that create opportunities for economic rent (Wong et al., 2005; Urbano & Aparicio, 2016). Schumpeter's theory predicts that an increase in the number of entrepreneurs fosters economic growth (Schumpeter, 1942; Wong et al. 2005). Schumpeterian type of models attributes special attention and recognition to innovation as a source of economic development (Wong et al., 2005). Recent studies in this line draw attention to entrepreneurship as a driver of economic growth and a set of them include it as a fourth production factor in the production function (Audretsch & Keilbach, 2004; Stam & van Stel, 2009).

From the viewpoint of evolutionary economics, entrepreneurs bring new ideas to markets and stimulate growth through a process of competitive firm selection (Wong et al., 2005). Indeed, they facilitate the reallocation of resources from less to more productive uses by performing “cost-discovery”, “gap-filling”, and “input-completing” functions in the economy and by supporting structural changes (Wong et al., 2005).

Despite the above referred theoretical importance, entrepreneurship is a missing link in most empirical studies that aim to explain the drivers to economic growth. Taking into account Schumpeter's work and theory, subsequent empirical literature arose and included the idea of innovation as a source of economic development (Wong et al., 2005; Urbano & Aparicio, 2016; Ferreira et al., 2017).

Entrepreneurs are the ones who respond to opportunities, threats, uncertainties, constraints, and incentives emanating from the economic environment in which they operate (Szirmai et al., 2011). This puts entrepreneurship at the heart of economic growth, development, and catching-up (Szirmai et al., 2011). Entrepreneurship also contributes to economic development by introducing innovations, creating change, creating competition and enhancing rivalry, which involves the development of new products, new processes, new sources of supply and also the exploitation of new markets and the development of new ways to organize businesses (Wong et al., 2005).

Several authors (e.g., Acs et al., 2012; Urbano & Aparício, 2016; Ferreira et al., 2017) demonstrate that overall entrepreneurship is positively related to economic growth (see Table 1). According to Acs et al. (2012), when using ideas that in other ways might not use and introducing them into the market through the creation of a new firm, entrepreneurship is shown to positively influence economic growth. Urbano & Aparício (2016) found that the overall total entrepreneurial activity (TEA) is higher in OECD countries than in non-OECD countries and it is higher in a post-crisis period than in a crisis period (Urbano & Aparício, 2016). Ferreira et al. (2017), considering Schumpeterian and Kirznerian approaches to entrepreneurship, reported that the overall entrepreneurship holds a statistically significant influence on the global competitiveness index (the proxy for economic growth). Valliere & Peterson (2009) evidence that high-expectation entrepreneurs are positively associated with growth in developed countries. In contrast, Wong et al. (2005) did not find support that higher levels of overall entrepreneurship are associated with higher GDP growth rates. However, they found that high growth potential entrepreneurship have a significant impact on economic growth (Wong et al., 2005).

Taking the above into account, we conjecture that:

*Hypothesis 1: Entrepreneurship affects positively countries' economic growth.*

Entrepreneurship can be divided into two main sub-categories (Zali et al., 2013; Urbano & Aparicio, 2016; Ferreira et al., 2017): opportunity and necessity entrepreneurship. Wong et al. (2005) state that opportunity entrepreneurship is related to higher rates of growth because its rates reflect the existence of an economic rent that ideally arises from implementing or creating knowledge and technology. Additionally, and according to Audretsch et al. (2008)

cited by Urbano & Aparicio (2016), entrepreneurs take knowledge-based opportunities and develop them into new products, which affect positively on countries' economic performance. In this same line of reasoning, Reynolds et al. (2005) state that opportunity entrepreneurship is the net result of individual decisions to pursue entrepreneurial activities based on knowledge, and in this way is associated with innovation. Such innovation led perspective of opportunity entrepreneurship reflect the creation of knowledge and technology influencing positively economic growth (Valliere & Peterson, 2009; Urbano & Aparicio, 2016). To Ferreira et al. (2017) opportunity-based or Kirzerian entrepreneurship positively influences labor productivity growth, suggesting a positive relation between opportunity entrepreneurship and economic growth.

In the study of Mrożewski & Kratzer (2017), it was found that a high share of opportunity entrepreneurship has a positive influence on technological progress. In this case, we should give special attention to opportunity entrepreneurship as an important driver of innovation that leads to an increase on economic growth (Mrożewski & Kratzer, 2017).

Contrasting with the above evidence, Wong et al. (2005), when studying lower-income nations, failed to encounter a significant relation between opportunity entrepreneurship and economic growth. Such absence can be explained, according to Wong et al. (2005), by the presence of economic rents derived from market imperfections.

Taking into account the theoretical and empirical contributions summarized above, we conjecture that:

*Hypothesis 2a: Opportunity entrepreneurship affects positively countries' economic growth.*

Regarding necessity entrepreneurship, Urbano & Aparicio (2016) reported that individuals who are motivated by the necessity due to bad work conditions, such as unemployment, tend to possess fewer endowments, most notably human capital and entrepreneurial capability. These authors found, nevertheless, that necessity entrepreneurship is positively related to economic growth, given its impact on employment. In contrast, Wong et al. (2005) did not found significant statistical relation between necessity entrepreneurship and economic growth.

According to Mrożewski & Kratzer (2017), a high share of necessity entrepreneurship is negatively related to innovation. In this case, the authors found that necessity entrepreneurship has a negative impact on economic development (Mrożewski & Kratzer, 2017).

Albeit affecting positively economic growth, Urbano & Aparicio (2016) found that necessity entrepreneurship tends to reflect a lower value creation and, thus, produces smaller impact on economic growth when compared to opportunity entrepreneurship.

In this context, we conjecture that:

*Hypothesis 2b: Necessity entrepreneurship affects positively countries' economic growth.*

and

*Hypothesis 2c: The impact of opportunity entrepreneurship on countries' economic growth is higher than that of necessity entrepreneurship.*

### **2.2.2. The direct and indirect impact of human capital on economic growth**

Several authors (e.g., Barro, 1991; Mankiw et al., 1992; Hanushek & Woessmann, 2008; Hanushek 2013) have studied the impact of human capital on economic growth. The general conclusion is that this factor is a critical driver of countries' economic growth.

Human capital encompasses the set of intangible resources inherent to the labor factor that improves its productivity, being associated with the knowledge and skills acquired by individuals through education, experience and health care (Schultz, 1961; Becker 1962). The increase in schooling allows individuals to become more productive and innovative, leading to improvements in the factor productivity (Romer, 1990; Benhabib & Spiegel, 1994, Bodman & Le, 2013).

At the aggregate, country, level, the improvements achieved in labor productivity through human capital result in enhanced economic growth (Barro, 1991; Benhabib & Spiegel, 1994; Sianesi e Reenen, 2003; Hanushek & Woessmann, 2008).

Considering the above, we conjecture that:

*Hypothesis 3: Human capital positively impacts on countries' economic growth.*



**Table 1: Selected studies on the impact of (the types of) entrepreneurship on economic growth**

| Author   | Countries   | Time-Frame                 | Methodology   | Dependent variable  | Data Source   | Independent variable   |  | Data Source   | Results regarding entrepreneurship |             |           |
|--|---|----------------------------|---|---|---|------------------------|--|---|------------------------------------|-------------|-----------|
|  |   |                            |   |   |   |                        |  |   | Overall                            | Opportunity | Necessity |
| Acs, Audretsch, Braunerhjelm & Carlsson (2012) | 18 countries  | 1981 to 1998, 1990 to 1998 | Davidson and Mackinnon (1993) test of exogeneity and standard fixed effects model | 5-year moving average of gross domestic product growth per capita | OECD, Statistical Compendium via Internet, (National Accounts vol. 1, and own calculations) | <i>Core variable</i>   | Entrepreneurship   | OECD, Statistical Compendium via Internet (Labor Market Statistics)   | +++                                | N/A         | N/A       |
|  |   |                            |   |   |   | <i>Other variables</i> | Gross domestic expenditure on Research & Development (R&D) as percentage of gross domestic product (GDP) | OECD, Statistical Compendium via Internet (Industry Science and Technology)   |                                    |             |           |
|  |   |                            |   |   |   |                        | Education  | Penn World tables   |                                    |             |           |
|  |   |                            |   |   |   |                        | Government expenditures as % of GDP  | OECD, Statistical Compendium via Internet (Historical Statistics)   |                                    |             |           |
|  |   |                            |   |   |   |                        | Capital stock/employment   | OECD, Statistical Compendium via Internet (OECD Economic Outlook Stat & Proj)   |                                    |             |           |
|  |   |                            |   |   |   |                        | Total population living in urban areas   | World Bank (2002), World Development Indicators CDROM   |                                    |             |           |
|  |   |                            |   |   |   |                        | Age  | Values only available for 1978, 1985, 1990, 1994 and 1998. Values in between are approximated by assuming constant change between the years |                                    |             |           |
| Unemployment                                   | OECD, Statistical Compendium via Internet (National Accounts and Historical Statistics) |                            |   |   |   |                        |  |   |                                    |             |           |
| Urbano & Aparicio (2016)                       | 43 countries: 25 OECD countries and 18 non-OECD countries                               | 2002 to 2012               | Data Estimation in Panel with Fixed Effects                                       | Gross domestic product (GDP)                                      | World Development Indicators (WDI) by World Bank  | <i>Core variables</i>  | Overall entrepreneurial activity   | Global Entrepreneurship Monitor (GEM)   | +++                                | +++         | ++        |
|  |   |                            |   |   |   | <i>Other variables</i> | Opportunity TEA  |   |                                    |             |           |
|  |   |                            |   |   |   |                        | Necessity TEA  |   |                                    |             |           |
|  |   |                            |   |   |   |                        | Gross capital formation (in ln)  | World Development Indicators (WDI) by World Bank  |                                    |             |           |
|  |   |                            |   |   |   |                        | Government consumption (in ln)   |   |                                    |             |           |
|  |   |                            |   |   |   |                        | Savings (in ln)  |   |                                    |             |           |
| Population ages 15-64                          |   |                            |   |   |   |                        |  |   |                                    |             |           |
| Age  |   |                            |   |   |   |                        |  |   |                                    |             |           |
| Wong, Ho & Autio (2005)                        | 37 countries  | 1997/1998 to 2001/2002     | Linear least squares regression   | Growth in GDP per worker  | World Economic Outlook by the International Monetary Fund (IMF)                             | <i>Core variables</i>  | New Firm Creation – measured by High Potential TEA, Necessity TEA, Opportunity TEA and overall TEA rates | Global Entrepreneurship Monitor (GEM)   | N/A                                | 0           | 0         |
|  |   |                            |   |   |   | <i>Other variables</i> | Base year GDP per Worker   | Euromonitor Global, Market Information Database (GMID)  |                                    |             |           |
|  |   |                            |   |   |   |                        | Growth in Capital per worker   |   |                                    |             |           |
|  |   |                            |   |   |   |                        | Technological Innovation intensity   | US Patents and Trademark Office (USPTO)   |                                    |             |           |

| Author                                       | Countries                                   | Time-Frame               | Methodology                                 | Dependent variable                               | Data Source   | Independent variable |  | Data Source   | Results regarding entrepreneurship |             |           |
|--|---|--------------------------|---|--|---|----------------------|--|---|------------------------------------|-------------|-----------|
|  |   |                          |   |  |   |                      |  |   | Overall                            | Opportunity | Necessity |
| Ferreira, Fayolle, Fernandes & Raposo (2017) | 49-56 countries                             | 2009 to 2011; 2012; 2013 | Data Estimation in Panel with Fixed Effects | GDP growth (GDP_GR)                              | Organization for Economic Co-operation and Development and World Bank                                   | Core variable        | Schumpeterian entrepreneurship (INNOV)                       | Global Entrepreneurship Monitor (GEM)                                 | +++                                | +++         | N/A       |
|  |   |                          |   |  |   |                      | Kirzenian entrepreneurship (OPP)                             |   |                                    |             |           |
|  |   |                          |   | Total Early-Stage Entrepreneurial Activity (TEA) |   |                      |  |   |                                    |             |           |
|  |   |                          |   | Global Competitiveness Index (GCI)               | World Economic Forum  | Other variables      | Foreign direct investment (FDI)                              | International Monetary Fund   |                                    |             |           |
|  |   |                          |   |  |   |                      | Net goods exports (NET_EXP)                                  |   |                                    |             |           |
|  |   |                          |   | Labor productivity (LP)                          | International Labor Organization, Organization for Economic Co-operation and Development and World Bank | Other variables      | Gross capital formation (GCF)                                | Organization for Economic Co-operation and Development and World Bank |                                    |             |           |
|  |   |                          |   |  |   |                      | Life expectancy at birth (L_EXP)                             | United Nations  |                                    |             |           |
|  |   |                          |   |  |   |                      | Total population (POP)                                       |   |                                    |             |           |
| Rural population (RURAL_POP)                 | United Nations and World Bank               |                          |   |  |   |                      |  |   |                                    |             |           |
| Valliere & Peterson (2009)                   | 44 countries (20 emerging and 24 developed) | 2004 to 2005             | Hierarchical regression                     | GDP growth rate (GDPG)                           | Global Entrepreneurship Monitor (GEM)   | Core variables       | Overall entrepreneurial activity                             | Global Entrepreneurship Monitor (GEM)                                 | +                                  | +           | +         |
|  |   |                          |   |  |   |                      | Opportunity TEA  |   |                                    |             |           |
|  |   |                          |   |  |   |                      | Necessity TEA  |   |                                    |             |           |
|  |   |                          |   |  |   | Other variables      | Annual GDP growth rate                                       | Global Competitiveness Reports  |                                    |             |           |
|  |   |                          |   |  |   |                      | One-year lagged value of GDPG                                |   |                                    |             |           |
|  |   |                          |   |  |   |                      | Per-capita GDP, purchasing power parity                      |   |                                    |             |           |
|  |   |                          |   |  |   |                      | Per-capita foreign direct investment company spending on R&D |   |                                    |             |           |
|  |   |                          |   |  |   |                      | Intellectual property protection                             |   |                                    |             |           |
| Firm-level technology absorption             |   |                          |   |  |   |                      |  |   |                                    |             |           |
| Several others                               |   |                          |   |  |   |                      |  |   |                                    |             |           |
| Mroźewski & Kratzer (2017)                   | 96 countries                                | 2001 – 2012, 2006 - 2013 | Linear regression (OLS)                     | Country innovativeness                           | World Economic Forum  | Core variables       | Necessity entrepreneurship                                   | Global Entrepreneurship Monitor (GEM)                                 | N/A                                | ++          | --        |
|  |   |                          |   |  |   |                      | Opportunity entrepreneurship                                 |   |                                    |             |           |
|  |   |                          |   |  |   |                      | Entrepreneurial opportunity availability (EOA)               |   |                                    |             |           |
|  |   |                          |   |  |   | Other variables      | Country-level innovation (GCI innovation)                    | World Bank  |                                    |             |           |
|  |   |                          |   |  |   |                      | Country size (POP)   |   |                                    |             |           |
|  |   |                          |   |  |   |                      | Quality of human capital (EDUC)                              |   |                                    |             |           |
|  |   |                          |   |  |   |                      | Openness to international capital flows (FDI)                |   |                                    |             |           |
| Quality of institutional environment         |   |                          |   |  |   |                      |  |   |                                    |             |           |

Legend: +++ (++) (+) [(-) (-)] statistically and positively [negatively] significant at 1% (5%) (10%); 0: not significant; N/A: not applicable.  
Source: Own elaboration.

Given that entrepreneurship is highly dependent on human capital attributes of entrepreneurs (Marvel, Davis & Sproul, 2016), the impact of the former on economic growth is likely to be intermediated by countries' endowments in terms of education, experience and skills.

Such contribution tends to be even greater when the absorption and innovation capacity of a country is more intense (Nelson & Phelps, 1966), usually translated into higher levels of opportunity entrepreneurship. The more educated individuals are the greater is their ability to overcome social obstacles and take advantages of business opportunities that emerge and to deal with the risks and uncertainty inherent to self-employment (Lackéus, 2015).

Therefore, we conjecture that:

*Hypothesis 4: Human capital positively intermediates the impact of (the types of) entrepreneurship on countries' economic growth.*

### **2.2.3. Other determinants of economic growth**

A myriad of factors (beside entrepreneurship, the types of entrepreneurship, and human capital) are likely to affect countries' economic growth: physical investment (through public infrastructure capital or private sector) (Barro, 1991, 1996; Nourzad & Powell, 2003), population growth (Nourzad & Powell, 2003), trade openness (Barro, 1996; Nourzad & Powell, 2003) and corruption (Barro, 1991; Neeman & Paserman, 2008).

Several other factors were added by Barro (1996): life expectancy and fertility rates, the quantity (male secondary and higher schooling) and quality of education, expenditures in Research and Development (R&D), openness to trade, distribution of income and wealth, public policies (regarding taxes, pension and other transfer programs, and labor, financial and other markets regulations), and infrastructure investments.

### **3. Methodological aspects**

#### **3.1. Main hypotheses and method of analysis**

The main goal of this study is to assess the impact of (the types of) entrepreneurship on economic growth, directly and indirectly through human capital. According to the literature review (Section 2), four main hypotheses are to be tested:

Hypothesis 1: Entrepreneurship affects positively countries' economic growth.

Hypothesis 2: The types of entrepreneurship affect positively countries' economic growth.

Hypothesis 2a: Opportunity entrepreneurship affects positively countries' economic growth.

Hypothesis 2b: Necessity entrepreneurship affects positively countries' economic growth.

Hypothesis 2c: The impact of opportunity entrepreneurship on countries' economic growth is higher than that of necessity entrepreneurship.

Hypothesis 3: Human capital positively impacts on countries' economic growth.

Hypothesis 4: Human capital positively intermediates the impact of (the types of) entrepreneurship on countries' economic growth.

The development of rich generalizable theories might involve both quantitative and qualitative methods (Wilson, Whitmoyer, Pieper, Astrachan, Hair Jr. & Sarstedt, 2014). The present study, similar to other studies in the area (see Table 1), resorts to quantitative methods of analysis. According to Ferreira & Serra (2009), a quantitative research occurs when researchers use quantitative data about the object to be studied, and statistical tests are performed. These data can be collected directly or indirectly, through specific sources for the study to be performed (Fortin 1999; Ferreira & Serra, 2009). Using the quantitative research method, it is possible for the researcher to compare, reproduce and generalize similar situations, obtaining a greater degree of precision and objectivity given the systematization in the process of gathering data objectives and events which is independent from the researcher (Freixo, 2011).

Taking into account the studies described in Table 1, some authors chose different types of quantitative methods in order to achieve their goals. Specifically, they involve estimations using a panel fixed effects (Urbano & Aparício, 2016; Ferreira et al., 2017), hierarchical

regression (Valliere & Peterson, 2009), linear regression (OLS) (Mrozewski & Kratzer (2017), and linear least squares regression (Wong et al., 2005).

### 3.2. Econometric specification and selection of the estimation technique

In light of the literature reviewed (see Section 2), the baseline econometric specification regresses the level of the *per capita* Gross Domestic Product (GDPpc) against total entrepreneurship (TE), human capital (HC), the interaction between TE and HC and a set of control variables, **X** (trade openness, physical investment, government consumption, population growth, and institutional quality). The econometric specification of the model to estimate is:

$$y_{i,t} = \beta_1 + \beta_2 TE_{i,t} + \beta_3 TE_{i,t} \cdot HC\_d_{i,t} + \beta_4 HC_{i,t} + \beta_5 X_{i,t} + \mu_{i,t}, \quad (1)$$

where:

*i* represents the country and *t* represents time;

*y* represents the *per capita* Gross Domestic Product (GDPpc);

**HC\_d** represents a dummy which assumes value 1 when HC is high (above the average) and 0 otherwise;

**HC** represents a measure for the stock of human capital;

**TE** represents a measure for the total entrepreneurship;

**TE \* HC** interaction between the measures of human capital and the total entrepreneurship;

**X** encompasses the measures of the trade openness, physical investment, government consumption, population growth, and institutional quality;

**μ** is the error term.

Along with this basic equation, an analysis is made of the impact of the types of entrepreneurship on economic growth. The extended econometric specification is similar to the baseline, but instead of considering TE, it included the opportunity entrepreneurship (OE) and necessity entrepreneurship (NE):

$$y_{i,t} = \beta'_1 + \beta'_2 OE_{i,t} + \beta'_3 NE_{i,t} + \beta'_4 OE_{i,t} \times HC\_d_{i,t} + \beta'_5 NE_{i,t} \times HC\_d_{i,t} + \beta'_6 HC_{i,t} + \beta'_7 X_{i,t} + \mu'_{i,t}. \quad (2)$$

In the above equation, the dependent variable ( $y$ ) represents the *per capita* Gross Domestic Product (GDP<sub>pc</sub>); OE represents the Opportunity Entrepreneurship and NE represents the Necessity Entrepreneurship; OE×HC<sub>d</sub> is the interaction between human capital and the Opportunity Entrepreneurship, while NE×HC<sub>d</sub> means the interaction between Human Capital and Necessity Entrepreneurship;  $\mu'$  is the error term.

In order to estimate the effects of the relevant variables on economic growth, namely human capital and its interaction with different types of entrepreneurship, and in line with previous studies made by Urbano & Aparício (2016) and Ferreira et al. (2017), we selected panel data techniques for estimating the econometric specification described above.

It is important to bear in mind that when the described data is characterized by a combination of time series and cross-sectional dimensions, the study should employ panel data techniques. These panel techniques are typically assorted by three approaches: (1) Random effects model (the independent variables are uncorrelated with time constant individual effects); (2) Fixed-effects model (it exists a correlation between the explanatory variables and time invariant individual effects); and (3) pooled OLS estimator (it is a simple linear regression using a panel data arrangement) (Johnston & DiNardo, 1997; Gil-García & Puron-Cid, 2013).

Johnston & DiNardo (1997) and Greene (2001) argue that the OLS estimation may not be a proper technique for a panel data due to the nature of the pooling method to contempt the distinct attributes of individuals. In this context the authors recommended the use of random or fixed-effects models.

The method of analysis through panel data models allows the researcher to study the adjustment dynamics when carrying out an analysis in dynamic terms, estimating effects over a long period of time (Greene, 2011). Additionally, it enables the analysis of a set of variables for a large number of countries, providing more information (Greene, 2011). The estimation of panel data also allows us to assume that countries are heterogeneous with specific and unobservable characteristics. On the other hand, cross-section and times series estimates do not allow to control this heterogeneity, and because of that, the results may be skewed (Greene, 2011).

In the context of panel models, it is important to consider the existence of two types: 'random effects model' (REM) and 'fixed effects model' (FEM). The latter “computes estimates from differences in variables within country across time, on the assumption that individual effects are correlated over time, but are unrelated to other regressors” (Batten & Vo, 2009: pp. 1626). In contrast, the REM assumes that the observations (the countries) have unobservable and constant effects over time that are not correlated with the explanatory variables (Dreher, 2006; Batten & Vo, 2009). One advantage of FEM is that it does not attend to the problem of omitted variables (Batten & Vo, 2009). If the researcher selects the wrong econometric model it can be a huge problem because it can lead to wrong inferences (Onali, Ginesti & Vasilakis, 2017).

These methods must be preceded by specification tests, namely the Hausman test, in order to determine which of the two models are the most suitable (Johnston & DiNardo, 1997). When the Hausman test is insignificant, the REM model should be chosen because if the FEM model is used instead it “may result in statistically insignificant coefficients even when they would be statistically significant for the REM model” (Onali et al., 2017: pp. 463). The null hypothesis (H0) of the Hausman test establishes that the random effects model is more efficient than the fixed effects model.

### **3.3. Variable proxies, data collection and sources**

Our dependent variable is the per capita gross domestic product (GDPpc), in purchasing power parities (PPP), at constant prices (base year 2010) thousands of dollars, which is one of the best-known indicators of material economic performance (Urbano & Aparício, 2016) and it is also used by authors such as Wong et al. (2005), Dreher (2006) and Batten & Vo (2009). The data source for this measure is the World Development Indicator (WDI) by the World Bank.

The core independent variables are the total entrepreneurship (TE), opportunity entrepreneurship (OE), and the necessity entrepreneurship (NE). Two alternative set of proxies are used for these variables, one from the Global Entrepreneurship Monitor (GEM) and the other from the World Bank Indicators.

Regarding GEM's proxies, TE is measured by Total early-stage Entrepreneurial Activity (TEA), that is, the percentage of adults aged between 18–64 who are either a nascent

entrepreneur or owner-manager of a new business (up to 3.5 years old).<sup>1</sup> The OE is measured by the percentage of adults aged between 18–64 who are either a nascent entrepreneur or owner-manager of a new business (up to 3.5 years old), who are motivated to pursue perceived business opportunities.<sup>2</sup> On the other hand, NE is measured by the percentage of adults aged between 18–64 who are either a nascent entrepreneur or owner-manager of a new business (up to 3.5 years old), who are involved in entrepreneurship because they have no better option for work.<sup>3</sup> The GEM proxies are consistent and internationally comparable measures of entrepreneurship and its subtypes being frequently applied in empirical country-level investigations (e.g. Van Stel et al., 2005; Wennekers et al., 2005; Wong et al., 2005).

In what concerns the proxies drawn from the World Development Indicator (WDI) by World Bank, OE is measured by the percentage of employers in terms of total employment and NE as the percentage of self-employment in terms of total employment.

In order to collect data for Human Capital (HC), which in this case is measured by the average number of years of formal education of the working age population ( $\geq 25$  years), we use information extracted from a database constructed by Barro & Lee (2010) which covers the period from 1950 to 2010, referring to 146 countries. The data comes from Eurostat, UNESCO, national agencies, among others, and it is disaggregated for periods of 5 years. The recent unavailability of provided data only allows us to study this variable until the year 2010. Taking into account the fact that there has been an unavailability of data in the human capital variable since 2010, in this study, we fill in the missing values of the variables between the two quinquennia, considering that the compound annual growth rate is constant in that period (Table A 3 presents data of Human Capital from 1990 to 2016).

The other independent, control, variables, include Trade Openness (O), measured by the percentage of imports and exports of goods in terms of GDP; Physical Investment (I), measured by the Investment in physical capital (in percentage of the GDP) (Barro, 1991; Moral-Benito, 2012); Government Consumption (G), measured by the weight of public consumption in GDP and Population Growth (POP), measured by the population annual growth rate. All these indicators come from the World Development Indicators (WDI) by

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<sup>1</sup> Table A4, in Annexes, presents data of TE from 2001 to 2016.

<sup>2</sup> Table A5, in Annexes, presents data of OE from 2005 to 2015.

<sup>3</sup> Table A6, in Annexes, presents data of NE from 2001 to 2015.



World Bank. Finally, the variable Institutional Quality (INST) is measured by the corruption index and it was obtained from the Transparency International.

The description of the variables, period of data availability and their source are presented in Table 2.

**Table 2: Description of the variables and data sources**

|             | Variables                                 | Description  | Proxies  | Period       | Source   |
|-------------|---|--|--|--------------|--|
| Dependent   | Gross Domestic Product per capita (GDPpc) | Measure of the total output of a country that takes gross domestic product (GDP) divided by the number of people in the country              | Gross Domestic Product per capita (GDPpc)  | 1990 to 2016 | World Development Indicator (WDI) by World Bank  |
|             | Total entrepreneurship (TE)               | Percentage of individuals who set up a business or owning-managing a young firm.   | Percentage of adults aged 18–64 setting up a business or owning-managing a young firm (up to 3.5 years old).   | 2001 to 2016 | Global Entrepreneurship Monitor (GEM)            |
| Independent | Opportunity entrepreneurship (OE)         | Percentage of individuals who set up a business or owning-managing a young firm who are motivated to pursue perceived business opportunities | Percentage of adults aged 18–64 setting up a business or owning-managing a young firm (up to 3.5 years old), including self-employment who are motivated to pursue perceived business opportunities.   | 2005 to 2015 |  |
|             | Necessity entrepreneurship (NE)           | Employers in % of total employment   | Percentage of workers who, working on their own account or with one or a few partners, hold jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced), and that have one or more persons to work for them as employee(s). | 1990 to 2016 | World Development Indicator (WDI) by World Bank  |
|             |   | Percentage of individuals who set up a business or owning-managing a young firm because they have no better option for work                  | Percentage of adults aged 18–64 setting up a business or owning-managing a young firm (up to 3.5 years old), including self-employment who are involved in entrepreneurship because they have no better option for work  | 2001 to 2015 | Global Entrepreneurship Monitor (GEM)            |
|             | Human Capital (HC)                        | Self-employment in % of total employment   | Percentage of workers that have their own business or work with one or a few partners and that hold jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced.   | 1990 to 2016 | World Development Indicator (WDI) by World Bank  |
|             |   | Human capital  | Average number of years of formal education of the working age population ( $\geq 25$ years)   | 1950 to 2010 | Barro & Lee (2010)                               |
| Control     | Trade openness (O)                        | Represent the value of all goods and other market services received/provided from/to the rest of the world.                                  | Sum of exports and imports of goods and services measured as a share of GDP.   | 1960 to 2016 | World Development Indicators (WDI) by World Bank |
|             | Physical investment (I)                   | It consists in the acquisition/investment in a tangible, hard or real asset  | Gross capital formation as percentage of the GDPpc   | 1960 to 2016 |  |
|             | Government consumption (G)                | All government current expenditures for purchases of goods and services, in percentage of the GDP  | Government consumption as percentage GDP   | 1960 to 2016 |  |
|             | Population growth (POP)                   | It can be measured by the difference between birth rates and death rates   | Annual population growth rate for year t is the exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage   | 1960 to 2016 |  |
|             | Institutional quality (INST)              | It corresponds to the measure of the quality of governance and institutions in a country <sup>4</sup>  | Corruption index <sup>5</sup>  | 1995 to 2016 | Transparency International                       |

Source: Own elaboration.

<sup>4</sup> Information available on: <https://www.igi-global.com/dictionary/institutional-quality/44120> and accessed on January 2018.

<sup>5</sup> Scale of 0 - 10, where 0 means that a country is perceived as highly corrupt and 10 means that a country is perceived as very clean.

In terms of data, the present study considers a sample of 79 countries - 34 OECD and 45 non-OECD countries<sup>6</sup> (see Table A1, in Annexes, for the list of countries) – for which we found data for all the (dependent and independent) variables. It is important to note that in the particular case of the GEM’s entrepreneurship variables, we cannot consider the whole sample of countries because of the unavailability of data - Table A2, in Annexes, presents the effective number of observation by country and variable for the chosen period.

We estimate two models for the specification (2), which reflect the usage of two distinct data sources for the main independent variables respecting the entrepreneurship types. Model B1 considers Employers (E) and Self-Employment (SE) as proxies for the variables ‘opportunity entrepreneurship’ and ‘necessity entrepreneurship’, comprising the period 1990-2016 (26 years). Models B2 uses GEM’s related proxies ‘Opportunity entrepreneurship’ and ‘Necessity entrepreneurship’, comprising a shorter period of time, 2001-2015 (14 years).

Table 3 presents a summary of the data information regarding the models’ variables.

**Table 3: Models’ specifications**

|             | Variables                                 | Model A<br>2001-2016              | Model B1<br>1990-2016 | Model B2<br>2001-2015 |
|-------------|---|-----------------------------------|-----------------------|-----------------------|
| Dep.        | Gross Domestic Product per capita (GDPpc) |                                   |                       |                       |
| Independent | Total entrepreneurial (TE)                |                                   |                       |                       |
|             | Opportunity entrepreneurship              | Employers (E), WBI                |                       |                       |
|             |   | Opportunity entrepreneurship, GEM |                       |                       |
|             | Necessity entrepreneurship                | Self-Employment (SE), WBI         |                       |                       |
|             |   | Necessity entrepreneurship, GEM   |                       |                       |
|             | Human Capital (HC)                        |                                   |                       |                       |
|             | HC*TE                                     |                                   |                       |                       |
| HC*OE       |   |                                   |                       |                       |
| Control     | Trade Openness (O)                        |                                   |                       |                       |
|             | Physical investment (I)                   |                                   |                       |                       |
|             | Government consumption (G)                |                                   |                       |                       |
|             | Population growth (POP)                   |                                   |                       |                       |
|             | Institutional quality (INST)              |                                   |                       |                       |

Source: Own elaboration.

Note: Blank cells means that the variables are not included; \*models with interaction variables.

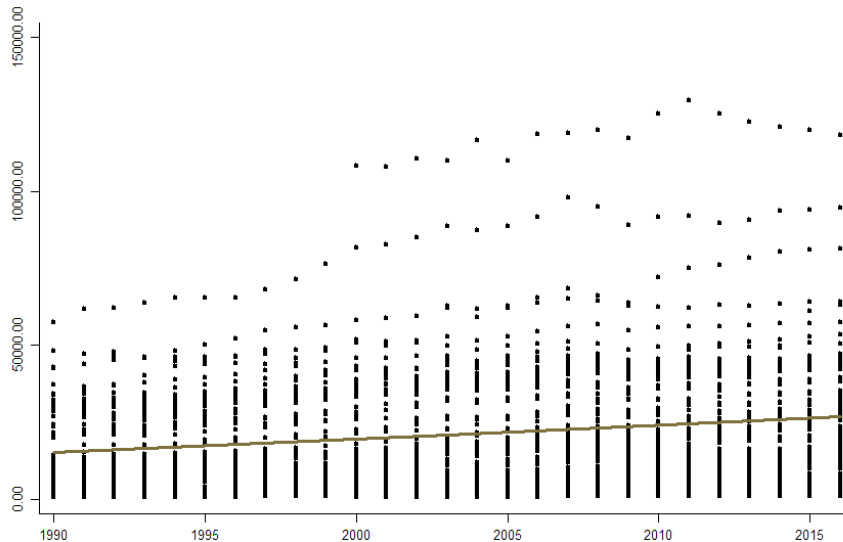
<sup>6</sup> We used the classification of the OECD: <http://www.oecd.org/about/membersandpartners/list-oecd-member-countries.htm>, accessed on January, 2018.

## 4. Empirical results

### 4.1. Brief descriptive analysis of the relevant variables

The primary objective of this study is to assess the impact of entrepreneurship and entrepreneurship types on economic growth, including the interaction effects of these variables with human capital. Thus, we proceed with an exploratory analysis of the relevant variables taking into account their time evolution by continent, detailing within each continent how countries position themselves against each other. Additionally, we analyse the correlation matrix for all variables.

The GDPpc variable presents 2091 observations which ranges between 711.2 (Malawi in 1994) and 129349.9 dollars (Qatar in 2011) within the observed period, with an average of 21087.6 dollars. Over the past 28 years, the selected countries have experienced an evolution of their GDP per capita. As we can observe in Figure 1, there is a positive growth tendency of the real GDPpc over the period in analysis.

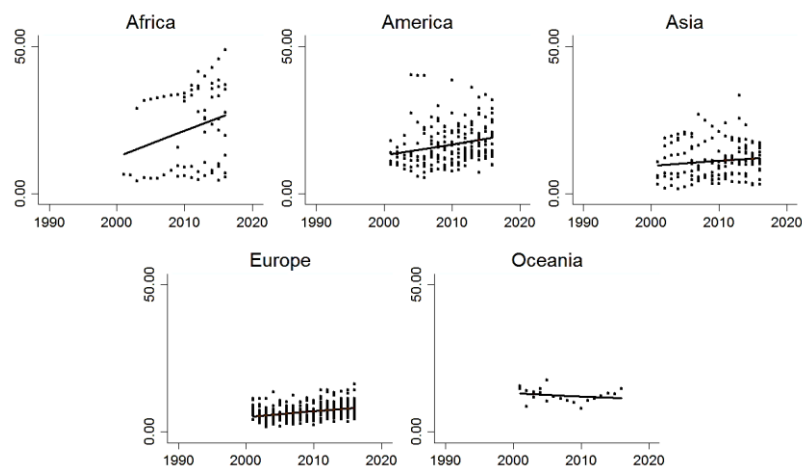


**Figure 1: Evolution of Gross Domestic Product per capita, 1990-2016**

*Source:* Stata v14 program (data from World Bank Indicators)

*Note:* **Europe:** Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom. **Asia:** Bangladesh, China, India, Indonesia, Israel, Japan, Jordan, Kazakhstan, Malaysia, Namibia, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Thailand, Turkey, Vietnam. **Africa:** Botswana, Cameroon, Ghana, Malawi, Morocco, Senegal, South Africa, Tunisia, Uganda, Zambia. **America:** Costa Rica, El Salvador, Guatemala, Panama, Mexico, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay, Barbados, Belize, Dominican Republic, Jamaica, Canada, United States. **Oceania:** Australia, New Zealand

Regarding the entrepreneurship variables, we observe that, for the whole sample, the average global entrepreneurship rate is 11.5%. For this indicator, we can state that in Japan (2004) only 1.48% of the individuals set up a business, while in Zambia (2016) the percentage of individuals who set up a business or own/manage a young firm achieved 48.8%. Additionally, there is a growth tendency of the total entrepreneurship variable in almost every continents with exception to Oceania, which presents stationary values between 2001 and 2016 (see Figure 2).

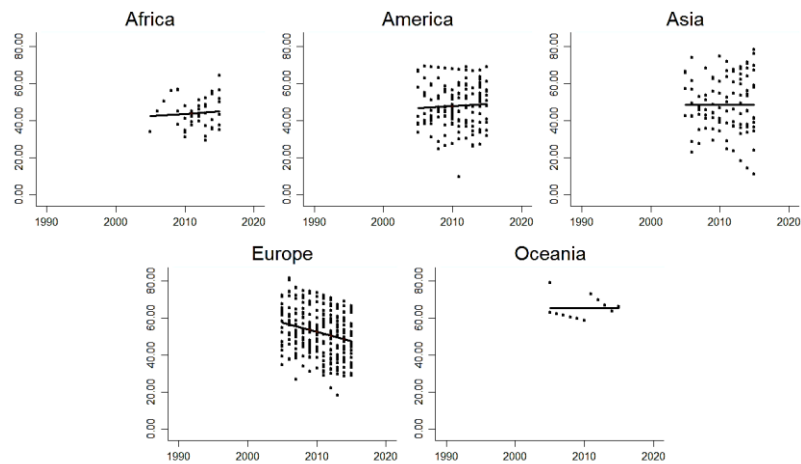


**Figure 2: Evolution of Total Entrepreneurship, by continents**

*Source:* Stata v14 program (data from GEM)

*Note:* **Europe:** Bulgaria, Czech Republic, Estonia, Finland, Germany, Greece, Iceland, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, Switzerland, United Kingdom; **Asia:** Bangladesh, China, India, Indonesia, Japan, Jordan, Kazakhstan, Malaysia, Namibia, Qatar, Turkey, Vietnam; **Africa:** Botswana, Cameroon, Senegal, Zambia; **America:** Guatemala, Panama, Mexico, Argentina, Brazil, Colombia, Uruguay, Barbados, Belize, Jamaica, Canada. **Oceania:** Australia, New Zealand.

When considering the type of entrepreneurship, we observe that, on average, 50.1% of the individuals set up a business or own a young firm motivated by the pursue of business opportunities. This indicator reaches the highest value for Norway (81.5%), in 2006, and the lowest, 8.2%, for Uruguay, in 2011. There is a negative growth tendency over time of the opportunity entrepreneurship variable in Europe (see Figure 3). In contrast, there is a slight positive growth tendency in Africa and America and a stability of values in Asia and Oceania.

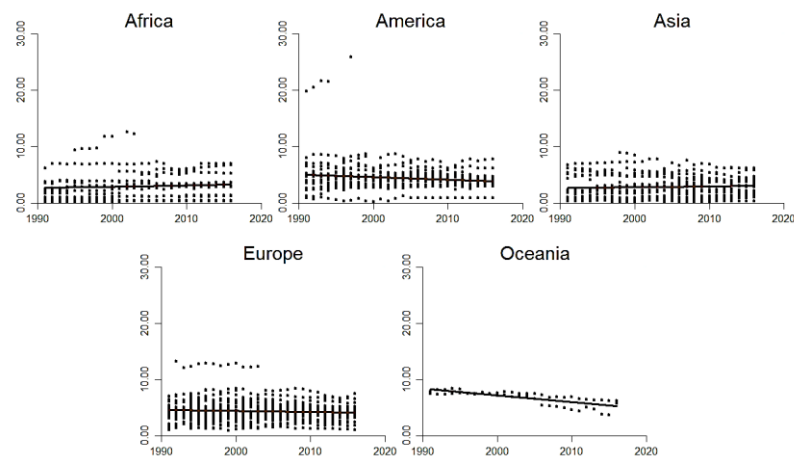


**Figure 3: Evolution of Opportunity Entrepreneurship, by continents**

*Source:* Stata v14 program (data from GEM)

*Note:* Europe: Bulgaria, Czech Republic, Estonia, Finland, Germany, Greece, Iceland, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, Switzerland, United Kingdom; Asia: Bangladesh, China, India, Indonesia, Japan, Jordan, Kazakhstan, Malaysia, Namibia, Qatar, Turkey, Vietnam; Africa: Botswana, Cameroon, Senegal, Zambia; America: Guatemala, Panama, Mexico, Argentina, Brazil, Colombia, Uruguay, Barbados, Belize, Jamaica, Canada. Oceania: Australia, New Zealand.

The other proxy for opportunity entrepreneurship, the percentage of individuals who are ‘employers’, presents a global average of 3.9%. Its highest (25.9%) and lowest (0.1%) values were registered in Belize (1997), and Uganda (1991)/Vietnam (1998), respectively. According to Figure 4, the variable depicts a stationary trend in almost every continents over time, excluding America and Oceania, which present a slight negative trend.



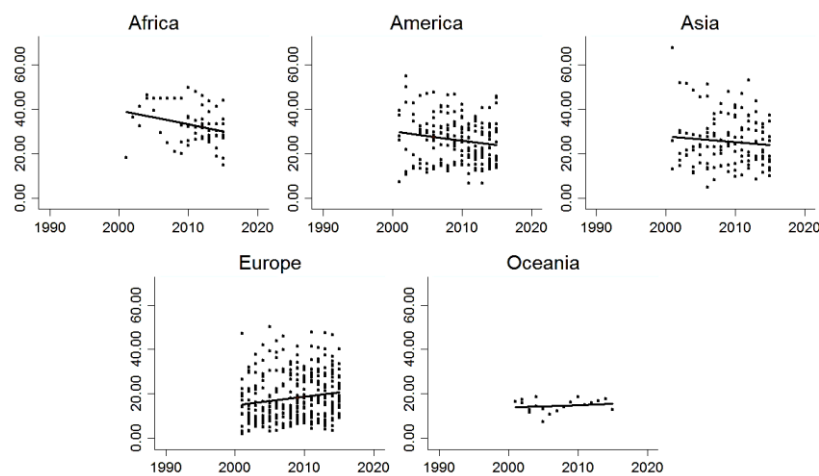
**Figure 4: Evolution of the share of employers, by continents**

*Source:* Stata v14 program (data from World Bank Indicators)

*Note:* **Europe:** Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom. **Asia:** Bangladesh, China, India, Indonesia, Israel, Japan, Jordan, Kazakhstan, Malaysia, Namibia, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Thailand, Turkey, Vietnam. **Africa:** Botswana, Cameroon, Ghana, Malawi, Morocco, Senegal, South Africa, Tunisia, Uganda, Zambia. **America:** Costa Rica, El Salvador, Guatemala, Panama, Mexico, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay, Barbados, Belize, Dominican Republic, Jamaica, Canada, United States. **Oceania:** Australia, New Zealand.

Finally, in what respects to necessity entrepreneurship, on average, 22.7% of the individuals located in the selected countries set up a business or own a young firm (up to 3.5 years old) because they have no better option for work. The highest value for this variable (67.8%) occurs in India, in 2001, whereas the lowest (1.8%) happens in Norway, also in 2001.

There is a negative growth tendency over time of the necessity entrepreneurship variable in Africa, Asia and America. In contrast, there is a positive growth tendency in Europe and Oceania (see Figure 5).



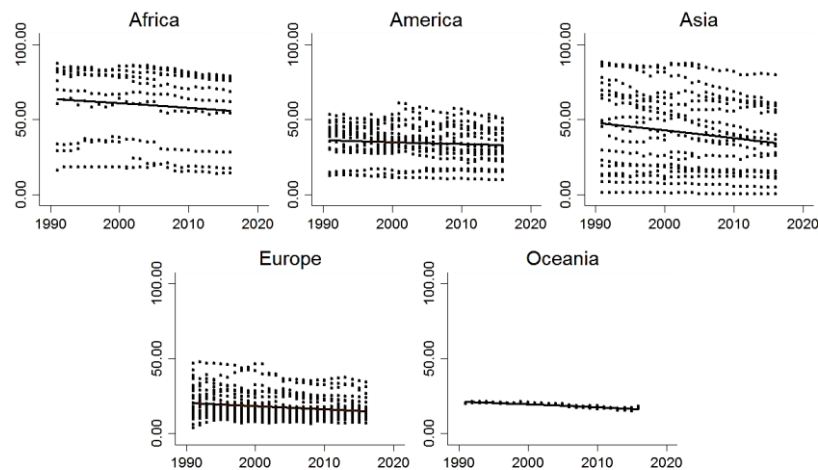
**Figure 5: Evolution of necessity entrepreneurship, by continents**

*Source:* Stata v14 program (data from GEM)

*Note:* **Europe:** Bulgaria, Czech Republic, Estonia, Finland, Germany, Greece, Iceland, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, Switzerland, United Kingdom; **Asia:** Bangladesh, China, India, Indonesia, Japan, Jordan, Kazakhstan, Malaysia, Namibia, Qatar, Turkey, Vietnam; **Africa:** Botswana, Cameroon, Senegal, Zambia; **America:** Guatemala, Panama, Mexico, Argentina, Brazil, Colombia, Uruguay, Barbados, Belize, Jamaica, Canada. **Oceania:** Australia, New Zealand.

The other proxy for ‘necessity entrepreneurship’, ‘self-employment’, reaches a global average of 32.4% with a maximum, in 1991, for Vietnam (88.0%), and a minimum of 0.5%, in 2009, for Qatar.

All continents depict a negative trend during the period (see Figure 6). In every continent, except for Europe, the value of self-employment increases until 2000, registering a fall afterwards. Oceania, America and Europe record low values of self-employment, whereas Asia and Africa record the highest values.



**Figure 6: Evolution of self-employment, by continents**

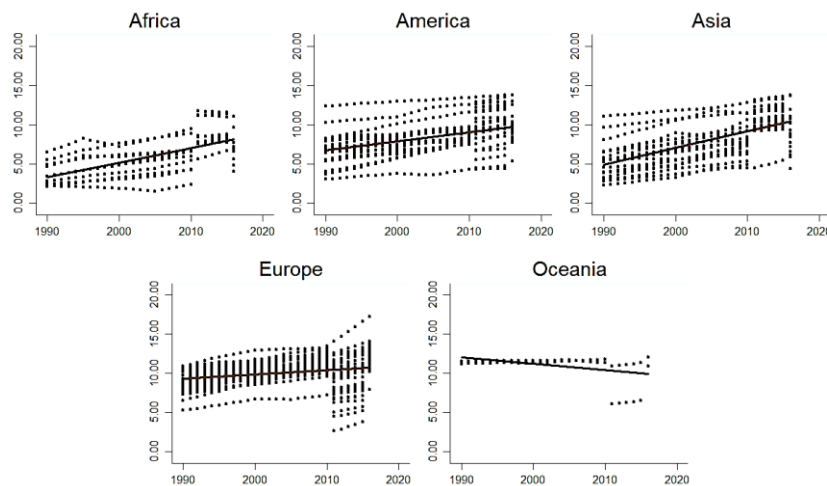
Source: Stata v14 program (data from World Bank Indicators)

(Note: **Europe:** Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom. **Asia:** Bangladesh, China, India, Indonesia, Israel, Japan, Jordan, Kazakhstan, Malaysia, Namibia, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Thailand, Turkey, Vietnam. **Africa:** Botswana, Cameroon, Ghana, Malawi, Morocco, Senegal, South Africa, Tunisia, Uganda, Zambia. **America:** Costa Rica, El Salvador, Guatemala, Panama, Mexico, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay, Barbados, Belize, Dominican Republic, Jamaica, Canada, United States. **Oceania:** Australia, New Zealand)

Regarding the human capital variable, Senegal recorded, in 2005, only 1.5 years of formal education of the working age population (with  $\geq 25$  years old) while in 2010, in Switzerland and United States, the number of years of formal education achieved 13.4. For the whole sample, the average human capital is 8.5.

Human capital grows over the period in analysis in almost every continent, with exception of Oceania, which presents a slight negative trend between 1990 and 2016 (see Figure 7). Africa recorded lowest levels of human capital during this period.





**Figure 7: Human Capital evolution by continents**

Source: Stata v14 program (data from Barro & Lee 2010)

(Note: **Europe:** Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom. **Asia:** Bangladesh, China, India, Indonesia, Israel, Japan, Jordan, Kazakhstan, Malaysia, Namibia, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Thailand, Turkey, Vietnam. **Africa:** Botswana, Cameroon, Ghana, Malawi, Morocco, Senegal, South Africa, Tunisia, Uganda, Zambia. **America:** Costa Rica, El Salvador, Guatemala, Panama, Mexico, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay, Barbados, Belize, Dominican Republic, Jamaica, Canada, United States. **Oceania:** Australia, New Zealand)

The average value of government consumption, in percentage of the GDP, is 16.4%, ranging between 2.98% (Argentina, 1992) and 34.4% (Qatar, 1994). Population growth values range between -5.8% (Croatia, 1991) and 16.3% (Qatar, 2007), with an average value of 1.2%.

The average value (5.3) for the institutional quality indicator – corruption perception index (0: highly corrupt... 10: highly transparent) – reflects that, for the sample as whole, countries are not perceived as highly corrupt or are relatively clean. Brazil emerges as one of the most corrupt countries with a corruption perception index of 0.35 (the lowest transparency level), in 2005. In contrast, Denmark (1998 and 1999) and Finland (2000) are perceived as a very clean/transparent countries, with a score of 10 (highest transparency) in the corruption index.

Regarding the trade openness variable, Argentina recorded, in 1991, only 13.8% of goods and other market services received/provided from/to the rest of the world, while, in 2008, for Singapore the number exports and imports of goods and services measured as a share of GDP achieved 441.6%. For the whole sample, the average trade openness rate is 81.8%.

Finally, in what respects to the gross capital formation, Bulgaria recorded, in 1996, only 0.3% on acquisitions/investments in a tangible, hard or real asset, while in 2011, China presented a value of 47.7% of gross capital formation. For the whole sample, the average gross capital formation rate is 23.5%.

**Table 4: Descriptive analysis, Correlation Matrix and VIF test**

|             | Variables                                  | Descriptive statistics            |          |          |        |           | Correlation Matrix |       |       |       |       |       |       |       |       |       |      |      | VIF |      |      |
|-------------|--|-----------------------------------|----------|----------|--------|-----------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|------|------|
|             |  | Obs                               | Mean     | St.dev   | Min    | Max       | GDPpc              | TE    | OE    | NE    | SE    | EMP   | HC    | G     | POP   | INST  | O    | I    |     |      |      |
| Dep.        | Gross Domestic Product per capita (GDPpc)* | 2091                              | 21087.56 | 18877.08 | 711.19 | 129349.90 | 1.00               |       |       |       |       |       |       |       |       |       |      |      |     |      |      |
| Independent | Total entrepreneurship (TE)                | 793                               | 11.51    | 7.96     | 1.48   | 48.81     | -0.53              | 1.00  |       |       |       |       |       |       |       |       |      |      |     | 1.73 |      |
|             | GEM  | Opportunity entrepreneurship (OE) | 575      | 50.13    | 12.74  | 9.82      | 81.50              | 0.54  | -0.23 | 1.00  |       |       |       |       |       |       |      |      |     |      |      |
|             |  | Necessity entrepreneurship (NE)   | 740      | 22.67    | 11.26  | 1.84      | 67.77              | -0.63 | 0.38  | -0.66 | 1.00  |       |       |       |       |       |      |      |     |      |      |
|             | WBI  | Self-Employment (SELF)            | 2054     | 32.40    | 22.20  | 0.50      | 88.00              | -0.71 | 0.68  | -0.39 | 0.48  | 1.00  |       |       |       |       |      |      |     |      | 2.60 |
|             |  | Employers (EMP)                   | 2054     | 3.91     | 2.24   | 0.10      | 25.90              | 0.17  | -0.29 | 0.04  | -0.14 | -0.30 | 1.00  |       |       |       |      |      |     |      | 2.42 |
|             | Human Capital (HC)                         | 2133                              | 8.55     | 2.73     | 1.52   | 17.19     | 0.14               | -0.18 | -0.01 | -0.05 | -0.16 | 0.02  | 1.00  |       |       |       |      |      |     | 1.12 |      |
| Control     | Government consumption (G)                 | 2075                              | 16.37    | 5.20     | 2.98   | 34.46     | 0.44               | -0.47 | 0.39  | -0.35 | -0.63 | 0.22  | 0.08  | 1.00  |       |       |      |      |     | 1.70 |      |
|             | Population growth (POP)                    | 2131                              | 1.18     | 1.38     | -5.81  | 16.33     | -0.06              | 0.46  | 0.01  | 0.04  | 0.39  | -0.12 | -0.17 | -0.34 | 1.00  |       |      |      |     | 1.39 |      |
|             | Institutional quality (INST)               | 1479                              | 5.28     | 2.28     | 0.37   | 10.00     | 0.82               | -0.47 | 0.60  | -0.65 | -0.70 | 0.16  | 0.12  | 0.54  | -0.15 | 1.00  |      |      |     | 1.78 |      |
|             | Trade openness (O)                         | 2.092                             | 81.88    | 53.81    | 13.75  | 441.60    | 0.45               | -0.16 | 0.19  | -0.27 | -0.26 | 0.02  | 0.07  | -0.01 | 0.01  | 0.27  | 1.00 |      |     | 1.21 |      |
|             | Physical investment (I)                    | 2.076                             | 23.48    | 6.11     | 0.30   | 47.69     | -0.14              | 0.19  | -0.01 | 0.10  | 0.30  | -0.20 | 0.11  | -0.29 | 0.17  | -0.18 | 0.01 | 1.00 |     | 1.09 |      |

Source: Own elaboration (extracted data from Stata v14 program); \* values in dollars

Note: Annexes A3, A4, A5 and A6 present the values of Human Capital, TE, OE and NE respectively

Table 4 reports the number of observations, means, standard deviations, maximum, minimum value and correlation coefficients of the variables used in this study. The correlation matrix evidences that richer countries (with a relatively high GDP per capita) tend to present lower global and necessity entrepreneurship rates and higher opportunity entrepreneurship rate and human capital. Additionally, more prosperous countries tend to present lower population growth and (physical) investment rates, spending more in terms of public consumption, being more open to trade, and characterized by higher levels of transparency (institutional quality).

## 4.2. Estimation results

We estimate 3 models (Model A, Model B1 and Model B2) that correspond to the different combinations of the entrepreneurship variables. The models are estimated using fixed effects panel techniques.

Model A includes ‘Total Entrepreneurship’ (TE) as core independent variable as well as the interaction between ‘Total Entrepreneurship’ and ‘Human capital’.

Models B1 and B2 include, respectively the types of entrepreneurship as core independent variables, Opportunity Entrepreneurship (OE) and Necessity Entrepreneurship (NE) and their interaction with human capital, considering the measures drawn from the World Bank indicators - Employers (E) is the proxy used for ‘Opportunity Entrepreneurship’ (OE) and Self-Employment (SE) for ‘Necessity Entrepreneurship’, the Global Entrepreneurship (GEM) database.

Before the estimations of the panel we perform several diagnosis tests, most notably testing for multicollinearity of the explanatory variables and the heteroscedasticity of the random errors. The Variance Inflation Factors (VIF) coefficients evidence that no signs of serious multicollinearity among the explanatory variables (Mean VIF < 10).<sup>7</sup> Regarding heteroscedasticity, we carry out the Breusch-Pagan test to check whether the errors terms

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<sup>7</sup> It is important to note that Variance inflation factors range from 1 upwards. VIF shows which percentage of the variance is inflated for each coefficient. For example, a VIF of 1.78 informs that the variance of a particular coefficient is 78% bigger than what we would expect if there was no multicollinearity — that is, if there was no correlation with other predictors. Thus, as a ‘rule of thumb’, VIF=1: not correlated; 1<VIF <=5: moderately correlated; IF > 5: highly correlated. (see <http://www.statisticshowto.com/variance-inflation-factor/>, accessed on 5<sup>th</sup> April 2018).

were homoscedastic. The null hypothesis (H0) underlying this test states that there are constant variances. After the Breusch-Pagan test, we reject the null hypothesis for the commonly used levels of significance (i.e. 1%, 5% and 10%) for the 3 estimated models (see Table 5). Since our models show the presence of heteroscedasticity it was necessary to estimate the models with robust standard errors.

According to the literature and since we have a diverse set of countries with the limited set of explanatory variables being unable to address all the countries' idiosyncrasies, we content that the fixed effects panel model would be more adequate. The Hausman test, whose null hypothesis (H0) is that the differences between the coefficients of the random effect and fixed effect models are not systematic, yields that in Model B1 the null hypothesis is rejected; for the remaining models, the null hypothesis was accepted. Despite the latter, and given the theoretical argumentation mentioned above, we opted to estimate all models using the fixed effects panel technique.

In general, the estimated models have a good quality of adjustment as reflected by the F-statistics and the *R*-squared measure (see Table 5). Looking at the F-statistics and their respective p-values, we can conclude that models are globally significant.

Analyzing the estimates, we found a positive and statistically significant direct impact of total entrepreneurship on the economic growth (see Model A:  $\hat{\beta} = 0.0627$ ,  $p < 0.01$ ). This corroborates H1 ("*Entrepreneurship affects positively countries' economic growth*") and suggests, as postulated in the literature, that, on average, all the remaining factors being held constant, countries that present high percentages of entrepreneurs (that is, working age individuals who set up a business or owning–managing a young firm) tend to present high growth performances.

Such results support Schumpeter's theory which predicts that an increase in the number of entrepreneurs fosters economic growth thanks to his/her innovation traits and ability to make new combinations of productive resources (Schumpeter, 1942; Wong et al. 2005; Fontenele, 2010) and that an entrepreneurial behavior should be used as a key factor to drive economic development, since an entrepreneurial activity leads to the process of creative destruction (Shumpeter, 1934).

Considering several studies made on this subject, we can confirm that our results are in line with the literature. Thus, similarly to the study of Stam & van Stel (2009), which tests the impact of entrepreneurial activity on GDP growth over a four year period for a sample of 36 countries participating in the GEM in 2002, we corrobore the fact that entrepreneurship is a

driver of economic growth and it could be the fourth production factor in the production function.

Our results are also in agreement with the viewpoint of evolutionary economics. As Wong et al. (2005: pp. 337) suggest in their study, which uses an augmented Cobb–Douglas production to explore firm formation and technological innovation in a cross-sectional data on the 37 countries participating in GEM 2002, entrepreneurship contributes to economic development “by introducing innovations, creating change, creating competition and enhancing rivalry, which involves the development of new products, new processes, new sources of supply and also the exploitation of new markets and the development of new ways to organize business”. Additionally, it states that entrepreneurs bring new ideas to markets and stimulate growth through a process of competitive firm selection by reallocating resources from less to more productive uses (Wong et al., 2005).

According to the work of Acs et al. (2012), which considers a panel data of 18 OECD countries over the period between 1981 and 1998, when using ideas that in other ways might not be used and introducing them into the market through the creation of a new firm, entrepreneurship is shown to positively influence economic growth.

More recent studies also corroborate our results. Considering the study of Urbano & Aparício (2016) through a panel-data analysis with 43 countries in the period from 2002 to 2012, we found that regardless the type of countries (OECD or non-OECD) and the type of period considered (crisis or post-crisis) the impact of the overall total entrepreneurial activity (TEA) on economic growth is positive. Also, Ferreira et al. (2017), considering Schumpeterian and Kirzenian approaches to entrepreneurship, reported that the overall entrepreneurship holds a statistically significant influence on the global competitiveness index (their proxy for economic growth) using an unbalanced panel data for 43 countries in the period from 2009 to 2013. The study of Mrożewski & Kratzer (2017) uses a moderated OLS regression analysis, corrected for heteroscedasticity, and considers a cross-section design during the period 2011-2012 (55 countries) to conduct the empirical analysis which suggest that entrepreneurship contributes to innovation.

Suming up, our results, using a larger and more diversified sample of 79 countries corroborate and reinforce most of the extant studies made by several authors who demonstrate that overall entrepreneurship is positively related to economic growth .

Table 5: Panel data fixed effects estimations (robust errors): dependent variable - GDP per capita

|                         | Variables   | Hypothesis                                    | Model A<br>2001-2016  | Model B1<br>1990-2016 | Model B2<br>2001-2015 |                    |
|-------------------------|---|---|---|-----------------------|-----------------------|--------------------|
| Direct Effect           | Total entrepreneurial (TE)                                |   | <i>H1: Entrepreneurship affects positively countries' economic growth.</i>              |                       |                       |                    |
|                         | Opportunity entrepreneurship                              | Employers (EMP), WBI                          | <i>H2a: Opportunity entrepreneurship affects positively countries' economic growth.</i> | 0.0627***<br>0.0230   | 0.0985**<br>0.0474    | 0.0625**<br>0.0252 |
|                         |   | Opportunity entrepreneurship (OE), GEM        |   |                       |                       |                    |
|                         | Necessity entrepreneurship                                | Self-Employment (SELF), WBI                   | <i>H2b: Necessity entrepreneurship affects positively countries' economic growth.</i>   | -0.6061***<br>0.1217  | -0.0871***<br>0.0271  |                    |
|                         |   | Necessity entrepreneurship (NE), GEM          |   |                       |                       |                    |
|                         | Human Capital (HC)  |   | <i>H3: Human capital positively impacts on countries' economic growth.</i>              |                       |                       |                    |
| Interaction variables   | TE <sub>x</sub> HC <sub>d</sub>                           |   | -0.0016<br>0.0121   |                       |                       |                    |
|                         | Opportunity entrepreneurship                              | EMP <sub>x</sub> HC <sub>d</sub>              | -0.0386<br>0.0296   |                       |                       |                    |
|                         |   | OE <sub>x</sub> HC <sub>d</sub>               | -0.0746***<br>0.0247  |                       |                       |                    |
|                         | Necessity entrepreneurship                                | SEL <sub>F</sub> <sub>x</sub> HC <sub>d</sub> | 0.0321**<br>0.0151  |                       |                       |                    |
|                         |   | NE <sub>x</sub> HC <sub>d</sub>               | 0.0978***<br>0.0324   |                       |                       |                    |
| Control variables       | Trade Openness (O)  |   | 0.1101<br>0.0903  |                       |                       |                    |
|                         | Physical investment (I)                                   |   | 0.1976***<br>0.0679   |                       |                       |                    |
|                         | Government consumption (G)                                |   | 0.1499<br>0.1105  |                       |                       |                    |
|                         | Population growth (POP)                                   |   | -0.1200<br>0.0839   |                       |                       |                    |
|                         | Institutional quality (INST)                              |   | 0.1352**<br>0.0606  |                       |                       |                    |
| Years × Countries       |   | N   | 766   | 1466                  | 550                   |                    |
| Goodness of fit         | R-squared   |   | 0.3645  | 0.7453                | 0.3305                |                    |
|                         | F-statistics ( <i>p</i> -value)                           |   | 6.460<br>(0.000)  | 17.460<br>(0.000)     | 5.900<br>(0.000)      |                    |
| Diagnosis tests         | Breusch-Pagan / Cook-Weisberg test for heteroskedasticity |   | 396.85<br>(0.000)   | 52.85<br>(0.000)      | 396.85<br>(0.000)     |                    |
|                         | Mean VIFs   |   | 1.74  | 2.71                  | 6.46                  |                    |
| Fixed vs Random Effects |   | Hausman test                                  | Chi2<0  | 108.40<br>(0.000)     | Chi2<0                |                    |

Source: Own elaboration (using Stata v14).

Notes: \*\*\* (\*\*) [\*] Statically significant at 1% (5%) [10%]; Highlighted cells show the statistically significant estimates; Excluding the dummy variable for human capital (HC<sub>d</sub>, which assumes the value 1 when HC is above the average and 0 otherwise), all the variables are in logarithms; Heteroscedasticity corrected - robust standard errors are shown in parentheses.

Despite the fact that Marvel, Davis & Sproul (2016) state that entrepreneurship is highly dependent on human capital attributes of entrepreneurs and the impact of the former on economic growth is likely to be intermediated by countries' endowments in terms of education, experience and skills, there is insufficient evidence in our results to assess the impact of total entrepreneurship through human capital on economic growth. Indeed, there is not enough evidence (the estimates are not statistically significant) regarding the potential increase or decrease that human capital could bring to total entrepreneurship. Thus, we are not able to validate or invalidate the hypothesis H4 (*"Human capital positively intermediates the impact of entrepreneurship on countries' economic growth"*).

Regarding the types of entrepreneurship, when we use the WBI proxies for opportunity (Employers) and necessity (Self-employment) entrepreneurship, which encompass a longer time period (1990-2016), results are in line with the extant literature. Specifically, we verify (see Model B1) a positive and statistically significant estimate associated with the variable opportunity entrepreneurship ( $\hat{\beta} = 0.0985$ ,  $p < 0.05$ ). With GEM proxies, involving a shorter time period (2001-2015), we also verify (see Model B2) a positive and statistically significant estimate associated with the variable opportunity entrepreneurship ( $\hat{\beta} = 0.0625$ ,  $p < 0.05$ ). Thus, the hypothesis H2a (*"Opportunity entrepreneurship affects positively countries' economic growth"*) is confirmed. This suggests that, controlling for a set of factors that are likely to influence countries' economic growth, opportunity entrepreneurship significantly fosters growth, which can be explained, at least in part, by the existence of economic rents derived from the implementation or creation of (new) knowledge and technology (Wong et al., 2005; Audretsch et al., 2008; Urbano & Aparicio, 2016).

Concerning necessity entrepreneurship (both GEM and WBI proxies), we found a negative and statistically significant estimates, indicating that countries which present higher levels of necessity entrepreneurship tend, on average, to growth less (see Model B1:  $\hat{\beta} = -0.6061$ ,  $p < 0.01$  and Model B2:  $\hat{\beta} = -0.0871$ ,  $p < 0.01$ ). Thus, the hypothesis H2b (*"Necessity entrepreneurship affects positively countries' economic growth"*) is not validated. This result, nevertheless, goes in line with recent findings of Mrożewski & Kratzer (2017), who conclude, when analyzing the effects of entrepreneurship on a country-level innovation, that a high share of necessity entrepreneurship is negatively related to innovation and because of that, necessity entrepreneurship has a negative impact on economic development.

Taking into consideration the direct effect of the types of entrepreneurship on economic growth, there is clear evidence that either using the GEM or WBI data, the different types

of entrepreneurship have a very distinct impact on economic growth. Thus, our results corroborate H2c (*“The impact of opportunity entrepreneurship on countries’ economic growth is higher than that of necessity entrepreneurship”*) once, contrary to necessity entrepreneurship, opportunity entrepreneurship presents a positive and statistically significant impact on economic growth. This suggests, as postulated in the literature, that necessity entrepreneurship tends to reflect a lower value creation and thus produces smaller impact on economic growth when compared to opportunity entrepreneurship (Urbano & Aparicio, 2016).

Regarding the impact of opportunity entrepreneurship on economic growth, mediated by human capital, we found that opportunity entrepreneurship is not enhanced by higher levels of human capital (see Model B2:  $\hat{\beta} = -0.0746$ ,  $p < 0.01$ ). Thus, although Lackeus (2015) arguments that the more educated individuals are the greater is their ability to overcome social obstacles and take advantages of business opportunities, our results suggest that in contexts/countries characterized by higher levels of human capital, the impact of opportunity entrepreneurship on economic growth is not leveraged up. This might reflect the fact that the opportunity cost of entrepreneurship for highly skilled/educated individuals might be higher in contexts characterized by higher levels of human capital. As Mickiewicz, Nyakudya, Theodorakopoulos & Hart (2017: pp. 957) contend, “individuals who are highly educated may not choose to become entrepreneurs if entrepreneurship may lead to reduced income as compared to the perceived higher incomes from employment”.

Contrary to the direct effect of necessity entrepreneurship in economic growth, we find that human capital is likely to enhance the impact of this variable on economic growth. Indeed, as shown by the positive and statistically significant coefficient of the interaction term between ‘Necessity entrepreneurship’ and ‘Human capital’, the impact of this type of entrepreneurship on economic growth tends to be higher for higher levels of human capital (see Model B1:  $\hat{\beta} = 0.0321$ ,  $p < 0.05$  and Model B2:  $\hat{\beta} = 0.0978$ ,  $p < 0.01$ ). Our results suggest that in countries that present high levels of human capital, higher shares of necessity entrepreneurship increase economic growth, evidencing some kind of match between human capital and necessity entrepreneurship. Concluding, the hypothesis H4 (*“Human capital positively intermediates the impact of (the types of) entrepreneurship on countries’ economic growth”*) is only validated when applied to necessity entrepreneurship.

Concerning the hypothesis H3 (*“Human capital positively impacts on countries’ economic growth”*), we found a positive and statistically significant impact of human capital on the economic growth (see Model A:  $p < 0.05$  and Models B1 and B2:  $p < 0.10$ ). This corroborates H3 and



suggests, as postulated in the literature, that, on average, all the remaining factors being held constant, countries that present high levels of formal education (that is, working age population who set up a business or owning–managing a young firm) tend to grow more rapidly over the periods considered (1990-2016 / 2001-2016). In other words, an increase in schooling years allows individuals to become more productive and innovative, leading to improvements in the factor productivity (Romer, 1990; Benhabib & Spiegel, 1994, Bodman & Le, 2013). Our results therefore advocate that the improvements achieved in labor productivity through human capital result in enhanced economic growth (e.g., Barro, 1991; Benhabib & Spiegel, 1994; Hanushek & Woessmann, 2008).

Concerning the control variables, when statistically significant, as the case of physical investment and institutional quality, we verify a positive impact on economic growth. Thus, the results obtained for the physical investment suggests that economies with higher levels of investment tend to grow faster than others. Considering the literature, we can affirm that higher investment rates are associated with higher economic growth since the high physical capital formation contributes positively to productivity (Barro, 1991; Romero-Ávila, 2011; Makuyana, 2016). Moreover, the positive relationship between the institutional quality and the economic growth reflects that countries with higher levels of transparency tend to grow faster than others. Regarding the trade openness, it only has a positive and significant impact on economic growth through the different types of entrepreneurship (WBI proxies). There is insufficient statistically evidence to discuss the impact of the remaining control variables.

## Conclusions

The main objective of the present study was to assess the impact of (the types of) entrepreneurship on economic growth, including the interaction effects of these variables with human capital.

Based on a large sample of 79 countries over the last two decades (1990 to 2016) and resorting to a fixed effect panel data techniques, we uncover several main results. First, our research suggest that, as postulated in the literature, entrepreneurship is an important mechanism to achieve economic growth. Second, when analysing the different types of entrepreneurship, we found that opportunity entrepreneurship positively influences economic growth. On the other hand, necessity entrepreneurship shows a negative effect on economic growth. Third, the interactions between the different types of entrepreneurship and human capital are positive and relevant only in the case of opportunity entrepreneurship. Finally, the direct impact of human capital on economic growth is statistically significant and positive .

Three main scientific contributions are drawn from the present study.

First, it provides a recent empirical analysis of a broader (79) and more diverse (including OECD and non OCDE countries; developed, developing and less developed countries) sample of countries. Extant literature has analysed a rather reduced number of countries – 18: Acs et al. (2012); 36: Stam & van Stel (2009); 37: Wong et al. (2005); 45: Urbano & Aparício (2016) and Ferreira et al. (2017) - and mainly from the OECD (e.g., Acs et al., 2012) or restricted to countries that were included in Global Entrepreneurship Monitor inquires (Stam & van Stel, 2009; Wong et al., 2005; Urbano & Aparício, 2016; Ferreira et al., 2017). Moreover, these latter analysis refer not very recent periods - 1981 and 1998: Acs et al. (2012); 2002: Stam & van Stel (2009); Wong et al. (2005); 2002 to 2012: Urbano & Aparício (2016); 2009 to 2013: Ferreira et al. (2017). Reinforcing the extant evidence, we demonstrate that even when using a broader and more diverse set of countries, over a longer time span, total entrepreneurship is a critical engine and a booster of economic growth.

Second, we demonstrate that regardless the proxy used for the types of entrepreneurship (Employers vs Self-employed/WBI or Opportunity vs Necessity entrepreneurs/ GEM), opportunity (necessity) entrepreneurship affects positively (negatively) economic growth. Although some evidence exists that necessity entrepreneurship has a positive impact on economic growth but it reflect a lower value creation and thus produces smaller impact on economic growth when compared to opportunity entrepreneurship (Urbano & Aparicio,

2016), our results sustain that necessity entrepreneurship is detrimental to economic growth. Such result corroborates to some extent the findings by Mrożewski & Kratzer (2017), who conclude that a high share of necessity entrepreneurship is negatively related to innovation and, ultimately on economic growth.

Third, studies that have focused on total entrepreneurship (e.g., Acs et al., 2012; Wong et al., 2005; Urbano & Aparicio, 2016; Ferreira et al., 2017) and the types of entrepreneurship (e.g., Carree & Thurik, 2003; Reynolds et al., 2005; Zali et al., 2013; Urbano & Aparicio, 2016; Ferreira et al., 2017) did not take into consideration the potential mediating effect of human capital. We demonstrate that human capital plays an important direct and indirect role on economic growth. Specifically, it mitigates the negative direct impact that necessity entrepreneurship has on economic growth. Thus, although necessity entrepreneurship emerged as harmful for a country economic growth, in countries characterized by a relatively high level of human capital, that negative effect comes reduced.

Our study entails important policy implications.

First, results imply that entrepreneurship, as a whole, has a positive impact on economic growth. Thus, it would be important for countries all over the world to implement active policies to promote businesses creation. Among those policies we could refer the subsidization of the emergence of new start ups, venture capital and the granting of tax benefits and/or the reduction of taxes payable by newly created companies. In addition, it may be beneficial to implement transversal policies, including policies that encourage R&D and most notably the investment in science and technology infrastructures that provide an adequate ecosystem for newly created firms, and /or reduce of bureaucracies associated to the creation of a new business as well as the regulation of labor markets and entry

A second policy implication derives from the finding that opportunity, but not necessity, entrepreneurship promotes growth. Thus, public authorities/ governments should adopt, regardless the country's characteristics (measured by productive specialization), employment promotion, policies that mitigate the existence of necessity entrepreneurship, by granting reduced costs of context and the encouragement of the emergence of proper employment alternatives for the age-active population.

Third, from the clear evidence of a strong and positive link between human capital and economic growth, we content that transversal education policies would be an important engine to boost economic growth, as well as a facilitator to relieve the negative impacts of the possible occurrence of necessity entrepreneurship. Considering this, it should be

reinforced some economic policies such as education incentives and training for the unemployed.

Despite the novelty of the scientific contributions presented in this dissertation, there are some limitations that need to be highlighted.

First, due to its aggregated character, our study presents an overall analysis of a set of 79 countries but overlooks potential differences between groups of countries (e.g., high, medium, low income countries). Such limitation, nevertheless, would constitute a challenging and interesting path for future research.

Second, this study assumes human capital as the unique mediating of entrepreneurship on economic growth. Nevertheless, other variables could be taken into consideration when analysing the direct and indirect impacts of entrepreneurship on economic growth, most notably countries' productive structure and industrial specialization and institutional related factors. Considering the productive specialization and taking into consideration the importance of technology (Lucio, Herce & Goicolea, 2002; Steenhuis & De Bruijn 2012; Hoon Yi & Choi 2017), it is likely that countries with more advanced levels of specialization, namely those specialized in high-tech industries, could obtain greater productivity gains compared to those specialized in low tech industries, meaning that they would tend to grow faster. Moreover, it is also likely that industrial specialization and structural change processes mediate the impact that entrepreneurship (and its types) have on economic growth (Sautet & Desrochers, 2008; Silva & Teixeira, 2012; Noseleit, 2013). Therefore, this would be a promising area for further inquiry.

Also, future researches could consider some variables in order to control the environmental characteristics that affect entrepreneurial activity in the light of institutional economics. For instance, authors such as Urbano & Alvarez (2014) signalized the importance of institutional dimensions (regulative, normative and cultural-cognitive) to understand the configuration of entrepreneurial activity among countries that have different economic growth rates. Under this approach, it would be interesting to perform a comparative analysis between countries with distinct institutional frameworks.

Third, our study do not focus the individuals' decision processes that sometimes requires the evaluation of multiple opportunities (which includes an opportunity-cost). Thus, it could be an interesting area for future research if we take into account individual factors, such as, social network, self-confidence and education background, which play an important role in

the entrepreneurs decisions to explore innovative opportunities. This would, nevertheless, require a distinct (micro based) data set.

Finally, despite the fact that we find a negative link between necessity entrepreneurship and economic growth, it is likely that specific situations in which businesses created out of necessity have the potential to become high-growth companies (Shane, 2009). Due to the general character of our analysis, further research with different methodological approaches should be made in order to deepen this issue.

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## Annexes

**Table A 1: List of Countries**

| Continents | Countries         | OECD countries | Non-OECD countries |
|------------|-------------------|----------------|--------------------|
| AFRICA     | 1 Botswana        |                | ×                  |
|            | 2 Cameroon        |                | ×                  |
|            | 3 Ghana           |                | ×                  |
|            | 4 Malawi          |                | ×                  |
|            | 5 Morocco         |                | ×                  |
|            | 6 Senegal         |                | ×                  |
|            | 7 South Africa    |                | ×                  |
|            | 8 Tunisia         |                | ×                  |
|            | 9 Uganda          |                | ×                  |
|            | 10 Zambia         |                | ×                  |
| ASIA       | 11 Bangladesh     |                | ×                  |
|            | 12 China          |                | ×                  |
|            | 13 India          |                | ×                  |
|            | 14 Indonesia      |                | ×                  |
|            | 15 Israel         | ×              |                    |
|            | 16 Japan          | ×              |                    |
|            | 17 Jordan         |                | ×                  |
|            | 18 Kazakhstan     |                | ×                  |
|            | 19 Malaysia       |                | ×                  |
|            | 20 Namibia        |                | ×                  |
|            | 21 Pakistan       |                | ×                  |
|            | 22 Philippines    |                | ×                  |
|            | 23 Qatar          |                | ×                  |
|            | 24 Saudi Arabia   |                | ×                  |
|            | 25 Singapore      |                | ×                  |
|            | 26 Thailand       |                | ×                  |
|            | 27 Turkey         | ×              |                    |
|            | 28 Vietnam        |                | •                  |
| EUROPE     | 29 Austria        | ×              |                    |
|            | 30 Belgium        | ×              |                    |
|            | 31 Bulgaria       |                | ×                  |
|            | 32 Croatia        |                | ×                  |
|            | 33 Czech Republic | ×              |                    |
|            | 34 Denmark        | ×              |                    |
|            | 35 Estonia        |                | ×                  |
|            | 36 Finland        | ×              |                    |
|            | 37 France         | ×              |                    |
|            | 38 Germany        | ×              |                    |
|            | 39 Greece         | ×              |                    |
|            | 40 Hungary        | ×              |                    |

| Continents |                | Countries          | OECD countries | Non-OECD countries |
|------------|----------------|--------------------|----------------|--------------------|
| EUROPE     | 41             | Iceland            | ×              |                    |
|            | 42             | Ireland            | ×              |                    |
|            | 43             | Italy              | ×              |                    |
|            | 44             | Latvia             | ×              |                    |
|            | 45             | Lithuania          |                | ×                  |
|            | 46             | Luxembourg         | ×              |                    |
|            | 47             | Netherlands        | ×              |                    |
|            | 48             | Norway             | ×              |                    |
|            | 49             | Poland             | ×              |                    |
|            | 50             | Portugal           | ×              |                    |
|            | 51             | Romania            |                | ×                  |
|            | 52             | Serbia             |                | ×                  |
|            | 53             | Slovak Republic    | ×              |                    |
|            | 54             | Slovenia           | ×              |                    |
| 55         | Spain          | ×                  |                |                    |
| 56         | Sweden         | ×                  |                |                    |
| 57         | Switzerland    | ×                  |                |                    |
| 58         | United Kingdom | ×                  |                |                    |
| AMERICA    | 59             | Argentina          |                | ×                  |
|            | 60             | Barbados           |                | ×                  |
|            | 61             | Belize             |                | ×                  |
|            | 62             | Bolivia            |                | ×                  |
|            | 63             | Brazil             |                | ×                  |
|            | 64             | Chile              | ×              |                    |
|            | 65             | Colombia           |                | ×                  |
|            | 66             | Costa Rica         |                | ×                  |
|            | 67             | Dominican Republic |                | ×                  |
|            | 68             | Ecuador            | ×              |                    |
|            | 69             | El Salvador        |                | ×                  |
|            | 70             | Guatemala          |                | ×                  |
|            | 71             | Jamaica            |                | ×                  |
|            | 72             | Mexico             | ×              |                    |
| 73         | Panama         |                    | ×              |                    |
| 74         | Peru           |                    | ×              |                    |
| 75         | Uruguay        |                    | ×              |                    |
| 76         | Canada         | ×                  |                |                    |
| 77         | United States  | ×                  |                |                    |
| OCEANIA    | 78             | Australia          | ×              |                    |
|            | 79             | New Zealand        | ×              |                    |

Source: Own elaboration

**Table A 2: Number of observations per country**

| Continents | OECD/ Non-OECD | Countries      | TE | OE | NE |
|------------|----------------|----------------|----|----|----|
| AFRICA     | Non-OECD       | Botswana       | 16 | 11 | 15 |
|            | Non-OECD       | Cameroon       | 11 | 6  | 9  |
|            | Non-OECD       | Ghana          | 5  | 4  | 4  |
|            | Non-OECD       | Malawi         | 1  | 1  | 1  |
|            | Non-OECD       | Morocco        | 5  | 5  | 5  |
|            | Non-OECD       | Senegal        | 15 | 11 | 15 |
|            | Non-OECD       | South Africa   | 2  | 1  | 1  |
|            | Non-OECD       | Tunisia        | 3  | 3  | 3  |
|            | Non-OECD       | Uganda         | 4  | 4  | 4  |
|            | Non-OECD       | Zambia         | 16 | 11 | 15 |
| ASIA       | Non-OECD       | Bangladesh     | 7  | 6  | 6  |
|            | Non-OECD       | China          | 15 | 11 | 14 |
|            | Non-OECD       | India          | 9  | 6  | 9  |
|            | Non-OECD       | Indonesia      | 9  | 6  | 8  |
|            | OECD           | Israel         | 5  | 4  | 4  |
|            | OECD           | Japan          | 15 | 10 | 14 |
|            | Non-OECD       | Jordan         | 11 | 7  | 10 |
|            | Non-OECD       | Kazakhstan     | 15 | 10 | 14 |
|            | Non-OECD       | Malaysia       | 9  | 8  | 8  |
|            | Non-OECD       | Namibia        | 14 | 10 | 14 |
|            | Non-OECD       | Pakistan       | 3  | 1  | 2  |
|            | Non-OECD       | Philippines    | 4  | 3  | 3  |
|            | Non-OECD       | Qatar          | 11 | 10 | 10 |
|            | Non-OECD       | Saudi Arabia   | 4  | 4  | 4  |
|            | Non-OECD       | Singapore      | 4  | 3  | 3  |
|            | Non-OECD       | Thailand       | 2  | 2  | 2  |
|            | OECD           | Turkey         | 9  | 8  | 8  |
| Non-OECD   | Vietnam        | 12             | 9  | 11 |    |
| EUROPE     | OECD           | Austria        | 3  | 2  | 2  |
|            | OECD           | Belgium        | 2  | 2  | 2  |
|            | Non-OECD       | Bulgaria       | 16 | 11 | 15 |
|            | Non-OECD       | Croatia        | 5  | 1  | 5  |
|            | OECD           | Czech Republic | 15 | 11 | 15 |
|            | OECD           | Denmark        | 3  | 3  | 3  |
|            | Non-OECD       | Estonia        | 7  | 6  | 6  |
|            | OECD           | Finland        | 12 | 10 | 11 |
|            | OECD           | France         | 4  | 4  | 4  |
|            | OECD           | Germany        | 9  | 5  | 8  |
|            | OECD           | Greece         | 10 | 7  | 9  |
|            | OECD           | Hungary        | 2  | 1  | 1  |
|            | OECD           | Iceland        | 9  | 9  | 9  |
|            | OECD           | Ireland        | 3  | 2  | 2  |
|            | OECD           | Italy          | 1  | 1  | 1  |
|            | OECD           | Latvia         | 3  | 3  | 3  |
|            | Non-OECD       | Lithuania      | 10 | 6  | 10 |
|            | OECD           | Luxembourg     | 6  | 5  | 5  |
| OECD       | Netherlands    | 15             | 11 | 14 |    |

| Continents | OECD/ Non-OECD | Countries          | TE | OE | NE |
|------------|----------------|--------------------|----|----|----|
| EUROPE     | OECD           | Norway             | 15 | 10 | 14 |
|            | OECD           | Poland             | 16 | 11 | 15 |
|            | OECD           | Portugal           | 14 | 9  | 13 |
|            | Non-OECD       | Romania            | 12 | 9  | 11 |
|            | Non-OECD       | Serbia             | 10 | 8  | 9  |
|            | OECD           | Slovak Republic    | 4  | 4  | 4  |
|            | OECD           | Slovenia           | 8  | 7  | 7  |
|            | OECD           | Spain              | 7  | 5  | 7  |
|            | OECD           | Sweden             | 16 | 11 | 15 |
|            | OECD           | Switzerland        | 16 | 11 | 15 |
|            | OECD           | United Kingdom     | 11 | 10 | 10 |
| AMERICA    | Non-OECD       | Costa Rica         | 2  | 1  | 1  |
|            | Non-OECD       | El Salvador        | 3  | 2  | 2  |
|            | Non-OECD       | Guatemala          | 10 | 5  | 9  |
|            | Non-OECD       | Panama             | 14 | 11 | 13 |
|            | OECD           | Mexico             | 11 | 10 | 10 |
|            | Non-OECD       | Argentina          | 15 | 11 | 14 |
|            | Non-OECD       | Bolivia            | 3  | 3  | 3  |
|            | Non-OECD       | Brazil             | 13 | 9  | 13 |
|            | OECD           | Chile              | 3  | 3  | 3  |
|            | Non-OECD       | Colombia           | 9  | 7  | 8  |
|            | OECD           | Ecuador            | 3  | 2  | 2  |
|            | Non-OECD       | Peru               | 5  | 4  | 4  |
|            | Non-OECD       | Uruguay            | 16 | 11 | 15 |
|            | Non-OECD       | Barbados           | 15 | 10 | 14 |
|            | Non-OECD       | Belize             | 15 | 10 | 14 |
|            | Non-OECD       | Dominican Republic | 3  | 3  | 3  |
|            | Non-OECD       | Jamaica            | 14 | 11 | 13 |
| OECD       | Canada         | 13                 | 10 | 12 |    |
|            | OECD           | United States      | 3  | 3  | 3  |
| OCEANIA    | OECD           | Australia          | 3  | 3  | 3  |
|            | OECD           | New Zealand        | 3  | 3  | 3  |

Source: Own elaboration

Note: Highlighted cells means that the countries are not included



**Table A 3: Human Capital values for the period between 1990 and 2016**

| Continent | Countries    | 1990  | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010         | 2011         | 2012         | 2013         | 2014         | 2015         | 2016         |
|-----------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| AFRICA    | Botswana     | 5,52  | 5,74  | 5,97  | 6,21  | 6,45  | 6,71  | 6,88  | 7,06  | 7,24  | 7,42  | 7,61  | 7,74  | 7,87  | 8,01  | 8,14  | 8,28  | 8,39  | 8,51  | 8,63  | 8,75  | <b>8,87</b>  | <b>8,99</b>  | <b>9,12</b>  | <b>9,24</b>  | <b>9,37</b>  | <b>9,50</b>  | <b>9,61</b>  |
|           | Cameroon     | 3,47  | 3,60  | 3,73  | 3,86  | 4,00  | 4,15  | 4,28  | 4,41  | 4,55  | 4,69  | 4,84  | 4,96  | 5,08  | 5,21  | 5,34  | 5,47  | 5,56  | 5,66  | 5,76  | 5,86  | <b>5,96</b>  | <b>6,06</b>  | <b>6,17</b>  | <b>6,27</b>  | <b>6,38</b>  | <b>6,49</b>  | <b>6,58</b>  |
|           | Ghana        | 4,91  | 5,05  | 5,20  | 5,35  | 5,50  | 5,66  | 5,75  | 5,84  | 5,94  | 6,03  | 6,13  | 6,19  | 6,24  | 6,30  | 6,35  | 6,41  | 6,48  | 6,55  | 6,62  | 6,69  | <b>6,76</b>  | <b>6,83</b>  | <b>6,91</b>  | <b>6,98</b>  | <b>7,05</b>  | <b>7,13</b>  | <b>7,19</b>  |
|           | Malawi       | 2,45  | 2,50  | 2,55  | 2,60  | 2,66  | 2,71  | 2,77  | 2,84  | 2,91  | 2,98  | 3,05  | 3,12  | 3,18  | 3,25  | 3,32  | 3,39  | 3,55  | 3,72  | 3,90  | 4,09  | <b>4,29</b>  | <b>4,50</b>  | <b>4,71</b>  | <b>4,94</b>  | <b>5,18</b>  | <b>5,43</b>  | <b>5,64</b>  |
|           | Morocco      | 2,11  | 2,21  | 2,31  | 2,42  | 2,54  | 2,66  | 2,77  | 2,89  | 3,01  | 3,13  | 3,26  | 3,36  | 3,46  | 3,57  | 3,68  | 3,79  | 3,88  | 3,96  | 4,05  | 4,15  | <b>4,24</b>  | <b>4,34</b>  | <b>4,43</b>  | <b>4,54</b>  | <b>4,64</b>  | <b>4,74</b>  | <b>4,83</b>  |
|           | Senegal      | 2,20  | 2,17  | 2,14  | 2,11  | 2,09  | 2,06  | 2,02  | 1,99  | 1,96  | 1,92  | 1,89  | 1,81  | 1,73  | 1,66  | 1,59  | 1,52  | 1,67  | 1,82  | 2,00  | 2,19  | <b>2,40</b>  | <b>2,63</b>  | <b>2,88</b>  | <b>3,16</b>  | <b>3,46</b>  | <b>3,79</b>  | <b>4,08</b>  |
|           | South Africa | 6,49  | 6,80  | 7,13  | 7,48  | 7,84  | 8,22  | 8,01  | 7,81  | 7,61  | 7,42  | 7,23  | 7,42  | 7,61  | 7,81  | 8,02  | 8,23  | 8,46  | 8,69  | 8,93  | 9,18  | <b>9,43</b>  | <b>9,69</b>  | <b>9,96</b>  | <b>10,23</b> | <b>10,51</b> | <b>10,80</b> | <b>11,04</b> |
|           | Tunisia      | 3,43  | 3,56  | 3,69  | 3,83  | 3,98  | 4,13  | 4,27  | 4,42  | 4,58  | 4,74  | 4,90  | 5,06  | 5,22  | 5,39  | 5,57  | 5,75  | 5,91  | 6,07  | 6,23  | 6,40  | <b>6,58</b>  | <b>6,76</b>  | <b>6,94</b>  | <b>7,13</b>  | <b>7,33</b>  | <b>7,53</b>  | <b>7,69</b>  |
|           | Uganda       | 2,77  | 2,88  | 3,00  | 3,12  | 3,25  | 3,38  | 3,47  | 3,56  | 3,66  | 3,76  | 3,86  | 3,97  | 4,08  | 4,19  | 4,31  | 4,43  | 4,61  | 4,80  | 5,00  | 5,21  | <b>5,42</b>  | <b>5,64</b>  | <b>5,88</b>  | <b>6,12</b>  | <b>6,37</b>  | <b>6,63</b>  | <b>6,85</b>  |
|           | Zambia       | 4,68  | 4,92  | 5,18  | 5,45  | 5,74  | 6,04  | 6,01  | 5,98  | 5,94  | 5,91  | 5,88  | 5,97  | 6,05  | 6,14  | 6,23  | 6,32  | 6,38  | 6,43  | 6,49  | 6,54  | <b>6,60</b>  | <b>6,66</b>  | <b>6,72</b>  | <b>6,77</b>  | <b>6,83</b>  | <b>6,89</b>  | <b>6,94</b>  |
| ASIA      | Bangladesh   | 2,84  | 2,92  | 3,01  | 3,10  | 3,19  | 3,29  | 3,37  | 3,44  | 3,52  | 3,61  | 3,69  | 3,78  | 3,88  | 3,98  | 4,08  | 4,19  | 4,33  | 4,46  | 4,61  | 4,76  | <b>4,91</b>  | <b>5,07</b>  | <b>5,23</b>  | <b>5,40</b>  | <b>5,57</b>  | <b>5,75</b>  | <b>5,90</b>  |
|           | China        | 5,34  | 5,51  | 5,68  | 5,85  | 6,03  | 6,22  | 6,37  | 6,52  | 6,68  | 6,84  | 7,00  | 7,07  | 7,13  | 7,20  | 7,27  | 7,34  | 7,38  | 7,42  | 7,45  | 7,49  | <b>7,53</b>  | <b>7,57</b>  | <b>7,61</b>  | <b>7,65</b>  | <b>7,69</b>  | <b>7,72</b>  | <b>7,76</b>  |
|           | India        | 2,96  | 3,06  | 3,17  | 3,28  | 3,39  | 3,51  | 3,67  | 3,85  | 4,03  | 4,21  | 4,41  | 4,49  | 4,57  | 4,65  | 4,74  | 4,82  | 4,93  | 5,04  | 5,15  | 5,27  | <b>5,39</b>  | <b>5,51</b>  | <b>5,64</b>  | <b>5,76</b>  | <b>5,89</b>  | <b>6,03</b>  | <b>6,14</b>  |
|           | Indonesia    | 3,28  | 3,45  | 3,62  | 3,81  | 4,00  | 4,21  | 4,31  | 4,42  | 4,53  | 4,64  | 4,75  | 4,96  | 5,17  | 5,40  | 5,63  | 5,88  | 6,13  | 6,40  | 6,67  | 6,96  | <b>7,26</b>  | <b>7,57</b>  | <b>7,90</b>  | <b>8,24</b>  | <b>8,59</b>  | <b>8,96</b>  | <b>9,27</b>  |
|           | Israel       | 11,03 | 11,10 | 11,18 | 11,25 | 11,33 | 11,40 | 11,48 | 11,55 | 11,63 | 11,70 | 11,78 | 11,85 | 11,93 | 12,00 | 12,07 | 12,14 | 12,21 | 12,28 | 12,35 | 12,42 | <b>12,76</b> | <b>12,91</b> | <b>13,06</b> | <b>13,21</b> | <b>13,36</b> | <b>13,51</b> | <b>13,64</b> |
|           | Japan        | 9,61  | 9,72  | 9,83  | 9,95  | 10,06 | 10,17 | 10,28 | 10,40 | 10,51 | 10,62 | 10,73 | 10,84 | 10,95 | 11,06 | 11,17 | 11,28 | 11,39 | 11,50 | 11,61 | 11,72 | <b>11,52</b> | <b>11,59</b> | <b>11,66</b> | <b>11,74</b> | <b>11,81</b> | <b>11,88</b> | <b>11,94</b> |
|           | Jordan       | 5,25  | 5,51  | 5,79  | 6,08  | 6,39  | 6,71  | 6,90  | 7,10  | 7,30  | 7,51  | 7,72  | 7,87  | 8,02  | 8,17  | 8,33  | 8,49  | 8,63  | 8,77  | 8,91  | 9,06  | <b>9,21</b>  | <b>9,36</b>  | <b>9,51</b>  | <b>9,67</b>  | <b>9,83</b>  | <b>9,99</b>  | <b>10,12</b> |
|           | Kazakhstan   | 8,05  | 8,28  | 8,52  | 8,76  | 9,01  | 9,27  | 9,50  | 9,74  | 9,98  | 10,23 | 10,48 | 10,72 | 10,97 | 11,21 | 11,45 | 11,70 | 11,94 | 12,18 | 12,42 | 12,66 | <b>11,42</b> | <b>11,36</b> | <b>11,29</b> | <b>11,23</b> | <b>11,17</b> | <b>11,11</b> | <b>11,06</b> |
|           | Malaysia     | 6,53  | 6,72  | 6,92  | 7,13  | 7,34  | 7,56  | 7,68  | 7,79  | 7,91  | 8,04  | 8,16  | 8,31  | 8,46  | 8,62  | 8,78  | 8,94  | 9,10  | 9,26  | 9,42  | 9,58  | <b>9,75</b>  | <b>9,92</b>  | <b>10,09</b> | <b>10,27</b> | <b>10,45</b> | <b>10,63</b> | <b>10,78</b> |
|           | Namibia      | 5,59  | 5,61  | 5,62  | 5,64  | 5,65  | 5,67  | 5,65  | 5,63  | 5,60  | 5,58  | 5,56  | 5,64  | 5,71  | 5,79  | 5,87  | 5,95  | 6,00  | 6,06  | 6,11  | 6,17  | <b>6,22</b>  | <b>6,28</b>  | <b>6,33</b>  | <b>6,39</b>  | <b>6,44</b>  | <b>6,50</b>  | <b>6,55</b>  |
|           | Pakistan     | 2,28  | 2,37  | 2,46  | 2,56  | 2,66  | 2,77  | 2,86  | 2,96  | 3,06  | 3,16  | 3,27  | 3,49  | 3,72  | 3,97  | 4,23  | 4,51  | 4,50  | 4,49  | 4,47  | 4,46  | <b>4,45</b>  | <b>4,44</b>  | <b>4,43</b>  | <b>4,41</b>  | <b>4,40</b>  | <b>4,39</b>  | <b>4,38</b>  |
|           | Philippines  | 6,59  | 6,69  | 6,80  | 6,90  | 7,01  | 7,12  | 7,20  | 7,29  | 7,37  | 7,45  | 7,54  | 7,60  | 7,66  | 7,72  | 7,79  | 7,85  | 7,91  | 7,98  | 8,05  | 8,11  | <b>8,18</b>  | <b>8,25</b>  | <b>8,32</b>  | <b>8,38</b>  | <b>8,45</b>  | <b>8,52</b>  | <b>8,58</b>  |
|           | Qatar        | 5,38  | 5,49  | 5,60  | 5,71  | 5,82  | 5,94  | 6,03  | 6,13  | 6,22  | 6,32  | 6,42  | 6,55  | 6,68  | 6,82  | 6,96  | 7,10  | 7,35  | 7,61  | 7,88  | 8,16  | <b>8,45</b>  | <b>8,75</b>  | <b>9,06</b>  | <b>9,38</b>  | <b>9,71</b>  | <b>10,06</b> | <b>10,34</b> |
|           | Saudi Arabia | 5,55  | 5,65  | 5,74  | 5,84  | 5,95  | 6,05  | 6,16  | 6,28  | 6,40  | 6,52  | 6,64  | 6,76  | 6,88  | 7,00  | 7,12  | 7,25  | 7,35  | 7,46  | 7,57  | 7,68  | <b>7,79</b>  | <b>7,90</b>  | <b>8,02</b>  | <b>8,13</b>  | <b>8,25</b>  | <b>8,37</b>  | <b>8,47</b>  |
|           | Singapore    | 5,79  | 6,07  | 6,36  | 6,66  | 6,98  | 7,32  | 7,61  | 7,92  | 8,23  | 8,56  | 8,90  | 8,82  | 8,75  | 8,67  | 8,59  | 8,52  | 8,91  | 9,31  | 9,73  | 10,17 | <b>10,63</b> | <b>11,11</b> | <b>11,61</b> | <b>12,14</b> | <b>12,69</b> | <b>13,26</b> | <b>13,74</b> |
|           | Thailand     | 3,83  | 3,93  | 4,02  | 4,12  | 4,23  | 4,33  | 4,42  | 4,52  | 4,61  | 4,71  | 4,81  | 5,10  | 5,41  | 5,73  | 6,07  | 6,44  | 6,60  | 6,77  | 6,94  | 7,12  | <b>7,30</b>  | <b>7,49</b>  | <b>7,68</b>  | <b>7,87</b>  | <b>8,07</b>  | <b>8,27</b>  | <b>8,44</b>  |
|           | Turkey       | 4,53  | 4,58  | 4,64  | 4,70  | 4,75  | 4,81  | 4,95  | 5,09  | 5,24  | 5,39  | 5,54  | 5,64  | 5,74  | 5,85  | 5,95  | 6,06  | 6,16  | 6,26  | 6,36  | 6,46  | <b>6,56</b>  | <b>6,66</b>  | <b>6,77</b>  | <b>6,88</b>  | <b>6,99</b>  | <b>7,10</b>  | <b>7,19</b>  |
|           | Vietnam      | 3,94  | 4,06  | 4,19  | 4,32  | 4,46  | 4,60  | 4,75  | 4,91  | 5,08  | 5,25  | 5,42  | 5,61  | 5,81  | 6,01  | 6,22  | 6,44  | 6,63  | 6,83  | 7,03  | 7,24  | <b>7,45</b>  | <b>7,67</b>  | <b>7,90</b>  | <b>8,13</b>  | <b>8,37</b>  | <b>8,62</b>  | <b>8,82</b>  |
| EUROPE    | Austria      | 8,64  | 8,69  | 8,73  | 8,78  | 8,82  | 8,87  | 8,90  | 8,94  | 8,97  | 9,01  | 9,04  | 9,13  | 9,21  | 9,30  | 9,39  | 9,48  | 9,56  | 9,64  | 9,72  | 9,81  | <b>9,89</b>  | <b>9,97</b>  | <b>10,06</b> | <b>10,14</b> | <b>10,23</b> | <b>10,32</b> | <b>10,39</b> |
|           | Belgium      | 9,10  | 9,23  | 9,37  | 9,50  | 9,64  | 9,78  | 9,86  | 9,95  | 10,03 | 10,11 | 10,20 | 10,29 | 10,38 | 10,47 | 10,55 | 10,64 | 10,69 | 10,74 | 10,79 | 10,84 | <b>10,78</b> | <b>10,88</b> | <b>10,88</b> | <b>10,88</b> | <b>10,88</b> | <b>10,88</b> | <b>10,91</b> |

|                 |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |
|-----------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| Bulgaria        | 8,44  | 8,56 | 8,68 | 8,80 | 8,92 | 9,05 | 9,11 | 9,17 | 9,23 | 9,29 | 9,35 | 9,56 | 9,78 | 10,0 | 10,2 | 10,4 | 10,6 | 10,8 | 11,0 | 11,2 | 11,45 | 11,66 | 11,88 | 12,10 | 12,3  | 12,5  | 12,73 |       |
| Croatia         | 8,68  | 8,80 | 8,93 | 9,05 | 9,18 | 9,31 | 9,42 | 9,53 | 9,65 | 9,76 | 9,88 | 10,0 | 10,1 | 10,2 | 10,4 | 10,5 | 10,7 | 10,9 | 11,0 | 11,2 | 11,42 | 11,60 | 11,77 | 11,96 | 12,14 | 12,3  | 12,48 |       |
| Czech Republic  | 10,88 | 11,1 | 11,3 | 11,5 | 11,8 | 12,0 | 12,2 | 12,4 | 12,5 | 12,7 | 12,9 | 12,9 | 12,9 | 13,0 | 13,0 | 13,0 | 13,1 | 13,1 | 13,1 | 13,1 | 13,16 | 13,18 | 13,19 | 13,21 | 13,2  | 13,2  | 13,25 |       |
| Denmark         | 8,96  | 9,14 | 9,33 | 9,52 | 9,71 | 9,91 | 10,0 | 10,2 | 10,3 | 10,5 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,1 | 11,2 | 11,3 | 11,3 | 11,4 | 11,53 | 11,60 | 11,67 | 11,74 | 11,81 | 11,88 | 11,94 |       |
| Estonia         | 9,31  | 9,53 | 9,77 | 10,0 | 10,2 | 10,4 | 10,7 | 10,9 | 11,2 | 11,4 | 11,7 | 11,8 | 11,8 | 11,9 | 12,0 | 12,0 | 12,1 | 12,2 | 12,3 | 12,4 | 12,4  | 12,5  | 12,6  | 12,7  | 12,81 | 12,8  | 12,96 |       |
| Finland         | 7,46  | 7,68 | 7,91 | 8,14 | 8,38 | 8,63 | 8,76 | 8,90 | 9,04 | 9,18 | 9,32 | 9,41 | 9,51 | 9,61 | 9,70 | 9,80 | 9,88 | 9,96 | 10,0 | 10,1 | 10,21 | 10,2  | 10,3  | 10,4  | 10,5  | 10,6  | 10,71 |       |
| France          | 7,33  | 7,56 | 7,79 | 8,03 | 8,28 | 8,54 | 8,73 | 8,92 | 9,12 | 9,32 | 9,53 | 9,63 | 9,73 | 9,84 | 9,94 | 10,0 | 10,1 | 10,2 | 10,4 | 10,5 | 10,6  | 10,7  | 10,8  | 11,01 | 11,14 | 11,26 | 11,37 |       |
| Germany         | 8,77  | 8,94 | 9,12 | 9,29 | 9,48 | 9,66 | 9,82 | 9,99 | 10,1 | 10,3 | 10,5 | 10,7 | 11,0 | 11,3 | 11,6 | 11,9 | 12,1 | 12,2 | 12,4 | 12,5 | 12,6  | 12,8  | 12,9  | 13,14 | 13,3  | 13,4  | 13,58 |       |
| Greece          | 7,89  | 7,95 | 8,00 | 8,06 | 8,12 | 8,18 | 8,26 | 8,33 | 8,41 | 8,49 | 8,57 | 8,80 | 9,03 | 9,27 | 9,52 | 9,77 | 9,87 | 9,96 | 10,0 | 10,1 | 10,2  | 10,3  | 10,4  | 10,5  | 10,6  | 10,7  | 10,86 |       |
| Hungary         | 8,68  | 8,99 | 9,32 | 9,66 | 10,0 | 10,3 | 10,5 | 10,7 | 10,8 | 11,0 | 11,2 | 11,3 | 11,4 | 11,5 | 11,6 | 11,7 | 11,7 | 11,8 | 11,9 | 12,0 | 12,14 | 12,2  | 12,3  | 12,41 | 12,5  | 12,5  | 12,66 |       |
| Iceland         | 8,46  | 8,55 | 8,64 | 8,74 | 8,83 | 8,93 | 9,03 | 9,13 | 9,24 | 9,34 | 9,45 | 9,57 | 9,68 | 9,80 | 9,92 | 10,0 | 10,1 | 10,2 | 10,3 | 10,4 | 10,5  | 10,7  | 10,8  | 10,9  | 11,05 | 11,17 | 11,27 |       |
| Ireland         | 9,73  | 9,86 | 9,99 | 10,1 | 10,2 | 10,4 | 10,4 | 10,5 | 10,6 | 10,7 | 10,8 | 11,0 | 11,1 | 11,3 | 11,5 | 11,7 | 11,8 | 11,9 | 12,0 | 12,1 | 12,2  | 12,3  | 12,3  | 12,4  | 12,5  | 12,6  | 12,77 |       |
| Italy           | 7,29  | 7,41 | 7,54 | 7,67 | 7,80 | 7,93 | 8,06 | 8,18 | 8,31 | 8,45 | 8,58 | 8,66 | 8,75 | 8,83 | 8,91 | 9,00 | 9,11 | 9,21 | 9,32 | 9,43 | 9,54  | 9,65  | 9,76  | 9,88  | 10,0  | 10,11 | 10,21 |       |
| Latvia          | 7,56  | 7,81 | 8,07 | 8,33 | 8,61 | 8,89 | 9,00 | 9,12 | 9,23 | 9,35 | 9,47 | 9,60 | 9,74 | 9,87 | 10,0 | 10,1 | 10,2 | 10,2 | 10,3 | 10,4 | 10,4  | 10,5  | 10,61 | 10,6  | 10,7  | 10,8  | 10,88 |       |
| Lithuania       | 8,25  | 8,40 | 8,55 | 8,71 | 8,87 | 9,03 | 9,19 | 9,35 | 9,52 | 9,69 | 9,86 | 10,0 | 10,1 | 10,3 | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 10,9 | 11,05 | 11,12 | 11,20 | 11,27 | 11,35 | 11,42 | 11,48 |       |
| Luxembourg      | 8,92  | 9,00 | 9,08 | 9,16 | 9,24 | 9,32 | 9,39 | 9,46 | 9,53 | 9,61 | 9,68 | 9,80 | 9,92 | 10,0 | 10,1 | 10,3 | 10,4 | 10,6 | 10,8 | 11,0 | 11,22 | 11,41 | 11,61 | 11,81 | 12,01 | 12,2  | 12,39 |       |
| Netherlands     | 10,34 | 10,4 | 10,4 | 10,5 | 10,5 | 10,6 | 10,7 | 10,7 | 10,8 | 10,9 | 10,9 | 10,9 | 10,9 | 10,9 | 10,9 | 10,9 | 11,1 | 11,2 | 11,3 | 11,4 | 11,60 | 11,73 | 11,86 | 11,99 | 12,12 | 12,2  | 12,36 |       |
| Norway          | 10,47 | 10,5 | 10,6 | 10,6 | 10,7 | 10,8 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 | 11,3 | 11,5 | 11,7 | 11,8 | 12,0 | 12,0 | 11,9 | 11,9 | 11,8 | 11,80 | 11,75 | 11,69 | 11,64 | 11,59 | 11,54 | 11,49 |       |
| Poland          | 8,96  | 9,13 | 9,30 | 9,47 | 9,65 | 9,83 | 9,95 | 10,0 | 10,1 | 10,3 | 10,4 | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 | 11,3 | 11,42 | 11,53 | 11,63 | 11,74 | 11,85 | 11,96 | 12,05 |       |
| Portugal        | 5,25  | 5,38 | 5,51 | 5,64 | 5,78 | 5,92 | 6,07 | 6,22 | 6,38 | 6,54 | 6,70 | 6,69 | 6,68 | 6,66 | 6,65 | 6,64 | 6,75 | 6,86 | 6,97 | 7,08 | 7,20  | 7,32  | 7,44  | 7,56  | 7,68  | 7,81  | 7,91  |       |
| Romania         | 9,05  | 9,16 | 9,27 | 9,39 | 9,50 | 9,62 | 9,70 | 9,78 | 9,86 | 9,94 | 10,0 | 10,0 | 10,1 | 10,2 | 10,2 | 10,3 | 10,4 | 10,5 | 10,6 | 10,7 | 10,81 | 10,9  | 11,00 | 11,10 | 11,19 | 11,29 | 11,37 |       |
| Serbia          | 7,95  | 8,12 | 8,28 | 8,46 | 8,63 | 8,81 | 8,92 | 9,04 | 9,15 | 9,27 | 9,39 | 9,55 | 9,71 | 9,87 | 10,0 | 10,2 | 10,3 | 10,5 | 10,6 | 10,8 | 10,9  | 11,7  | 11,13 | 11,29 | 11,45 | 11,62 | 11,79 | 11,92 |
| Slovak Republic | 10,75 | 10,8 | 11,0 | 11,1 | 11,2 | 11,3 | 11,4 | 11,4 | 11,4 | 11,4 | 11,5 | 11,7 | 11,9 | 12,1 | 12,3 | 12,5 | 12,6 | 12,7 | 12,8 | 12,9 | 13,0  | 13,17 | 13,2  | 13,3  | 13,4  | 13,5  | 13,66 |       |
| Slovenia        | 10,91 | 10,9 | 11,0 | 11,1 | 11,1 | 11,2 | 11,3 | 11,3 | 11,4 | 11,5 | 11,5 | 11,6 | 11,6 | 11,6 | 11,6 | 11,7 | 11,8 | 11,8 | 11,9 | 12,0 | 12,13 | 12,21 | 12,3  | 12,3  | 12,4  | 12,5  | 12,62 |       |
| Spain           | 6,52  | 6,74 | 6,96 | 7,20 | 7,44 | 7,69 | 7,92 | 8,15 | 8,39 | 8,64 | 8,89 | 9,13 | 9,38 | 9,63 | 9,89 | 10,1 | 10,1 | 10,2 | 10,2 | 10,2 | 10,3  | 10,3  | 10,3  | 10,3  | 10,41 | 10,4  | 10,46 |       |
| Sweden          | 10,54 | 10,6 | 10,7 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 | 11,3 | 11,4 | 11,5 | 11,6 | 11,8 | 11,9 | 12,0 | 12,0 | 12,0 | 11,9 | 11,9 | 11,89 | 11,85 | 11,81 | 11,77 | 11,73 | 11,69 | 11,66 |       |
| Switzerland     | 10,19 | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 | 10,2 | 10,2 | 10,2 | 10,2 | 10,4 | 10,5 | 10,6 | 10,7 | 10,8 | 11,3 | 11,8 | 12,3 | 12,8 | 13,4  | 14,01 | 14,6  | 15,2  | 15,9  | 16,61 | 17,19 |       |
| United Kingdom  | 8,88  | 8,96 | 9,04 | 9,12 | 9,21 | 9,29 | 9,40 | 9,51 | 9,63 | 9,74 | 9,86 | 10,0 | 10,3 | 10,5 | 10,7 | 11,0 | 11,2 | 11,5 | 11,7 | 12,0 | 12,3  | 12,6  | 12,8  | 13,17 | 13,4  | 13,7  | 14,01 |       |

|         |                    |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |              |              |              |              |              |              |              |
|---------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| AMERICA | Argentina          | 7,88  | 7,97  | 8,06  | 8,15  | 8,25  | 8,34  | 8,38  | 8,42  | 8,47  | 8,51  | 8,55  | 8,69  | 8,83  | 8,97  | 9,11  | 9,26  | 9,30  | 9,35  | 9,39  | 9,44  | <b>9,48</b>  | <b>9,52</b>  | <b>9,57</b>  | <b>9,61</b>  | <b>9,66</b>  | <b>9,71</b>  | <b>9,74</b>  |
|         | Barbados           | 8,08  | 8,20  | 8,33  | 8,45  | 8,58  | 8,71  | 8,70  | 8,70  | 8,69  | 8,69  | 8,68  | 8,78  | 8,88  | 8,98  | 9,09  | 9,19  | 9,22  | 9,24  | 9,27  | 9,29  | <b>9,32</b>  | <b>9,35</b>  | <b>9,37</b>  | <b>9,40</b>  | <b>9,43</b>  | <b>9,45</b>  | <b>9,47</b>  |
|         | Belize             | 8,22  | 8,39  | 8,57  | 8,75  | 8,94  | 9,13  | 9,32  | 9,51  | 9,70  | 9,90  | 10,10 | 10,24 | 10,39 | 10,54 | 10,69 | 10,84 | 10,99 | 11,13 | 11,28 | 11,44 | <b>11,59</b> | <b>11,75</b> | <b>11,90</b> | <b>12,06</b> | <b>12,23</b> | <b>12,39</b> | <b>12,53</b> |
|         | Bolivia            | 6,41  | 6,54  | 6,68  | 6,82  | 6,96  | 7,11  | 7,17  | 7,24  | 7,31  | 7,37  | 7,44  | 7,49  | 7,54  | 7,59  | 7,64  | 7,69  | 7,71  | 7,72  | 7,74  | 7,75  | <b>7,77</b>  | <b>7,79</b>  | <b>7,80</b>  | <b>7,82</b>  | <b>7,83</b>  | <b>7,85</b>  | <b>7,86</b>  |
|         | Brazil             | 4,04  | 4,19  | 4,34  | 4,50  | 4,67  | 4,84  | 5,01  | 5,20  | 5,38  | 5,58  | 5,78  | 5,96  | 6,15  | 6,34  | 6,54  | 6,75  | 6,92  | 7,10  | 7,28  | 7,47  | <b>7,66</b>  | <b>7,86</b>  | <b>8,06</b>  | <b>8,26</b>  | <b>8,48</b>  | <b>8,69</b>  | <b>8,87</b>  |
|         | Chile              | 8,02  | 8,09  | 8,17  | 8,25  | 8,32  | 8,40  | 8,47  | 8,54  | 8,61  | 8,68  | 8,75  | 8,88  | 9,01  | 9,14  | 9,27  | 9,41  | 9,47  | 9,53  | 9,59  | 9,65  | <b>9,71</b>  | <b>9,77</b>  | <b>9,83</b>  | <b>9,89</b>  | <b>9,96</b>  | <b>10,02</b> | <b>10,07</b> |
|         | Colombia           | 5,46  | 5,58  | 5,70  | 5,83  | 5,96  | 6,09  | 6,17  | 6,25  | 6,33  | 6,42  | 6,50  | 6,54  | 6,58  | 6,61  | 6,65  | 6,69  | 7,01  | 7,35  | 7,70  | 8,06  | <b>8,45</b>  | <b>8,85</b>  | <b>9,28</b>  | <b>9,72</b>  | <b>10,19</b> | <b>10,67</b> | <b>11,08</b> |
|         | Costa Rica         | 6,72  | 6,81  | 6,90  | 6,99  | 7,08  | 7,17  | 7,23  | 7,28  | 7,34  | 7,40  | 7,46  | 7,56  | 7,65  | 7,75  | 7,85  | 7,95  | 7,93  | 7,91  | 7,88  | 7,86  | <b>7,84</b>  | <b>7,82</b>  | <b>7,80</b>  | <b>7,77</b>  | <b>7,75</b>  | <b>7,73</b>  | <b>7,71</b>  |
|         | Dominican Republic | 5,34  | 5,45  | 5,56  | 5,68  | 5,80  | 5,92  | 5,99  | 6,05  | 6,12  | 6,19  | 6,26  | 6,39  | 6,52  | 6,66  | 6,80  | 6,94  | 7,06  | 7,18  | 7,31  | 7,43  | <b>7,56</b>  | <b>7,69</b>  | <b>7,82</b>  | <b>7,96</b>  | <b>8,10</b>  | <b>8,24</b>  | <b>8,35</b>  |
|         | Ecuador            | 6,44  | 6,49  | 6,55  | 6,60  | 6,66  | 6,71  | 6,72  | 6,73  | 6,74  | 6,75  | 6,76  | 6,81  | 6,86  | 6,91  | 6,97  | 7,02  | 7,10  | 7,19  | 7,27  | 7,35  | <b>7,44</b>  | <b>7,53</b>  | <b>7,61</b>  | <b>7,70</b>  | <b>7,79</b>  | <b>7,89</b>  | <b>7,96</b>  |
|         | El Salvador        | 3,72  | 3,88  | 4,04  | 4,21  | 4,39  | 4,58  | 4,79  | 5,01  | 5,24  | 5,48  | 5,73  | 5,91  | 6,09  | 6,28  | 6,47  | 6,67  | 6,86  | 7,05  | 7,25  | 7,45  | <b>7,66</b>  | <b>7,87</b>  | <b>8,10</b>  | <b>8,32</b>  | <b>8,56</b>  | <b>8,80</b>  | <b>8,99</b>  |
|         | Guatemala          | 3,05  | 3,12  | 3,19  | 3,26  | 3,33  | 3,41  | 3,47  | 3,54  | 3,60  | 3,67  | 3,74  | 3,71  | 3,68  | 3,64  | 3,61  | 3,58  | 3,71  | 3,85  | 4,00  | 4,15  | <b>4,30</b>  | <b>4,46</b>  | <b>4,63</b>  | <b>4,80</b>  | <b>4,98</b>  | <b>5,16</b>  | <b>5,32</b>  |
|         | Jamaica            | 6,47  | 6,66  | 6,86  | 7,06  | 7,27  | 7,48  | 7,70  | 7,92  | 8,14  | 8,38  | 8,62  | 8,71  | 8,81  | 8,90  | 9,00  | 9,10  | 9,21  | 9,32  | 9,44  | 9,55  | <b>9,67</b>  | <b>9,79</b>  | <b>9,91</b>  | <b>10,03</b> | <b>10,15</b> | <b>10,28</b> | <b>10,38</b> |
|         | Mexico             | 5,56  | 5,73  | 5,91  | 6,10  | 6,28  | 6,48  | 6,60  | 6,73  | 6,85  | 6,98  | 7,11  | 7,26  | 7,41  | 7,57  | 7,73  | 7,89  | 7,98  | 8,06  | 8,15  | 8,24  | <b>8,33</b>  | <b>8,42</b>  | <b>8,51</b>  | <b>8,61</b>  | <b>8,70</b>  | <b>8,79</b>  | <b>8,87</b>  |
|         | Panama             | 7,26  | 7,41  | 7,56  | 7,72  | 7,88  | 8,04  | 8,14  | 8,23  | 8,33  | 8,43  | 8,53  | 8,61  | 8,70  | 8,79  | 8,87  | 8,96  | 9,00  | 9,04  | 9,07  | 9,11  | <b>9,15</b>  | <b>9,19</b>  | <b>9,23</b>  | <b>9,27</b>  | <b>9,30</b>  | <b>9,34</b>  | <b>9,38</b>  |
|         | Peru               | 6,52  | 6,66  | 6,80  | 6,95  | 7,10  | 7,25  | 7,44  | 7,64  | 7,85  | 8,06  | 8,27  | 8,45  | 8,63  | 8,81  | 9,00  | 9,19  | 9,09  | 8,98  | 8,88  | 8,78  | <b>8,68</b>  | <b>8,58</b>  | <b>8,48</b>  | <b>8,39</b>  | <b>8,29</b>  | <b>8,20</b>  | <b>8,12</b>  |
|         | Uruguay            | 7,13  | 7,17  | 7,21  | 7,24  | 7,28  | 7,32  | 7,44  | 7,56  | 7,69  | 7,81  | 7,94  | 7,93  | 7,92  | 7,90  | 7,89  | 7,88  | 7,93  | 7,97  | 8,02  | 8,06  | <b>8,11</b>  | <b>8,16</b>  | <b>8,20</b>  | <b>8,25</b>  | <b>8,30</b>  | <b>8,35</b>  | <b>8,39</b>  |
|         | Canada             | 10,28 | 10,35 | 10,42 | 10,49 | 10,56 | 10,63 | 10,70 | 10,77 | 10,84 | 10,91 | 10,98 | 11,05 | 11,12 | 11,19 | 11,26 | 11,33 | 11,40 | 11,47 | 11,54 | 11,61 | <b>11,68</b> | <b>11,75</b> | <b>11,82</b> | <b>11,89</b> | <b>11,96</b> | <b>12,03</b> | <b>12,10</b> |
|         | United States      | 12,32 | 12,39 | 12,46 | 12,53 | 12,60 | 12,67 | 12,74 | 12,81 | 12,88 | 12,95 | 13,02 | 13,09 | 13,16 | 13,23 | 13,30 | 13,37 | 13,44 | 13,51 | 13,58 | 13,65 | <b>13,72</b> | <b>13,79</b> | <b>13,86</b> | <b>13,93</b> | <b>14,00</b> | <b>14,07</b> | <b>14,14</b> |
| OCEANIA | Australia          | 11,20 | 11,22 | 11,24 | 11,26 | 11,28 | 11,30 | 11,32 | 11,34 | 11,36 | 11,38 | 11,40 | 11,42 | 11,44 | 11,46 | 11,48 | 11,50 | 11,52 | 11,54 | 11,56 | 11,58 | <b>11,60</b> | <b>11,62</b> | <b>11,64</b> | <b>11,66</b> | <b>11,68</b> | <b>11,70</b> | <b>11,72</b> |
|         | New Zealand        | 11,54 | 11,55 | 11,56 | 11,57 | 11,58 | 11,59 | 11,60 | 11,61 | 11,62 | 11,63 | 11,64 | 11,65 | 11,66 | 11,67 | 11,68 | 11,69 | 11,70 | 11,71 | 11,72 | 11,73 | <b>11,74</b> | <b>11,75</b> | <b>11,76</b> | <b>11,77</b> | <b>11,78</b> | <b>11,79</b> | <b>11,80</b> |

Source: Barro & Lee (2010)

Note: Highlighted values means that values were obtained through the calculation of the Compound Annual Growth Rate (C.A.G.R)

**Table A 4: TE values for the period between 2001 and 2016**

| Continents | Countries      | 2001  | 2002  | 2003         | 2004         | 2005         | 2006        | 2007        | 2008         | 2009         | 2010         | 2011         | 2012         | 2013        | 2014         | 2015         | 2016         |              |
|------------|----------------|-------|-------|--------------|--------------|--------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|
| AFRICA     | Botswana       |       |       |              |              |              |             |             |              |              |              |              | 27,66        | 20,85       | 32,79        | 33,23        | <b>35,33</b> |              |
|            | Cameroon       |       |       |              |              |              |             |             |              |              |              |              |              |             | 37,37        | 25,37        | 27,56        |              |
|            | Ghana          |       |       |              |              |              |             |             |              |              | 33,95        | <b>35,21</b> | 36,52        | 25,82       | <b>23,57</b> | <b>21,52</b> | <b>19,64</b> |              |
|            | Malawi         |       |       |              |              |              |             |             |              |              |              |              | 35,56        | 28,11       |              |              |              |              |
|            | Morocco        |       |       |              |              |              |             |             |              | 15,74        |              |              |              |             |              | 4,44         | 5,56         |              |
|            | Senegal        |       |       |              |              |              |             |             |              |              |              |              |              |             |              |              | 38,55        |              |
|            | South Africa   | 6,49  | 6,3   | 4,21         | 5,27         | 5,11         | 5,14        | <b>6,32</b> | 7,76         | 5,92         | 8,86         | 9,14         | 7,32         | 10,59       | 6,97         | 9,19         | 6,91         |              |
|            | Tunisia        |       |       |              |              |              |             |             |              | 9,43         | 6,12         | <b>5,41</b>  | 4,78         | <b>6,14</b> | <b>7,89</b>  | 10,13        | <b>13,01</b> |              |
|            | Uganda         |       |       | 28,85        | 31,6         |              |             |             |              |              | 33,67        | 31,29        | <b>33,45</b> | 35,76       | 25,21        | 35,53        | <b>36,25</b> | <b>36,99</b> |
|            | Zambia         |       |       |              |              |              |             |             |              |              |              | 32,63        | <b>36,78</b> | 41,46       | 39,91        | <b>42,68</b> | <b>46,64</b> | <b>48,81</b> |
| ASIA       | Bangladesh     |       |       |              |              |              |             |             |              |              |              |              |              |             |              |              | 12,77        |              |
|            | China          |       | 12,11 | 12,92        | <b>13,31</b> | 13,71        | 15,97       | 16,43       | <b>17,59</b> | 18,84        | 14,37        | 24,01        | 12,83        | 14,02       | 15,53        | 12,84        | 10,29        |              |
|            | India          | 10,81 | 16,04 | <b>17,32</b> | <b>18,70</b> | <b>20,20</b> | 10,09       | 8,53        | 11,49        | <b>11,15</b> | <b>10,82</b> | <b>10,49</b> | <b>10,18</b> | 9,88        | 6,6          | 10,83        | 10,59        |              |
|            | Indonesia      |       |       |              |              |              |             | 19,28       |              |              |              |              |              | 25,52       | 14,2         | 17,67        | 14,08        |              |
|            | Israel         | 5,29  | 6,99  | <b>6,80</b>  | 6,62         | <b>7,09</b>  | <b>7,59</b> | 5,44        | 6,36         | 6,07         | 5,02         | <b>5,73</b>  | 6,53         | 10,04       | <b>10,89</b> | 11,82        | 11,31        |              |
|            | Japan          | 3,1   | 1,69  | 2,76         | 1,48         | 2,2          | 2,9         | 4,34        | 5,42         | 3,26         | 3,3          | 5,22         | 3,99         | 3,72        | 3,83         | <b>3,45</b>  | <b>3,12</b>  |              |
|            | Jordan         |       |       |              | 18,18        |              |             |             |              |              | 10,24        |              |              |             |              |              |              | 8,20         |
|            | Kazakhstan     |       |       |              |              |              |             |             | 9,36         |              |              |              |              |             |              | 13,72        | 11           | 10,15        |
|            | Malaysia       |       |       |              |              |              |             | 11,09       | <b>8,15</b>  | <b>6,00</b>  | 4,41         | 4,96         | 4,92         | 6,99        | 6,6          | 5,91         | 2,93         | 4,70         |
|            | Namibia        |       |       |              |              |              |             |             |              |              |              |              |              | 18,15       | 33,34        |              |              |              |
|            | Pakistan       |       |       |              |              |              |             |             |              |              |              | 9,08         | 9,07         | 11,57       |              |              |              |              |
|            | Philippines    |       |       |              |              |              |             | 20,39       |              |              |              |              |              |             | 18,52        | 18,38        | 17,16        | <b>16,52</b> |
|            | Qatar          |       |       |              |              |              |             |             |              |              |              |              |              |             |              | 16,38        | <b>11,34</b> | 7,85         |
|            | Saudi Arabia   |       |       |              |              |              |             |             |              |              | 4,66         | 9,4          |              |             |              |              |              | 11,44        |
|            | Singapore      | 6,05  | 5,91  | 4,95         | 5,66         | 7,24         | 4,8         | <b>5,12</b> | <b>5,45</b>  | <b>5,81</b>  | <b>5,81</b>  | <b>6,19</b>  | 6,6          | 11,56       | 10,68        | 10,96        | <b>12,98</b> | <b>15,37</b> |
|            | Thailand       |       | 18,9  |              |              |              | 20,74       | 15,2        | 26,87        | <b>24,80</b> | <b>22,90</b> | <b>21,14</b> | 19,51        | 18,94       | 17,66        | 23,3         | 13,74        | 17,24        |
|            | Turkey         |       |       |              |              |              |             | 6,07        | 5,58         | 5,96         | <b>7,16</b>  | 8,59         | 11,87        | 12,22       | 9,95         | <b>11,69</b> | <b>13,74</b> | 16,14        |
| Vietnam    |                |       |       |              |              |              |             |             |              |              |              |              |              | 15,35       | 15,3         | 13,65        | <b>12,87</b> |              |
| EUROPE     | Austria        |       |       |              |              | 5,28         |             | 2,44        |              |              |              |              | 9,58         |             | 8,71         |              | 9,63         |              |
|            | Belgium        | 4,19  | 2,99  | 3,88         | 3,42         | 3,93         | 2,73        | 3,15        | 2,85         | 3,51         | 3,67         | 5,69         | 5,2          | 4,92        | 5,4          | 6,24         | <b>7,03</b>  |              |
|            | Bulgaria       |       |       |              |              |              |             |             |              |              |              |              |              |             |              |              | 3,46         | 4,84         |
|            | Croatia        |       | 3,62  | 2,56         | 3,73         | 6,11         | 8,47        | 7,27        | 7,59         | 5,58         | 5,52         | 7,32         | 8,27         | 8,27        | 7,97         | 7,69         | 8,41         |              |
|            | Czech Republic |       |       |              |              |              |             | 7,85        |              |              |              |              | 7,64         | 7,33        |              |              |              |              |
|            | Denmark        | 7,23  | 6,53  | 5,88         | 5,31         | 4,71         | 5,31        | 5,39        | 4,04         | 3,64         | 3,77         | 4,63         |              | 5,36        | <b>5,41</b>  | 5,47         | <b>5,78</b>  | <b>6,11</b>  |
|            | Estonia        |       |       |              |              |              |             |             |              |              |              |              |              | 14,26       | 13,11        | 9,43         | 13,14        | 16,16        |
|            | Finland        | 8,16  | 4,56  | 3,14         | 4,35         | 4,92         | 4,99        | 6,91        | 7,34         | 5,17         | 5,72         | 6,25         | 5,98         | 5,29        | 5,63         | 6,59         | 6,71         |              |
|            | France         | 5,72  | 3,13  | 1,63         | 6,03         | 5,35         | 4,39        | 3,17        | 5,64         | 4,35         | 5,83         | 5,73         | 5,17         | 4,57        | 5,34         | <b>5,33</b>  | 5,32         |              |
|            | Germany        | 6,28  | 5,16  | 5,22         | 4,4          | 5,09         | 4,21        | <b>3,98</b> | 3,77         | 4,1          | 4,17         | 5,62         | 5,34         | 4,98        | 5,27         | 4,7          | 4,56         |              |
|            | Greece         |       |       | 6,77         | 5,77         | 6,5          | 7,9         | 5,71        | 9,86         | 8,79         | 5,51         | 7,95         | 6,51         | 5,51        | 7,85         | 6,75         | 5,70         |              |
|            | Hungary        | 10,86 | 6,53  | <b>5,29</b>  | 4,29         | 1,88         | 6,04        | 6,86        | 6,61         | 9,13         | 7,13         | 6,29         | 9,22         | 9,68        | 9,33         | 7,92         | 7,94         |              |
|            | Iceland        |       | 11,32 | 11,18        | 13,57        | 10,59        | 10,21       | 12,48       | 10,05        | 11,45        | 10,58        | <b>10,15</b> | <b>9,74</b>  | <b>9,34</b> | <b>8,96</b>  | <b>8,60</b>  | <b>8,25</b>  |              |
|            | Ireland        | 11,37 | 9,14  | 8,1          | 7,7          | 9,83         | 7,35        | 8,22        | 7,59         | <b>7,16</b>  | 6,76         | 7,25         | 6,15         | 9,25        | 6,53         | 9,33         | 10,88        |              |
|            | Italy          | 9,11  | 5,74  | 3,11         | 4,32         | 4,94         | 3,47        | 5,01        | 4,62         | 3,72         | 2,35         | <b>3,19</b>  | 4,32         | 3,43        | 4,42         | 4,87         | 4,42         |              |
|            | Latvia         |       |       |              |              | 6,65         | 6,53        | 4,46        | 6,53         | 10,51        | 9,68         | 11,85        | 13,39        | 13,25       | <b>13,67</b> | 14,11        | 14,19        |              |
| Lithuania  |                |       |       |              |              |              |             |             |              |              |              | 11,26        | 6,69         | 12,43       | 11,32        | <b>11,34</b> | <b>11,36</b> |              |

|             |                    |           |             |             |             |              |              |              |              |              |             |              |              |              |              |              |              |       |
|-------------|--------------------|-----------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|-------|
|             | Luxembourg         |           |             |             |             |              |              |              |              |              |             |              |              | 8,69         | 7,14         | 10,18        | 9,19         |       |
|             | Netherlands        | 5,87      | 4,59        | 3,6         | 5,11        | 4,34         | 5,4          | 5,18         | 5,2          | 7,19         | 7,22        | 8,21         | 10,31        | 9,27         | 9,46         | 7,21         | 11,00        |       |
|             | Norway             | 7,4       | 8,64        | 7,35        | 6,86        | 9,11         | 8,9          | 6,18         | 8,7          | 8,53         | 7,72        | 6,94         | 6,75         | 6,25         | 5,65         | 5,66         | <b>5,38</b>  |       |
|             | Poland             | 8,04      | 3,96        | <b>5,90</b> | 8,78        |              |              |              |              |              |             | 9,03         | 9,36         | 9,28         | 9,21         | 9,21         | 10,66        |       |
|             | Portugal           | 6,61      | <b>5,52</b> | <b>4,61</b> | 3,85        | <b>5,07</b>  | <b>6,67</b>  | 8,78         | <b>6,97</b>  | <b>5,54</b>  | 4,4         | 7,54         | 7,67         | 8,25         | 9,97         | 9,49         | 8,15         |       |
|             | Romania            |           |             |             |             |              |              | 4,02         | 3,98         | 5,02         | 4,29        | 9,89         | 9,22         | 10,13        | 11,35        | 10,83        | <b>11,20</b> |       |
|             | Serbia             |           |             |             |             |              |              | 8,56         | 7,59         | 4,9          |             |              |              |              |              |              |              |       |
|             | Slovak Republic    |           |             |             |             |              |              |              |              |              |             | 14,2         | 10,22        | 9,52         | 10,9         | 9,64         | 9,45         |       |
|             | Slovenia           |           | 4,63        | 4,05        | 2,6         | 4,36         | 4,63         | 4,78         | 6,4          | 5,36         | 4,65        | 3,65         | 5,42         | 6,45         | 6,33         | 5,91         | 8,02         |       |
|             | Spain              | 6,32      | 4,59        | 6,65        | 5,15        | 5,65         | 7,27         | 7,62         | 7,03         | 5,1          | 4,31        | 5,81         | 5,7          | 5,21         | 5,47         | 5,7          | 5,23         |       |
|             | Sweden             | 5,65      | 3,9         | 4,12        | 3,71        | 4,04         | 3,45         | 4,15         | <b>4,38</b>  | <b>4,62</b>  | 4,88        | 5,8          | 6,44         | 8,25         | 6,71         | 7,16         | 7,58         |       |
|             | Switzerland        |           | 7,13        | 7,29        | <b>6,64</b> | 6,05         | <b>6,16</b>  | 6,27         | <b>6,96</b>  | 7,72         | 5,04        | 6,58         | 5,93         | 8,18         | 7,12         | 7,31         | 8,21         |       |
|             | United Kingdom     | 6,49      | 5,36        | 6,35        | 6,25        | 6,19         | 5,76         | 5,53         | 5,91         | 5,74         | 6,42        | 7,29         | 8,98         | 7,14         | 10,66        | 6,93         | 8,80         |       |
| AMERICA     | Argentina          | 9,92      | 14,15       | 19,73       | 12,84       | 9,49         | 10,24        | 14,43        | 16,54        | 14,68        | 14,2        | 20,78        | 18,88        | 15,93        | 14,41        | 17,74        | 14,51        |       |
|             | Barbados           |           |             |             |             |              |              |              |              |              |             | 8            | 17,12        | 21,67        | 12,71        | 21,05        | <b>20,75</b> |       |
|             | Belize             |           |             |             |             |              |              |              |              |              |             |              |              |              | 7,14         | <b>14,35</b> | 28,83        |       |
|             | Bolivia            |           |             |             |             |              |              |              | 29,82        |              | 38,6        |              |              |              |              | 27,4         |              |       |
|             | Brazil             | 13,8      | 13,53       | 12,9        | 13,48       | 11,32        | 11,65        | 12,72        | 12,02        | 15,32        | 17,5        | 14,89        | 15,44        | 17,31        | 17,23        | 20,98        | 19,56        |       |
|             | Chile              |           | 15,68       | 16,87       |             | 11,15        | 9,19         | 13,43        | 13,08        | 14,79        | 16,77       | 23,69        | 22,58        | 24,33        | 26,83        | 25,93        | 24,18        |       |
|             | Colombia           |           |             |             |             |              | 22,37        | 22,72        | 24,52        | 22,57        | 20,61       | 21,44        | 20,11        | 23,71        | 18,55        | 22,67        | 27,35        |       |
|             | Costa Rica         |           |             |             |             |              |              |              |              |              |             | 13,44        |              | 15,04        |              | 11,33        |              |       |
|             | Dominican Republic |           |             |             |             |              |              | 16,75        | 20,35        | 17,53        |             |              |              |              |              |              |              |       |
|             | Ecuador            |           |             |             | 27,24       | <b>24,28</b> | <b>21,63</b> | <b>19,28</b> | 17,18        | 15,82        | 21,25       | <b>23,78</b> | 26,61        | 35,97        | 32,61        | 33,56        | 31,83        |       |
|             | El Salvador        |           |             |             |             |              |              |              |              |              |             |              | 15,26        | <b>17,24</b> | 19,48        | <b>16,67</b> | 14,26        |       |
|             | Guatemala          |           |             |             |             |              |              |              |              |              | 19,2        | 16,3         | 19,31        | <b>15,40</b> | 12,28        | 20,39        | 17,71        | 20,07 |
|             | Jamaica            |           |             |             |             | 17           | 20,32        | <b>17,82</b> | 15,63        | 22,73        | 10,48       | 13,71        | <b>13,73</b> | 13,75        | 19,27        | <b>13,78</b> | 9,85         |       |
|             | Mexico             | 17,91     | 12,4        |             |             | 5,91         | 5,26         | <b>8,30</b>  | 13,09        | <b>11,70</b> | 10,45       | 9,62         | 12,11        | 14,83        | 18,99        | 21,01        | 9,63         |       |
|             | Panama             |           |             |             |             |              |              |              | 9,59         | <b>14,12</b> | 20,78       | 9,46         | 20,64        | 17,06        | 12,8         | 13,20        |              |       |
|             | Peru               |           |             |             | 40,27       | <b>40,17</b> | 40,08        | 25,89        | 25,57        | 20,93        | 27,24       | 22,89        | 20,21        | 23,38        | 28,81        | 22,22        | 25,14        |       |
|             | Uruguay            |           |             |             |             |              | 12,51        | 12,21        | 11,9         | 12,16        | 11,68       | 16,72        | 14,63        | 14,08        | 16,08        | 14,28        | 14,11        |       |
|             | Canada             | 10,27     | 9,51        | 8,28        | 8,85        | 9,28         | 7,12         | <b>7,69</b>  | <b>8,30</b>  | <b>8,97</b>  | <b>9,68</b> | <b>10,45</b> | <b>11,29</b> | 12,19        | 13,04        | 14,72        | 16,72        |       |
|             | United States      | 11,07     | 10,62       | 11,85       | 11,27       | 12,44        | 10,03        | 9,61         | 10,76        | 7,96         | 7,59        | 12,34        | 12,84        | 12,73        | 13,81        | 11,88        | 12,63        |       |
|             | OCEANIA            | Australia | 14,68       | 8,66        | 11,62       | 13,38        | 10,47        | 11,89        | <b>11,21</b> | <b>10,57</b> | <b>9,97</b> | 7,8          | 10,5         | <b>11,32</b> | <b>12,19</b> | 13,14        | 12,79        | 14,56 |
| New Zealand |                    | 15,45     | 14,01       | 13,6        | 14,67       | 17,57        |              |              |              |              |             |              |              |              |              |              |              |       |

Source: Global Entrepreneurship Monitor (GEM)

Note: Highlighted values means that values were obtained through the calculation of the Compound Annual Growth Rate (C.A.G.R)

**Table A 5: OE values for the period between 2005 and 2015**

| Continents | Countries      | 2005  | 2006         | 2007         | 2008         | 2009         | 2010         | 2011         | 2012         | 2013         | 2014         | 2015         |              |
|------------|----------------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| AFRICA     | Botswana       |       |              |              |              |              |              |              | 47,97        | 52,01        | 54,71        | 50,06        |              |
|            | Cameroon       |       |              |              |              |              |              |              |              |              | 40,51        | 37,50        |              |
|            | Ghana          |       |              |              |              |              | 34,67        | <b>42,04</b> | 50,97        | 44,07        |              |              |              |
|            | Malawi         |       |              |              |              |              |              |              | 42,87        | 29,42        |              |              |              |
|            | Morocco        |       |              |              |              | 56,54        |              |              |              |              |              | 43,17        |              |
|            | Senegal        |       |              |              |              |              |              |              |              |              |              | 51,89        |              |
|            | South Africa   | 34,10 | 44,96        | <b>50,24</b> | 56,14        | 38,02        | 31,11        | 39,29        | 39,74        | 31,52        | 35,49        | 37,49        |              |
|            | Tunisia        |       |              |              |              | 56,64        | 47,96        | <b>45,04</b> | 42,29        | <b>48,58</b> | <b>55,80</b> | 64,10        |              |
|            | Uganda         |       |              |              |              | 45,13        | 33,49        | <b>37,55</b> | 42,11        | 47,53        | 54,25        | <b>56,28</b> |              |
|            | Zambia         |       |              |              |              |              |              | 41,15        | <b>43,62</b> | 46,24        | 37,25        | <b>36,03</b> | <b>34,86</b> |
| ASIA       | Bangladesh     |       |              |              |              |              |              | 50,05        |              |              |              |              |              |
|            | China          | 42,65 | 28,43        | 43,11        | <b>35,62</b> | 29,43        | 34,18        | 28,96        | 39,37        | 35,90        | 45,41        | 38,87        |              |
|            | India          |       | 42,51        | 27,42        | 42,89        | <b>41,40</b> | <b>39,96</b> | <b>38,57</b> | <b>37,23</b> | 35,94        | 36,54        | 34,26        |              |
|            | Indonesia      |       | 61,33        |              |              |              |              |              |              | 43,68        | 37,95        | 36,48        |              |
|            | Israel         |       |              | 47,24        | 53,44        | 48,40        | 54,56        | <b>50,17</b> | 46,13        | 49,25        | <b>44,90</b> | 40,93        |              |
|            | Japan          | 65,66 | 73,76        | 52,72        | 68,19        | 62,36        | 46,87        | 63,53        | 66,41        | 59,63        | 68,24        | <b>69,48</b> |              |
|            | Jordan         |       |              |              |              | 35,31        |              |              |              |              |              |              |              |
|            | Kazakhstan     |       |              | 45,53        |              |              |              |              |              |              |              | 33,68        | 24,04        |
|            | Malaysia       |       | 49,13        | <b>47,44</b> | <b>45,81</b> | 44,24        | 41,20        | 71,81        | 60,70        | 64,87        | 63,99        | 67,01        |              |
|            | Namibia        |       |              |              |              |              |              |              | 36,79        | 32,91        |              |              |              |
|            | Pakistan       |       |              |              |              |              |              | 38,95        | 24,74        | 23,56        | <b>18,32</b> | <b>14,25</b> | <b>11,08</b> |
|            | Philippines    |       | 42,11        |              |              |              |              |              |              |              | 38,03        | 33,49        | 41,55        |
|            | Qatar          |       |              |              |              |              |              |              |              |              |              | 54,37        |              |
|            | Saudi Arabia   |       |              |              |              |              | 63,02        | 74,56        |              |              |              |              |              |
|            | Singapore      | 66,51 | 61,35        |              |              |              |              |              | 52,61        | 54,45        | 68,77        | 70,81        | <b>78,18</b> |
|            | Thailand       | 57,27 | 56,93        | 46,59        | <b>50,98</b> | <b>55,77</b> | <b>61,03</b> | 66,77        | 67,40        | 67,80        | 71,23        | 75,86        |              |
| Turkey     |                | 22,76 | 34,97        | 41,23        | <b>43,86</b> | 46,66        | 44,83        | 54,57        | 53,62        | <b>56,16</b> | <b>58,83</b> |              |              |
| Vietnam    |                |       |              |              |              |              |              |              | 62,21        | 53,27        | 57,88        |              |              |
| EUROPE     | Austria        | 58,44 | <b>57,19</b> | 55,96        | <b>51,85</b> | <b>48,03</b> | <b>44,50</b> | <b>41,23</b> | 38,20        | <b>37,78</b> | 37,37        |              |              |
|            | Belgium        | 44,77 | 51,90        | 50,20        | 46,37        | 54,76        | 51,81        | 72,38        | 61,56        | 43,89        | 43,12        | 44,3         |              |
|            | Bulgaria       |       |              |              |              |              |              |              |              |              |              | 29,00        |              |
|            | Croatia        | 34,74 | 37,75        | 39,89        | 56,93        | 38,94        | 48,78        | 30,73        | 35,68        | 29,84        | 28,67        | 40,85        |              |
|            | Czech Republic |       | 60,90        |              |              |              |              |              | 56,53        | 60,26        |              |              |              |
|            | Denmark        | 65,45 | 80,47        | 72,04        | 60,17        | 55,64        | 53,80        | 64,02        | 70,65        | <b>65,19</b> | 60,15        | <b>55,50</b> |              |
|            | Estonia        |       |              |              |              |              |              |              | 49,10        | 50,07        | 41,15        | 57,03        |              |
|            | Finland        | 62,99 | 61,75        | 64,80        | 62,96        | 61,95        | 54,33        | 59,40        | 59,88        | 65,99        | 63,12        | 63,02        |              |
|            | France         | 39,51 | 45,68        | 51,29        | 62,33        | 67,25        | 55,99        | 70,69        | 58,94        | 60,87        | 69,15        |              |              |
|            | Germany        | 45,37 | 37,96        | <b>43,30</b> | 49,40        | 42,59        | 48,47        | 54,92        | 50,74        | 55,70        | 53,74        | 64,19        |              |
|            | Greece         | 62,14 | 48,30        | 56,53        | 39,26        | 47,22        | 38,63        | 36,83        | 32,11        | 35,83        | 30,53        | 34,43        |              |
|            | Hungary        | 42,77 | 50,94        | 46,06        | 48,57        | 44,84        | 42,86        | 29,16        | 35,27        | 38,67        | 36,27        | 50,52        |              |
|            | Iceland        | 71,42 | 71,78        | 70,32        | 71,42        | 57,50        | 68,61        | <b>68,06</b> | <b>67,52</b> | <b>66,98</b> | <b>66,44</b> | <b>65,91</b> |              |

|         |                    |       |              |              |              |              |              |              |              |              |              |              |
|---------|--------------------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|         | Ireland            | 67,73 | 61,65        | 47,41        | 45,41        | <b>38,80</b> | 33,15        | 36,92        | 40,52        | 43,85        | 48,56        | 38,53        |
|         | Italy              | 63,24 | 58,56        | 62,23        | 60,38        | 56,63        | 54,58        | <b>34,89</b> | 22,30        | 18,38        | 38,58        | 30,04        |
|         | Latvia             | 47,13 | 58,27        | 40,71        | 54,00        | 53,67        | 50,84        | 46,17        | 46,02        | 52,69        | <b>52,05</b> | 51,41        |
|         | Lithuania          |       |              |              |              |              |              | 47,19        | 51,49        | 55,17        | 43,78        | <b>42,70</b> |
|         | Luxembourg         |       |              |              |              |              |              |              |              | 56,59        | 59,81        | 52,16        |
|         | Netherlands        | 58,26 | 74,36        | 56,70        | 70,63        | 57,38        | 63,90        | 62,32        | 66,35        | 67,12        | 62,77        | 65,28        |
|         | Norway             | 72,04 | 81,50        | 58,51        | 72,36        | 74,29        | 73,54        | 70,50        | 69,63        | 60,80        | 69,03        | 66,36        |
|         | Poland             |       |              |              |              |              |              | 31,54        | 30,13        | 32,70        | 47,11        | 46,42        |
|         | Portugal           |       |              | 53,18        | <b>52,74</b> | <b>52,30</b> | 51,86        | 58,06        | 53,08        | 50,65        | 49,31        | 35,87        |
|         | Romania            |       |              | 38,33        | 34,13        | 31,37        | 47,16        | 34,45        | 37,7         | 31,59        | 49,75        | 33,24        |
|         | Serbia             |       |              | 27,02        | 44,43        | 46,05        |              |              |              |              |              |              |
|         | Slovak Republic    |       |              |              |              |              |              | 33,86        | 42,88        | 40,17        | 51,83        | 51,30        |
|         | Slovenia           | 63,88 | 65,60        | 76,07        | 68,19        | 69,14        | 53,84        | 51,25        | 64,02        | 53,42        | 44,78        | 44,94        |
|         | Spain              | 54,63 | 56,33        | 49,65        | 48,47        | 41,16        | 42,04        | 39,32        | 32,51        | 33,18        | 33,48        | 44,52        |
|         | Sweden             | 61,49 | 74,16        | 76,38        | <b>74,76</b> | <b>73,17</b> | 71,61        | 67,62        | 48,59        | 58,43        | 56,16        | 52,62        |
|         | Switzerland        | 54,6  | <b>58,43</b> | 62,52        | <b>64,93</b> | 67,44        | 60,09        | 61,38        | 57,46        | 67,19        | 58,14        | 65,8         |
|         | United Kingdom     | 52,27 | 61,00        | 52,40        | 48,54        | 43,25        | 43,10        | 46,29        | 42,61        | 45,18        | 52,71        | 51,19        |
|         | Argentina          | 33,64 | 53,36        | 41,10        | 47,28        | 37,42        | 43,28        | 44,67        | 46,61        | 47,43        | 43,51        | 50,68        |
|         | Barbados           |       |              |              |              |              |              | 60,19        | 62,68        | 47,79        | 53,13        | 56,45        |
|         | Belize             |       |              |              |              |              |              |              |              |              | 47,61        |              |
|         | Bolivia            |       |              |              | 45,52        |              | 56,52        |              |              |              | 51,70        |              |
|         | Brazil             | 37,86 | 40,00        | 38,07        | 45,56        | 47,66        | 45,91        | 45,16        | 58,83        | 57,36        | 57,81        | 47,79        |
|         | Chile              | 57,72 | 54,80        | 59,57        | 45,34        | 42,15        | 52,44        | 54,27        | 68,87        | 57,65        | 62,18        | 61,18        |
|         | Colombia           |       | 43,70        | 42,45        | 41,91        | 44,52        | 40,83        | 30,10        | 47,83        | 26,65        | 51,55        | 56,47        |
|         | Costa Rica         |       |              |              |              |              | 37,84        |              | 47,88        |              | 63,52        |              |
|         | Dominican Republic |       |              | 39,84        | 28,74        | 26,41        |              |              |              |              |              |              |
|         | Ecuador            |       |              |              | 47,31        | 42,59        | 44,54        | <b>36,68</b> | 30,21        | 32,11        | 34,95        | 34,57        |
|         | El Salvador        |       |              |              |              |              |              |              | 39,22        |              | 54,48        |              |
|         | Guatemala          |       |              |              |              | 31,73        | 27,47        | 33,47        | <b>38,46</b> | 44,19        | 38,93        | 40,79        |
|         | Jamaica            | 38,61 | 39,41        | <b>31,24</b> | 24,77        | 45,34        | 38,60        | 39,76        | <b>36,87</b> | 34,19        | 33,51        | <b>31,65</b> |
|         | Mexico             | 42,06 | 38,80        | <b>45,92</b> | 53,18        | <b>47,03</b> | 41,60        | 54,51        | 51,82        | 26,27        | 50,04        | 55,53        |
|         | Panama             |       |              |              |              | 58,64        | <b>48,73</b> | 40,49        | 56,76        | 39,79        | 60,23        | 39,06        |
|         | Peru               |       | 53,68        | 45,24        | 44,73        | 42,44        | 47,53        | 51,98        | 53,13        | 54,21        | 58,90        | 53,60        |
|         | Uruguay            |       | 38,16        | 51,14        | 51,76        | 56,79        | 53,51        | 9,82         | 39,85        | 36,80        | 27,28        | 53,65        |
|         | Canada             | 66,53 | 69,19        | <b>68,86</b> | <b>68,52</b> | <b>68,19</b> | <b>67,87</b> | <b>67,54</b> | <b>67,21</b> | 66,89        | 63,34        | 55,92        |
|         | United States      | 67,12 | 62,96        | 58,92        | 62,72        | 55,16        | 51,45        | 58,94        | 59,45        | 57,43        | 66,93        | 69,02        |
|         | Australia          | 63,00 | 62,26        | <b>61,36</b> | <b>60,47</b> | <b>59,60</b> | 58,74        | 73,10        | <b>69,85</b> | <b>66,75</b> | 63,78        | 66,01        |
|         | New Zealand        | 78,94 |              |              |              |              |              |              |              |              |              |              |
| AMERICA |                    |       |              |              |              |              |              |              |              |              |              |              |
| OCEANIA |                    |       |              |              |              |              |              |              |              |              |              |              |

Source: Global Entrepreneurship Monitor (GEM)

Note: Highlighted values means that values were obtained through the calculation of the Compound Annual Growth Rate (C.A.G.R)

**Table A 6: NE values for the period between 2001 and 2015**

| Continents | Countries      | 2001  | 2002  | 2003         | 2004         | 2005         | 2006         | 2007         | 2008         | 2009         | 2010         | 2011         | 2012         | 2013         | 2014         | 2015         |              |
|------------|----------------|-------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| AFRICA     | Botswana       |       |       |              |              |              |              |              |              |              |              |              | 33,41        | 26,27        | 30,25        | 35,56        |              |
|            | Cameroon       |       |       |              |              |              |              |              |              |              |              |              |              |              | 33,46        | 29,77        |              |
|            | Ghana          |       |       |              |              |              |              |              |              |              | 36,86        | <b>31,87</b> | 27,56        | 33,31        |              |              |              |
|            | Malawi         |       |       |              |              |              |              |              |              |              |              |              | 41,92        | 43,69        |              |              |              |
|            | Morocco        |       |       |              |              |              |              |              |              | 25,30        | <b>25,79</b> | <b>26,28</b> | <b>26,79</b> | <b>27,30</b> | <b>27,83</b> | 28,36        |              |
|            | Senegal        |       |       |              |              |              |              |              |              |              |              |              |              |              |              | 27,06        |              |
|            | South Africa   | 18,15 | 36,33 | 32,38        | 46,27        | 39,46        | 29,30        | <b>24,79</b> | 20,97        | 32,66        | 35,96        | 34,83        | 31,67        | 30,34        | 28,19        | 33,23        |              |
|            | Tunisia        |       |       |              |              |              |              |              |              | 20,01        | 23,73        | <b>29,01</b> | 35,47        | <b>28,31</b> | <b>22,59</b> | 18,03        |              |
|            | Uganda         |       |       | 41,38        | 45,00        | <b>44,96</b> | <b>44,92</b> | <b>44,87</b> | <b>44,83</b> | 44,79        | 49,81        | <b>47,87</b> | 46,00        | 25,08        | 18,88        | <b>14,81</b> |              |
|            | Zambia         |       |       |              |              |              |              |              |              |              | 32,15        | <b>32,07</b> | 32,00        | 38,80        | <b>41,31</b> | <b>43,98</b> |              |
| ASIA       | Bangladesh     |       |       |              |              |              |              |              |              |              |              |              | 27,33        |              |              |              |              |
|            | China          |       | 51,75 | 51,69        | <b>48,42</b> | 45,36        | 51,35        | 37,8         | <b>42,58</b> | 47,96        | 41,75        | 40,56        | 36,88        | 33,88        | 33,22        | 34,70        |              |
|            | India          | 67,77 | 29,47 | <b>28,98</b> | <b>28,49</b> | <b>28,02</b> | 27,55        | 19,57        | 21,54        | <b>24,23</b> | <b>27,25</b> | <b>30,64</b> | <b>34,46</b> | 38,76        | 31,71        | 18,92        |              |
|            | Indonesia      |       |       |              |              |              | 13,57        |              |              |              |              |              |              | 25,45        | 20,52        | 18,95        |              |
|            | Israel         |       | 20,02 | <b>21,51</b> | 23,12        | <b>23,06</b> | <b>22,99</b> | 22,93        | 20,17        | 24,82        | 24,36        | <b>21,61</b> | 19,17        | 17,41        |              | 12,42        |              |
|            | Japan          | 25,77 | 30,30 | 19,33        | 11,84        | 19,37        | 15,42        | 33,34        | 23,06        | 29,56        | 36,40        | 24,88        | 20,72        | 25,00        | 18,82        |              |              |
|            | Jordan         |       |       |              | 14,06        |              |              |              |              |              | 28,22        |              |              |              |              |              |              |
|            | Kazakhstan     |       |       |              |              |              |              |              | 27,81        |              |              |              |              |              | 26,39        | 27,55        |              |
|            | Malaysia       |       |       |              |              |              |              | 4,75         | <b>8,27</b>  | <b>14,41</b> | 25,10        | 12,37        | 10,17        | 13,32        | 18,40        | 17,54        | 13,68        |
|            | Namibia        |       |       |              |              |              |              |              |              |              |              |              | 37,25        | 33,62        |              |              |              |
|            | Pakistan       |       |       |              |              |              |              |              |              |              |              | 40,64        | 46,94        | 52,95        |              |              |              |
|            | Philippines    |       |       |              |              |              | 45,72        |              |              |              |              |              |              |              | 43,59        | 29,36        | 25,64        |
|            | Qatar          |       |       |              |              |              |              |              |              |              |              |              |              |              | 21,53        |              |              |
|            | Saudi Arabia   |       |       |              |              |              |              |              |              |              | 11,76        | 9,58         |              |              |              |              |              |
|            | Singapore      | 13,13 | 14,55 | 19,11        | 11,15        | 15,87        | 13,03        | <b>13,62</b> | <b>14,23</b> | <b>14,88</b> | <b>15,55</b> | 16,25        | 14,77        | 8,41         | 11,40        |              |              |
|            | Thailand       |       | 17,05 | <b>19,12</b> | <b>21,43</b> | 24,03        | 31,28        | 29,01        | <b>26,06</b> | <b>23,42</b> | <b>21,04</b> | 18,90        | 16,69        | 18,67        | 17,81        | 17,18        |              |
|            | Turkey         |       |       |              |              |              | 29,49        | 35,53        | 38,51        | <b>37,92</b> | 37,33        | 31,58        | 30,88        | 30,24        |              |              |              |
| Vietnam    |                |       |       |              |              |              |              |              |              |              |              |              |              | 25,08        | 29,74        | 37,36        |              |
| EUROPE     | Austria        |       |       |              |              | 14,30        | <b>9,59</b>  | 6,43         | <b>7,13</b>  | <b>7,92</b>  | <b>8,78</b>  | <b>9,74</b>  | 10,81        | <b>10,88</b> | 10,95        | <b>11,02</b> |              |
|            | Belgium        | 10,69 | 10,34 | 8,26         | 4,98         | 9,91         | 6,81         | 5,51         | 8,98         | 9,08         | 9,90         | 10,44        | 17,91        | 28,98        | 30,67        | 27,46        |              |
|            | Bulgaria       |       |       |              |              |              |              |              |              |              |              |              |              |              |              | 33,42        |              |
|            | Croatia        |       | 21,61 | 22,90        | 42,00        | 50,17        | 43,64        | 39,87        | 28,40        | 37,31        | 32,30        | 35,32        | 34,23        | 37,40        | 46,57        | 40,06        |              |
|            | Czech Republic |       |       |              |              |              | 30,58        | <b>29,90</b> | <b>29,24</b> | <b>28,59</b> | <b>27,96</b> | 27,34        | <b>24,92</b> | 22,72        |              |              |              |
|            | Denmark        | 3,02  | 6,52  | 6,26         | 6,87         | 3,22         | 3,55         | 4,76         | 5,17         | 7,10         | 8,00         | 7,08         | 8,24         | <b>6,69</b>  | 5,43         |              |              |
|            | Estonia        |       |       |              |              |              |              |              |              |              |              |              | 18,22        | 14,82        | 15,10        | 13,69        |              |
|            | Finland        | 5,11  | 7,21  | 9,00         | 7,48         | 12,43        | 14,15        | 13,24        | 12,81        | 19,25        | 18,07        | 18,26        | 17,10        | 17,93        | 15,62        | 15,02        |              |
|            | France         | 17,02 | 3,00  | 22,05        | 22,60        | 39,34        | 38,67        | 24,25        | 10,19        | 13,57        | 25,23        | 14,83        | 18,14        | 15,66        | 16,06        | <b>16,61</b> |              |
|            | Germany        | 16,99 | 21,81 | 23,32        | 27,65        | 30,58        | 36,19        | <b>30,93</b> | 26,44        | 31,4         | 25,66        | 18,59        | 21,68        | 18,71        | 23,18        | 17,13        |              |
|            | Greece         |       |       | 37,86        | 28,55        | 14,19        | 20,66        | 9,63         | 30,87        | 26,24        | 27,76        | 25,39        | 29,94        | 23,46        | 34,77        | 22,30        |              |
|            | Hungary        | 26,50 | 30,34 | <b>29,56</b> | 28,80        | 39,34        | 22,08        | 23,31        | 28,27        | 24,49        | 19,64        | 30,98        | 31,13        | 28,00        | 33,19        | 23,21        |              |
|            | Iceland        |       | 8,12  | 7,22         | 5,32         | 4,94         | 8,88         | 6,40         | 5,41         | 10,18        | 6,83         | <b>7,29</b>  | <b>7,77</b>  | <b>8,30</b>  | <b>8,85</b>  | <b>9,44</b>  |              |
|            | Ireland        | 13,95 | 14,51 | 16,11        | 12,81        | 19,06        | 10,39        | 5,43         | 18,06        | <b>23,60</b> | 30,83        | 29,48        | 28,14        | 18,02        | 29,65        | 19,33        |              |
|            | Italy          | 20,01 | 9,19  | 6,92         | 7,68         | 15,95        | 22,34        | 14,79        | 14,32        | 14,42        | 13,38        | <b>14,51</b> | 15,74        | 18,70        | 13,59        | 18,69        |              |
|            | Latvia         |       |       |              |              | 16,49        | 15,99        | 15,05        | 20,72        | 31,77        | 26,82        | 25,94        | 25,26        | 21,21        | <b>19,04</b> | 17,10        |              |
|            | Lithuania      |       |       |              |              |              |              |              |              |              |              |              | 28,37        | 24,63        | 23,30        | 19,61        | <b>17,34</b> |
| Luxembourg |                |       |       |              |              |              |              |              |              |              |              |              |              | 5,63         | 11,81        | 9,31         |              |



|         |                    |       |              |              |              |              |              |              |              |              |              |              |              |              |       |              |       |
|---------|--------------------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------|--------------|-------|
|         | Netherlands        |       | 10,95        | 9,88         | 13,6         | 7,76         | 6,14         | 10,86        | 8,93         | 10,38        | 8,41         | 9,10         | 8,44         | 7,98         | 15,67 | 14,66        |       |
|         | Norway             | 1,84  | 3,38         | 9,12         | 12,36        | 8,77         | 3,56         | 4,98         | 6,75         | 9,09         | 15,44        | 4,32         | 7,41         | 4,00         | 3,54  | 10,6         |       |
|         | Poland             | 47,11 | 31,98        | <b>33,43</b> | 34,94        |              |              |              |              |              |              | 47,62        | 40,71        | 47,40        | 36,75 | 28,06        |       |
|         | Portugal           | 18,91 | <b>20,97</b> | <b>23,25</b> | 25,78        | <b>18,55</b> | <b>13,34</b> | 9,60         | <b>12,62</b> | <b>16,60</b> | 21,83        | 17,80        | 17,86        | 21,45        | 27,37 | 24,49        |       |
|         | Romania            |       |              |              |              |              |              | 13,83        | 34,35        | 34,06        | 31,10        | 41,32        | 24,19        | 31,64        | 28,94 | 27,54        |       |
|         | Serbia             |       |              |              |              |              |              | 46,02        | 33,29        | 41,41        |              |              |              |              |       |              |       |
|         | Slovak Republic    |       |              |              |              |              |              |              |              |              |              | 27,56        | 35,57        | 40,17        | 32,57 | 31,09        |       |
|         | Slovenia           |       | 29,57        | 20,09        | 16,50        | 11,17        | 10,18        | 9,56         | 12,07        | 9,60         | 16,24        | 12,05        | 7,36         | 24,06        | 25,46 | 23,67        |       |
|         | Spain              | 22,15 | 22,17        | 5,13         | 12,10        | 14,07        | 15,19        | 14,89        | 14,80        | 15,75        | 25,38        | 25,85        | 25,59        | 29,24        | 29,79 | 24,80        |       |
|         | Sweden             | 11,05 | 17,07        | 9,03         | 9,00         | 14,43        | 7,11         | 9,52         | <b>10,66</b> | <b>11,93</b> | 13,36        | 6,09         | 6,84         | 9,69         | 7,91  | 9,22         |       |
|         | Switzerland        |       | 11,23        | 12,40        | <b>13,13</b> | 13,91        | <b>14,02</b> | 14,14        | <b>9,65</b>  | 6,59         | 14,09        | 11,39        | 18,08        | 7,49         | 14,35 | 10,08        |       |
|         | United Kingdom     | 14,46 | 13,01        | 14,59        | 10,14        | 11,26        | 15,36        | 11,23        | 14,00        | 16,99        | 10,60        | 17,20        | 18,30        | 16,13        | 12,90 | 23,92        |       |
| AMERICA | Argentina          | 39,41 | 50,14        | 37,64        | 28,96        | 30,05        | 25,84        | 32,25        | 38,38        | 46,69        | 36,25        | 33,11        | 34,54        | 29,82        | 28,03 | 29,76        |       |
|         | Barbados           |       |              |              |              |              |              |              |              |              |              | 6,77         | 12,42        | 12,92        | 14,56 | 15,23        |       |
|         | Belize             |       |              |              |              |              |              |              |              |              |              |              |              |              |       | 13,07        |       |
|         | Bolivia            |       |              |              |              |              |              |              | 28,66        | <b>21,96</b> | 16,83        | <b>18,17</b> | <b>19,61</b> | <b>21,26</b> |       | 22,84        |       |
|         | Brazil             | 37,43 | 55,02        | 42,66        | 46,12        | 47,11        | 47,66        | 41,60        | 32,87        | 38,70        | 31,06        | 30,66        | 30,13        | 28,60        | 28,95 | 42,87        |       |
|         | Chile              |       | 42,97        | 34,56        |              | 25,99        | 28,20        | 23,82        | 27,43        | 25,20        | 29,32        | 27,41        | 17,40        | 20,11        | 17,63 | 25,29        |       |
|         | Colombia           |       |              |              |              |              | 38,85        | 40,86        | 41,40        | 34,31        | 39,58        | 25,11        | 12,42        | 18,05        | 33,33 | 33,26        |       |
|         | Costa Rica         |       |              |              |              |              |              |              |              |              | 31,74        | <b>25,32</b> | 20,20        | <b>19,75</b> | 19,31 | <b>17,05</b> |       |
|         | Dominican Republic |       |              |              |              |              |              |              | 29,52        | 30,62        | 34,02        |              |              |              |       |              |       |
|         | Ecuador            |       |              |              | 30,98        | <b>30,31</b> | <b>29,66</b> | <b>20,02</b> | 28,40        | 32,37        | 27,63        | <b>31,46</b> | 35,83        | 33,64        | 29,43 | 30,56        |       |
|         | El Salvador        |       |              |              |              |              |              |              |              |              |              |              | 35,24        | <b>33,55</b> | 31,95 | <b>31,18</b> |       |
|         | Guatemala          |       |              |              |              |              |              |              |              |              | 25,02        | 15,01        | 33,49        |              | 31,43 | 40,62        | 45,78 |
|         | Jamaica            |       |              |              |              | 33,40        | 32,49        | <b>38,89</b> | 46,56        | 33,24        | 42,20        | 33,05        |              | 40,60        | 32,09 | <b>30,38</b> |       |
|         | Mexico             | 27,78 | 21,75        | <b>19,46</b> | <b>17,41</b> | 15,58        | 22,29        | <b>17,31</b> | 13,44        | <b>15,98</b> | 18,99        | 19,42        | 13,44        | 6,75         | 22,46 | 18,91        |       |
|         | Panama             |       |              |              |              |              |              |              |              |              | 23,63        | <b>25,22</b> | 26,92        | 19,49        | 18,57 | 26,32        | 45,31 |
|         | Peru               |       |              |              | 32,51        | <b>29,29</b> | 26,38        | 31,69        | 31,37        | 27,89        | 21,26        | 22,39        | 23,42        | 22,48        | 16,39 | 25,25        |       |
|         | Uruguay            |       |              |              |              |              | 36,09        | 31,45        | 23,64        | 21,81        | 26,01        | 11,07        | 18,38        | 11,98        | 15,96 | 18,18        |       |
|         | Canada             | 25,95 | 11,70        | 14,18        | 15,38        | 12,96        | 14,35        | <b>14,47</b> | <b>14,59</b> | <b>14,72</b> | <b>14,84</b> | <b>14,96</b> | <b>15,09</b> | 15,09        | 15,67 | 13,51        |       |
|         | United States      | 7,16  | 10,56        | 13,48        | 13,41        | 11,66        | 13,14        | 15,66        | 11,98        | 23,26        | 36,58        | 21,21        | 21,35        | 21,24        | 13,50 | 14,32        |       |
|         | OCEANIA            |       |              |              |              |              |              |              |              |              |              |              |              |              |       |              |       |
|         | Australia          |       | 17,37        | 12,97        | 18,50        | 13,16        | 10,74        | <b>12,31</b> | <b>14,11</b> | <b>16,17</b> | 18,54        | 15,04        |              |              | 17,60 | 12,73        |       |
|         | New Zealand        | 16,46 | 15,75        | 11,62        | 14,41        | 7,23         |              |              |              |              |              |              |              |              |       |              |       |

Source: Global Entrepreneurship Monitor (GEM)

Note: Highlighted values means that values were obtained through the calculation of the Compound Annual Growth Rate (C.A.G.R)