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ENTREPRENEURSHIP IN DEVELOPING COUNTRIES

THE RELATION WITH ECONOMIC DEVELOPMENT

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Abstract

Entrepreneurial activity in developing countries enhances a different kind of entrepreneurial activity as the activities occurring in the developed countries. The relationship between entrepreneurial activity and economic development changes as economies develop and GDP per capita increases. In developing countries the relation between economic development and level of entrepreneurship is negative, while in developed countries this relationship is positive. The levels of entrepreneurship are very high in the developing countries, but decrease as economies develop.

The changing relation between economic development and entrepreneurship is attempted to be explained by two models, firstly by the differences in economic activities between the stages of development (Porter, 1990). The high rates on entrepreneurship in developing countries are mostly due to entrepreneurial activities that are either agricultural or very small scale of nature. As economies start to develop industries start changing. The economy becomes more manufacturing based and dependent on economies of scale. This is a huge entry barrier for entrepreneurs. Secondly, the motivation behind entrepreneurial activities provides an understanding on the changing relationship (Reynolds et al., 2001). In developing countries the motivation to entrepreneurship is often necessity-based. The lack of other employment options pushed many people into self-employment. The necessity to become self-employed will decrease, as more wage-employment options become available as a country develops.

The empirical research has shown that the three phases; entrepreneurial intentions, total early-stage and established business ownership, all have negative relation with economic development. The rates of entrepreneurial activity decline as countries move to a higher stages of economic development. The more mature the phase of an entrepreneurial activity is, the less the decline in entrepreneurship rates is when moving to higher development phases. Intentions have the strongest negative relation with economic development. While levels of established businesses decrease relatively the least as economies develop. The more developed a country is the less the decline in entrepreneurial rates is as GDP per capita increases. The high rates of entrepreneurship should not be interpreted as a sign of economic development in developing countries.

CONTENTS

1. Introduction

1.1. List of acronyms

IEA	Entrepreneurial Intentions
TEA	Total Early-Stage Entrepreneurial Activity
EST	Established Business Ownership
ET	Entrepreneurship
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor

1.2. Research proposal

In the 17th century, it was Ricard Cantillion to be the first one to recognize the important value of entrepreneurs. According to Cantillion entrepreneurship has a central role in the economy and is responsible for all exchange and circulation in the economy. However, in the past researchers often neglected entrepreneurship as an influencing factor in the generation of economic growth. Nowadays it is more generally believed that entrepreneurial activity is a necessity for the economic development of a country (van Stel et al., 2005; Reynolds, 2005; Carree et al., 2002; Wennekers et al., 2005). Schumpeter (1934) stated the importance of entrepreneurship for economic development through the affecting mechanisms of employment, innovation and welfare effects. Entrepreneurs are held responsible for the stimulation of innovativeness in products and markets and thereby generate economic progress (van Praag, 1999). The innovativeness of a product may also affect the relationship of the entrepreneurial activity towards economic growth (Sternberg & Wennekers, 2005). Throughout the past decades levels of entrepreneurial activity in the OECD countries increased as their economies developed. Their activities became more marked by growth aspirations and level of innovativeness. Several theories show the rates of entrepreneurial activity to be positively related to levels of economic development but research is mostly limited to OECD countries (Carree et al., 2007).

The interpretation of entrepreneurship is not consistent throughout different countries. Being an entrepreneur in the Netherlands is very likely to have a totally different meaning than being an entrepreneur in Congo. The nature and format of entrepreneurial activity differs between countries (Acs, 2006). The type of business as well as the motivation behind the decision to become self-employed is likely to be very different between developed and developing countries. While in high-income countries self-employment is more likely to come forth after observing a market opportunity or driven by innovation. People in developing countries are more likely to be self-employed due to the lack of other employment options available (Thurik et al., 2008). In developing countries only a very small fraction of entrepreneurs is innovative (Sala-I-Martin et al., 2007). The majority of firms in the developing countries are very small, in numbers of employees and assets, often operating in the informal markets and employ mostly family. Entrepreneurial activity in developing countries is

characterized by small-scale businesses and agriculture. These types of entrepreneurial activities will not lead to economic development (Leff, 1978). In the words of Autio (2007): *"We actually know very little about whether and how entrepreneurship either contributes or does not contribute to economic growth in developing countries."*

This brings forth the following research question: How do levels of entrepreneurial activities relate with economic development in developing countries? How can rates of entrepreneurial activity be explained by GDP per capita, with the focus on the developing countries?

In previous research evidence has been found for the existence of a U-shaped relationship between total early-stage entrepreneurship and GDP per capita (Carree et al., 2002; Bosma et al., 2008, 2009; Wennekers et al., 2010). Developing countries have the highest rates on entrepreneurial activity, but as economies further develop these rates decrease along. The relationship between entrepreneurship and economic development appears to be negative in low-income countries (Acs, 2006). A country's level of entrepreneurial activity can be explained by various factors, economic as non-economic. According to (Branchflower, 2002) the levels of entrepreneurship are influenced by differentiations in institutional, education, demographic, cultural factors between countries. Amorós et al., (2009) also states that factors such as education, climate, property rights, as well as financial market and corruption are of influence.

The research in this thesis will be limited to attempting to explain the changing relation between rates of entrepreneurial activity by stage of economic development. In 1990, Porter provided a method to divide countries into three stages of economic development, between which the rates of entrepreneurship vary. This model enhances the differences in entrepreneurial activities and industry composition between different countries, in order to better understand the changing relationship between GDP per capita and entrepreneurship. The economies are divided in three stages of development based on GDP per capita and export rates. Since the beginning of the 21th century a lot of research emphasis has been put on the nature of entrepreneurial activity in an attempt to explain the relation between entrepreneurship and economic development. A distinction has been made between necessity-based and opportunity-based entrepreneurship (Reynolds et al., 2001).

Also a distinction can be made in the phases of entrepreneurial activity. This is mainly relevant for the empirical model of the thesis. This separation will not be covered in the theoretical framework, due to the limited available academic work that covers the differences between the entrepreneurial phases in the relation with economic development. The Global Entrepreneurship Monitor manual (Bosma et al., 2012) provides a suitable structure on the phases of entrepreneurship towards the generation of economic growth:

1) Potential entrepreneurs: Identified based on beliefs and attitudes towards entrepreneurship.
2) Those with concrete intentions to start an own business in the upcoming future.

3) Total early-stage entrepreneurial activities: All entrepreneurial activities younger than 42 months.
4) Established businesses: All entrepreneurial businesses older than 42 months.
5) Business discontinuance.

Based on this GEM model the following funnel model is designed (figure 1) to which this the empirical research done is limited. The funnel model captures three important phases of entrepreneurial activity: the intentions to entrepreneurial activity, the total early-stage entrepreneurship and the established business ownership rates. These three phases are likely to have a direct relation with economic development. To limit the research in this paper, rates on beliefs and attitudes or on business discontinuance rates will not be included in the research.

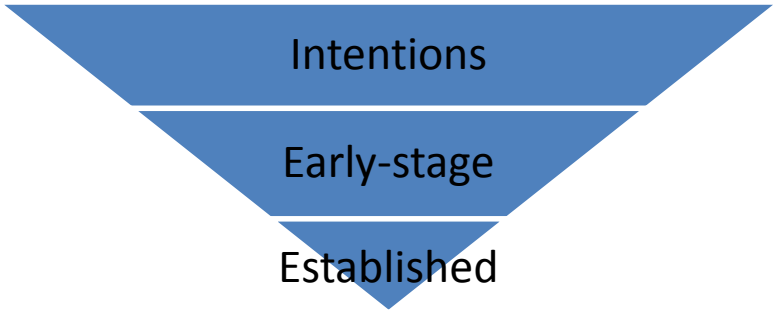


FIGURE 1: The funnel model on the 3 phases of entrepreneurship.

In summary, this thesis will give a descriptive analysis on the relation between entrepreneurship and the economic development in developing countries. The main contributions of this thesis are the extended investigations. First of all, the focus of the research is on entrepreneurship in developing countries. Most academic research has been done specifying the entrepreneurship in OECD countries. Secondly, an extension of the empirical research is made by including the three phases of entrepreneurship in the testing. The existing academic research mostly focuses on total early-stage entrepreneurship only.

This thesis is structured as followed. Firstly, in the theoretical framework the terminology and definitions used throughout the paper will be specified. Secondly, the literature review will provide a review of existing literature on the relation, with a special focus on the Wennekers et al. (2002) on a U-shaped relation between entrepreneurial activity TEA and GDP per capita. Thereafter the main lines of reasoning behind the relationship between entrepreneurship and economic development will be presented; as Porter et al. (2002)'s stages of economic development and the necessity-opportunity entrepreneurship by Reynolds et al. (2001). The empirical model will provide a graphical inspection on the correlation between the three phases of entrepreneurship and economic development. Thereafter, attempt is done to find more statistical evidence through testing the correlation between GDP per capita and the entrepreneurial phases. The model will not test for causal effects, but is limited to suggest the direction of the relationship between the variables. This thesis will finish with a discussion on the findings.

2. Theoretical Framework

2.1. Terminology and definitions

As the term *entrepreneurship* is a very multidimensional term, it is important to specify the correct terminology that will be applicable in this thesis. The term can be distinguished in several sub-phases, which will be defined.

Van Praag (1999) defines an entrepreneur as someone who is self-employed in an unincorporated business. The definition often used in the academic world is as follows: the introduction of new economic activity, including both the introduction of innovation as well as the entering of an imitative competitor. Citing Schumpeter (1934) *"One who starts or assumes control of a business or other independent enterprise, often employing innovation and more than an ordinary degree of risk"*. The term *entrepreneurship* according to the GEM: *"Any attempt at new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business"*. This definition used by the GEM will hold throughout this paper.

In this thesis the funnel model (figure 1) of the three phases of entrepreneurial activity is applied. A distinction has been made between phases of entrepreneurial intentions, total early-stage entrepreneurship and established business ownership as the variables in the relation with GDP per capita of a country. The precise definition on the three stages is derived from the GEM[1]. The entrepreneurial intentions (IEA) indicate the part of the population of 18-64 who have intentions to start a business within the next three years. Intentions however, do not imply the actual start of a new business. *Entrepreneurial intentions* are distinguished from *nascent entrepreneurs* in the fact that the intentions are not yet actively pursued. Neither does the term *intention* include positive attitudes and perceptions towards entrepreneurship among the local population.

Total early-stage entrepreneurship (TEA) captures both the nascent entrepreneurs and owners of new businesses. The separation can be made between the two forms of entrepreneurial early-stage activity. The term *nascent entrepreneurs* captures people in a country who are currently engaged in the process of creating or setting up a business. The business has not yet made any payments to the owners for the last three months. The term *ownership of new business* indicates the levels of entrepreneurial activity among the population of a country that is already established. Entrepreneurial businesses are new when older than three months, but still younger than 42 months, (GEM, 2000). Adding the two types of entrepreneurial activity together gives the total rate of early-stage entrepreneurial activity (TEA) in a country, collection of all new firm activities, including agricultural activities. Necessary to mention, the relation of the two types can differ towards the aspect of effect on economic growth. Also, differences between rates can give an indication of the

[1] GEM methodology report 2011 by Bosma et al. (2012)

levels of successful entrepreneurial activity in a country. Despite these differences to simplify the model, the term *total early-stage entrepreneurship* (TEA) will be defined as all entrepreneurial activity younger than 42 months[2]. The two forms are pulled together because both represent dynamic new firm activity in a country (GEM, 2000). Even if a substantial share does not succeed their action might have a positive effect on the economy increasing the market competition and pressuring existing markets to excel. Most of the ongoing literature is specified on the relation of TEA with economic development.

The term *established Business Ownership* (EST) captures those entrepreneurs currently owning or co-owning a business paying salaries, wages, or any other payments to the owners for more than 42 months. According to Bosma et al. (2008), established entrepreneurial businesses are the most likely to contribute to job creation and wealth payments and might indicate positive conditions for firm survival, in a country. This term will cover all types of entrepreneurial activity older than 42 months. According to GEM (2012), the established businesses are most likely to contribute to economic development.

Another relevant distinction can be made between necessity and opportunity entrepreneurship (Reynolds et al., 2001). The term *necessity entrepreneurship* enhances a very different type of entrepreneurship than opportunity entrepreneurship. Necessity entrepreneurship captures the entrepreneurial activities coming forth from people 'pushed' into self-employment, due to lack of alternatives and employment options. *Opportunity entrepreneurship*, on the other hand, indicates the levels of entrepreneurial activity derived from observed opportunities in the markets. The term enhances those who willingly decide to be self-employed.

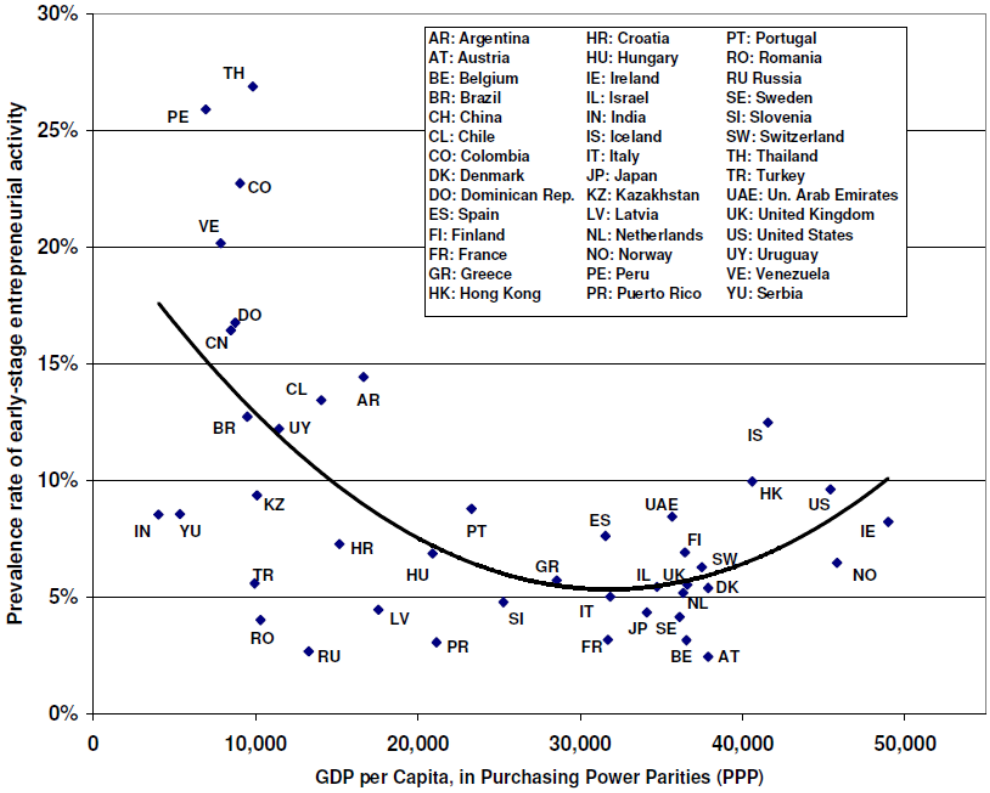
At last, a distinction is also made between stages of economic development, according to Porter et al. (2002). The low-income countries will be defined as *factor-driven* economies, signed by small-scale productions based on labor and land as inputs. The middle-income countries will be referred to as *efficiency-driven* countries; industries are characterized by manufacturing activities. The third stage, *innovation-driven* economy captures the high income countries, mostly consists of service industry.

2.1. Literature review

Much research has been done on the relationship between the entrepreneurship and economic development. Wennekers et al. (2010) described the existence of a U-shaped relation between total early-stage entrepreneurial activity and economic development. Their model tries to illustrate the relation between levels of entrepreneurial activity and economic development; the variable GDP per-capita is used. The entrepreneurial activities include independent entrepreneurship, self-employment, start-up rates and new business ownership rates. Despite the fact that there are no

[2] No payments have been made to owners for more than 42 months

recent studies that can confirm the U-shaped hypothesis with significant evidence, there is still enough evidence available to establish the existence of a clear relation between economic development and rates on entrepreneurial activity. The U-shaped line implies a varying correlation between entrepreneurship rates dependent on the level of economic development, i.e. dependent on GDP per capita of a country. It is important to realize that the plotting of TEA against GDP per capita does not reflect a linear relationship between entrepreneurship and economic development (Acs, 2006). Figure 2 shows the curved relationship between, the U-shaped graphical model of Bosma et al. (2008). The rates of total early-stage entrepreneurship rates are plotted against the GDP per capita of a country.



Resource: Bosma et al. (2008)

FIGURE 2: Rates of Early-Stage Entrepreneurship (TEA) and Per-Capita Income 2007.

As can be observed in figure 2, the factor-driven countries, as Peru and Colombia, have very high rates of total early-stage entrepreneurship. The entrepreneurial activity rates decrease as countries are experiencing a shift towards the higher levels of economic development. Efficiency-driven countries are moving to lower levels of entrepreneurship, as Chile and Uruguay. Yet then a changing point has been reached. After a certain level of income, countries moving from efficiency-driven to innovation-driven economies, observe an increase in level of entrepreneurship. At the upper end of the U-graph innovation-driven countries such as the United States and Hong Kong are found with higher rates of entrepreneurial activity. In other words, the rate of entrepreneurship changes by the stage of economic development of a country.

In highly developed countries entrepreneurial activities are observed to have a positive effect on the economic progress of a country. The rates of total entrepreneurial activity are positively correlated to the rates of GDP growth in the OECD countries (Wennekers et al., 2010). In factor-driven and efficiency-driven countries on the other hand a significant negative correlation was found between rates of entrepreneurship and economic development (van Stel et al., 2005). A similar negative relation between economic development and rates of self-employment was observed by Blau (1987). Shane (2008) found that correlations between rates of new firm formation decline as economic growth increases. Loufti (1987) also found rates of self-employment to decline strongly as levels of economic development increase. No consistent interpretation on the levels of TEA rates exists. Higher rates of TEA are not always preferable but are dependent on the stage of the economy (Bosma et al., 2008). The impact of entrepreneurial activities depends upon the economic development stage and varies with the per-capita GDP rate (Amorós et al., 2009). Also Acs (2008) states that diversity between the development stages of economies is a major source in understanding the differences in rates of entrepreneurial activity.

The Porter et al. (2002) model attempts to provide an explanation on the changing relation between entrepreneurship and economic development. A separation is made between countries based on their GDP per capita. The commonly engaged kind of entrepreneurial activities are dependent on the stage of economic development a country is in and differ in between. The governments and entrepreneurs in different stages of development focus on different aspects to improve and generate economic development. In different stages of development the occurring economic activities are focused on different aspects of society. The model divides countries in three stages of development, between these three stages large differences are observed.

The countries with the lowest income and low export rates are captured by the term *factor-driven economies.* These countries have the highest rates of early-stage entrepreneurship, and are signed by low cost commodities and production (Bosma et al., 2008, 2009). Production is based upon the mobilization of primary factors of production as labor and land (Acs, 2006). In this stage the economic development emphasis is put on basic requirements: development of institutions, infrastructure and creating macroeconomic stability (Acemoglu et al., 2007). The countries do not create knowledge for production or exporting. The factor-driven countries are found to have a substantial agricultural sector (Gries & Naudé, 2008). Differences in activities are the high self-employment rates in agriculture in the factor-driven countries compared to innovation-driven countries. But also the rates of non- agricultural self-employment are higher in the factor-driven countries (Loufti, 1987). In factor-driven economies, entrepreneurship is a manner to cover gaps in the society and imperfect markets. This form of entrepreneurship relates negatively with economic development (Leff, 1978).

After a certain level of income per capita a transition will occur from factor-driven to efficiency-driven economies. The rates of entrepreneurial activity start to decline. The negative slope of the

relation can be explained by the large decline of self-employment in agriculture as GDP per capita increases. A significant decline in rates of self-employment can also be observed in the non-agricultural sector (Loufti, 1987). The labor population will shift from self-employment to wage-employment. As economies of scale arise wage-employment becomes a more available option for the working population (Sala-I-Martin, 2007).

The second stage is for the middle-income countries, the *efficiency-driven economies*. In this stage, countries are focused on stabilizing and improving markets. The production is mainly determined by manufacturing industry. The economy is more industrialized and more dependent on economies of scale and capital-intensive activities (Acs, 2006). The competition on production efficiency rises; the development emphasis lies more upon improving efficiency. Furthermore economic development is defined by the focus on accumulating human and physical capital and improving education (Wennekers et al., 2005b). The efficiency-driven stage is marked by low rates of self-employment (Acs & Autio, 2011). The economies of scale are important in the manufacturing industry but are a large entry barrier for entrepreneurs (Acs et al., 1994). The declining share of agriculture and the increasing share of manufacturing diminishes the opportunities for self-employment (van Stel et al., 2004).

During the transition period from efficiency-driven towards the innovation-driven stage, the rates of entrepreneurial activity rise again. Carree et al. (2003) found that after a certain level of economic development the interest in self-employment increased and that there is a change in occupational preferences. A large share of the labor employed in manufacturing sector shifts to the service sector, as GDP per capita increases. This is also referred to as the shift from the managed to the entrepreneurial economy.

Innovation driven stage is the final stage and enhances the high-income countries. Higher levels of entrepreneurial activity are observed. In this stage countries are characterized by technology and innovative powers. The innovation-driven stage is marked by an increase in knowledge-intensive activities (Romer, 1990). A decrease in manufacturing sector has occurred, business are directed towards service industry. The service sector with more small scale businesses and low entry barriers allows more entrepreneurial activity (Wennekers et al., 2010). In the service industry of innovation-driven economies, the opportunities for entrepreneurial activities are broader and more accessible (Acs & Audretsch, 1994). Furthermore, the decreasing importance of economies of scale lowers the barriers to entrepreneurship. Additionally, the increase in economic development eases the financial constraint in business start-ups (Audretsch, 2007).

Another possible explanation on the high rates of entrepreneurial activity in low-income countries considers risk distribution. It is argued that the perceived risk of becoming an entrepreneur increases as economic development increases (Iyigun & Owen, 1998). In higher levels of economic development the opportunity cost of becoming an entrepreneur rises, the increased availability of

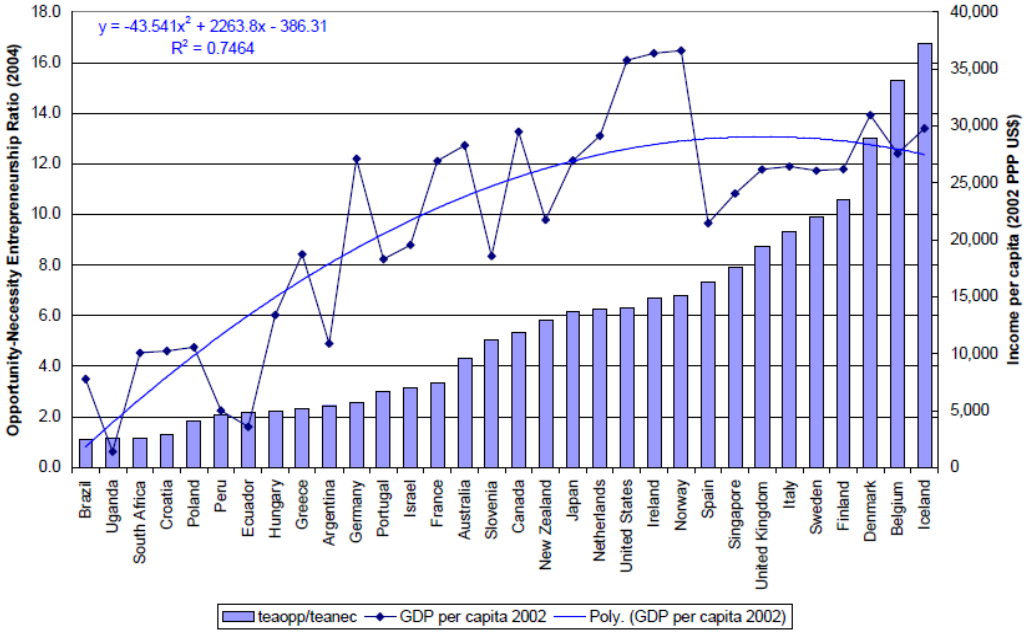
relatively safe wage-job earnings becomes more attractive than a risky entrepreneurial income (Lucas, 1978). As a country gets wealthier, the real wages rise and the opportunity cost of becoming an entrepreneur becomes higher. Entrepreneurship would be a more attractive option in the factor-driven countries because of the lower opportunity cost compared to innovation-driven countries (Shane, 2008). Hence, the high but decreasing entrepreneurship rates when a country develops from factor-driven to efficiency-driven countries. Yet once the basic material and social needs are secured in innovation-driven economies, a rise among individuals is observed in the need for autonomy. Self-employment becomes a more attractive option (Maslow, 1970). The increase in income has resulted in differentiation of consumer preferences. As GDP per capita increases, the demand for a variety in products and services increases simultaneously. The increased demand creates market niches providing entrepreneurs with new opportunities. This reflects the choice aspect, explaining why more people make the decision to become an entrepreneur as the economical state develops (Wennekers et al., 2010).

Several researchers state the importance of understanding the motivation behind entrepreneurial activity in order to understand the relation between entrepreneurial activity and GDP per capita. Complimentary to the levels of entrepreneurial activity also the motivation behind entrepreneurial activity changes as economies develop (Amorós et al., 2009). Considerable differences are observed in the type and nature of entrepreneurial activities across countries in different economic stages (Autio, 2007). The nature, character and structure of the entrepreneurial activities between the different stages of development differ hugely. Also Acs (2006, 2008) found that results on economic development differ significantly when distinguishing by the motivational reasons behind entrepreneurship. The least capable individuals will be pushed into self-employment. High levels of necessity entrepreneurship are probably due to high unemployment rates and indicate low business opportunities in a country. Necessity entrepreneurship is characterized by low survival rates and low generation of employment. Thurik et al. (2008) found a negative correlation between necessity-based entrepreneurship and economic development. On the other hand an individual may willingly decide to become self-employed after observing an opportunity in the markets, opportunity-based entrepreneurship. Opportunity entrepreneurs are often found to be endowed with higher skills and a higher availability of capital (Carree & Thurik, 2005). The main difference in these two types of entrepreneurship lies within the growth aspirations. On average the opportunity-based entrepreneurial activity has more aspiration to grow and innovate, also the employment-creation factor is likely to be larger (Acs & Audretsch, 2008). Opportunity entrepreneurs are better prepared, possess superior skills, and earn more than necessity entrepreneurs (Bhola et al., 2006). The higher rates of opportunity-based entrepreneurship are more likely to stimulate economic development than entrepreneurial activities with a necessity-based motivation.

The presence of necessity-based entrepreneurship is found to be significant in factor-driven and efficiency-driven countries (Wennekers et al., 2010; Bosma et al., 2008). The high rates of necessity entrepreneurship in developing countries are partly explained by the lack of institutions (Levie &

Autio, 2011). A country's environment is of influence, in its contribution to improve the conditions and possibilities for entrepreneurship. Due to the lack of basic requirements less opportunity-based entrepreneurship is possible (Acemoglu, 2007). Naudé (2008) sets the hypothesis that the relation between necessity-based entrepreneurship and economic development is likely to be negative in factor-driven and efficiency countries. According to Acs (2006) necessity entrepreneurship has no effect on economic development. Even the suggestion is made that necessity-based entrepreneurship could lead to underdevelopment of a country. Opportunity-based entrepreneurship, on the other hand, has a positive effect on economic development in countries (Acs & Varga, 2005).

Reynolds et al. (2001) were the first to use the opportunity-necessity ratio per country to identify the differences in the opportunity-necessity ratio in relation with different stages of economic development. A positive relation can be observed between opportunity-based entrepreneurship and level of income per-capita (Amorós, 2009). This relation is displayed in figure 3. With a higher/lower the share of opportunity/necessity entrepreneurship, a higher the level of income and economic development is observed. The factor-driven and efficiency-driven countries have lower necessity-opportunity ratios, confirming the substantial presence of necessity entrepreneurship. Since economic growth is more likely to come forth from opportunity-based entrepreneurship; the findings in figure 3 could offer an explanation of why a developing country benefits less from high rates of entrepreneurial activity (Naudé, 2008).



Resource: Acs et al. (2005)

FIGURE 3: Ratio of opportunity/necessity entrepreneurship and income per capita.

Yet the effect of necessity entrepreneurship should not be diminished, in developing countries self-employment provides job opportunities and has the ability to create new markets (Amorós, 2009). Naudé (2009) found empirical evidence that more entrepreneurial opportunities are available in developing countries than in developed countries. Acs et al. (2005) have found that in factor and

efficiency-driven countries the higher entrepreneurial opportunities are matched by higher numbers of opportunity entrepreneurs entering the market. India's rates of opportunity entrepreneurship are much higher than rates in, example given, Finland. Xavier et al. (2013) point out the likelihood of underestimating the effect of necessity entrepreneurship and overestimating opportunity entrepreneurship. Entrepreneurship is still of great importance for developing countries because entrepreneurs are able to fill the gaps left by the underdeveloped markets (Leff, 1978).

New technologies create many market opportunities for start-up businesses (Wennekers et al., 2010). Therefore another important distinction in nature of entrepreneurial activities is made between innovative and imitative entrepreneurship. The level of innovativeness of entrepreneurship implies the degree and type of novelty introduced into the economy (Koellinger, 2008). The lack of additional uncertainty and the risk of novelty of a product in the imitative entrepreneurial activity is the main distinction between the two forms (Koellinger, 2008). The innovativeness of a product may also affect the relationship of the entrepreneurial activity towards economic growth (Sternberg & Wennekers, 2005). It is mainly those entrepreneurs that have introduced product, process and market innovations that are responsible for the economic growth and create job employment possibilities. Through the innovations both the product market and the labor market are stimulated, thereby contributing greatly to the development of a country (van Praag, 1999). This finding is partly contradicting the findings of Schmitz (1989) who states it is the imitative entrepreneurs who plays a key role in economic development; imitation diffuses innovations throughout the economy. Innovation alone does not create economic growth but the adaption of the innovation does so through imitation. In the innovation-driven economies entrepreneurship is found to contribute greatly to the economic development by introducing innovation, increasing competition and stimulating economic performance (Audretsch & Thurik, 2001). A positive correlation is found between innovative start-ups and the average income per-capita (Wennekers et al., 2010). Also Koellinger (2008) found a positive relation between economic development and innovative entrepreneurship. Innovative and imitative forms of entrepreneurship co-exist in all countries. In developing countries also innovations may occur. As Koellinger (2008) states that no country is characterized by only imitative or innovative entrepreneurial activity. Yet developing countries are often further away from the technological frontier, due to differences in emphasis on economic activities (Acemoglu, 2007). Sala-I-Martin et al. (2007) found that innovation accounts for only about 5% of economic activity in factor-driven economies and rises to 10% in the efficiency driven stage. While in the innovation-driven stage, innovative activity accounts for 30% of economic activity. These percentages are derived from a specific weighted regression on the GEM data from 2006.

In the GEM 2012 Global Report by Xavier et al. (2013) differences have been measured in necessity-opportunity entrepreneurial rates between the different stages of development. Also rates on entrepreneurship in the different phases of entrepreneurship per development stage are provided. The three different phases are: intentions, total early-stage entrepreneurship and established business

ownership. Both the rates on entrepreneurial phases as well as on motivation are displayed in table 1. The levels of entrepreneurship in an economy vary according to the phase of economic development (Wennekers et al., 2005). Considerable differences are observed in the type and motivation of entrepreneurial activities across countries in different stages economy (Autio, 2007).

	Intentions[3]	Early-stage	Established	Necessity[4]	Improvement[4]
Factor-driven	48%	24%	11%	35%	42%
Efficiency -driven	26%	13%	8%	28%	46%
Innovation-driven	10%	7%	7%	18%	51%

TABLE 1: Three phases of ET and necessity-opportunity ET on stages of development rates. The percentages are based on the responses in a representative population survey in the GEM 2012 report by Xavier et al. (2013).

Several observations can be made from table 1. In the factor-driven economies the rates for all three phases of entrepreneurship are the highest. Entrepreneurial intention rates are found to be decreasing as economic development increases. The same observed relation holds for rates of total early-stage entrepreneurship; low development is opposed by the higher TEA rates. The results on TEA are similar to the findings in the literature review (Amorós et al., 2009; Blau, 1987; Carree et al., 2002). Also the rates on established business ownership are the highest in factor-driven countries. A negative relationship between the business ownership rate and economic development is found (Iyigun & Owen, 1998). Rates of failure appear to be high in factor- and efficiency-driven countries since the difference between total early-stage rates and established business ownership is relatively big. The decrease between phases is stronger in the factor and efficiency driven stages. The rates of TEA are only half of the rates of IEA in factor-driven countries, also in efficiency-driven countries the change is 50%. In innovation-driven countries the difference between IEA and TEA is only 30%. Respectively the difference in rates of TEA and EST are 54%, 38% and 0%. The differences between IEA, TEA and EST of the factor-driven and efficiency-driven economies are much larger than in the innovation-driven phase. The overall rates of entrepreneurial activity in the three phases in the factor-driven and efficiency driven economies are the highest. Consistently, several researches have indicated high rates of entrepreneurship in factor and efficiency-driven economies (Naudé, 2010). But here entrepreneurship appears to be less sustainable compared to innovation-driven countries. Factor- and efficiency-driven countries have large differences between the phases, indication a high level of failure. Table 1 suggests a negative relation between all three phases of entrepreneurship and economic development.

In the research paper of Naudé (2008) higher rates were found for both necessity and opportunity-based entrepreneurship in developing countries compared to developed countries. This is consistent with the findings in table 1. As GDP per capita decreases, the rate of improvement-driven entrepreneurship increases. The rate of necessity-driven entrepreneurship is higher when GDP per capita is lower. The higher rates of necessity entrepreneurship are combined with higher levels of

[3] Intentions are measured as a percentage among non-entrepreneurs
[4] Necessity- and improvement-driven rates are as a % of TEA

IEA and TEA. The evidence from table 1 could suggest that the high rates of TEA in the first two stages are likely to come from high necessity-based activities. This would be consistent with the necessity-opportunity ratio findings in Acs et al. (2005). The high entrepreneurial rates do not indicate a valid sketch of the economic strength of the countries. Only small percentage of the entrepreneurs actually generates substantial economic value in low-income countries, compared to the high-income countries.

The entrepreneurship in the developing world mostly consists of the small medium enterprises (SME) and the informal sector (Bosma et al., 2008). In factor-driven countries the informal sector contributes for 47.2%[5] to the GDP, compared to the 13% in innovation-driven countries. Low-income countries have to do with the 'marginal' entrepreneurs, e.g. local shopkeepers compared to innovation-driven businesses. The self-employment in factor and efficiency-driven countries often comes forth out of necessity and activities are either agricultural or very small scale of nature. The lack of other employment options and low opportunity cost are pushing many people into self-employment. The necessity of entrepreneurship decreases as economies develop. Therefore van Stel et al. (2005) perceive the high rates of entrepreneurship as a signal of a 'substantial informal sector' in factor and efficiency-driven countries, not as a sign of economic development. The types of entrepreneurial activities in these countries will not lead to economic development due to the missing mechanism that can link these activities to economic development (Leff, 1978).

In summary, an overall conclusion on the relation between entrepreneurship and economic development cannot be made. To estimate the correlation between entrepreneurial activity and economic development an additional diversification is required. The countries have to be reviewed depending on their stage of economic development or the motivation behind entrepreneurial activity. In factor and efficiency-driven countries, high entrepreneurial rates are negatively linked with economic development (Acs, 2006). Also large differences in the entrepreneurial rates between phases of economic development are found. In the literature, the relationship in developing countries is found to be negative. Existing literature is barely specified upon researching the differences between phases. The effect per entrepreneurial phase will be investigated further in the empirical model.

[5] World bank database

3. Empirical model

The literature review has indicated the existence of a negative relationship between level of entrepreneurship and GDP per capita in developing countries. The existing evidence is mostly specified on the rates of total early-stage entrepreneurship (TEA). The empirical model will be extended to the funnel model, the relation between GDP per capita and the three phases of entrepreneurial activity will be tested. The model is limited to factor-driven and efficiency-driven countries and will not include rates of entrepreneurship in innovation-driven countries. In the first part of the empirical model the entrepreneurial phases IEA, TEA and EST will be graphically modeled against GDP per capita, to get an indication on the direction of the relation. The second part of the empirical model focuses on testing on the correlation between GDP per capita and the three stages of entrepreneurship. The modeling is limited to determining the correlation coefficients between the variables and will provide an indication on the direction of the relationship. The results are descriptive evidence; a description on the relationship between GDP per capita and entrepreneurial activity is provided. No causality can be given, due to the third variable problem of unmeasured variables of influence (Field, 2009).The testing does not cover non-economic factors and several other economic factors of possible influence.

For the empirical model was considered the following:

- The modified dataset contains data on 52 countries.
- The selected countries are the factor-driven and efficiency-driven economies, the developing countries[6]. The selected countries have an average GDP per capita below international $22.000[7].
- The dataset used contains information conducted from several resources. All data on rates of entrepreneurial activities are obtained from the GEM data base.
- The data on TEA and EST account for the period of 2001-2012, the data of IEA range from 2002-2012.
- Due to data availability limitations a longer testing period was not possible. There are several missing observations on entrepreneurial activity, due to survey participation complications. There are differences in participation rates in the survey and availability of data on entrepreneurial activities between the countries.
- The data on rates of GDP per capita of the selected countries were obtained from databases on the International Monetary Fund and World Bank websites. The data on GDP per capita cover the period 2001-2012 and are complete.
- The rates of GDP per capita are given in international dollar measurement. International dollars are a hypothetical unit of currency that correct for differences in purchasing power parity among countries (Kravis et al., 1975).

[6] Defined by the GEM Global Report of Xavier et al.(2012)
[7] Averages are calculated over the period 2001-2012

- The combined data from the GEM and International Monetary Fund create the appropriate dataset for the testing.
- All data are measured in annual intervals.
- The data on a country's annual GDP are used as a proxy for the GDP general economic activity, hence economic development (Steenkamp & Fang, 2012).

First, a graphical illustration is created to get a clearer indication on the direction and strength of the relation between the three entrepreneurial phases and economic development. The dataset is used to calculate the country specific average rates of the variables: IEA, TEA, EST and GDP. The averages of GDP per capita are calculated according to formula (1). The average rate of entrepreneurial activities in a country is calculated for each phase separately (IEA, TEA and EST) according to formula (2). The averages are plotted against each other. The averages are calculated over the period of 2001-2012, with exception of IEA; ranging from 2002-2012. During the graphical modeling the dataset will be treated as a cross-sectional dataset. The literature review has indicated that higher rates of GDP per capita would imply lower rates of entrepreneurship. According to Wennekers et al. (2002) the graphical modeling of the data should display a downwards sloping line, a negative relation between variables. The figures 4-6 are plots based on the calculations from formula 1 and 2, and provide a graphical indication of the relationship between country-specific variables.

$$\overline{GDP\ per\ capita}_i = \frac{1}{11}\sum_{t=1}^{11} GDP\ per\ capita_{i,t} \qquad (1)$$

$$\overline{ET\ Phase}_{\ i} = \frac{1}{11}\sum_{t=1}^{11} ET\ phase_{i,t} \qquad (2)$$

The first graph provides a clear picture on the relationship between the average entrepreneurial intentions (IEA) and average GDP per capita. Figure 4 plots the calculated average IEA rates against average GDP per capita rates per country. The plot looks similar to the graph (figure 2) of Bosma et al. (2008). The data points of country averages are relatively unified and seem well clustered together. The downwards sloping clustered observations per country could even suggest a linear relation, when taking out some outliers. The rates of IEA range between a broad spread from 2.2% in Russia to 75% in outlier Botswana. The graph suggests a strong negative relationship between averages rates of IEA and GDP per capita. Entrepreneurial intentions decrease as GDP per capita increases in a country.

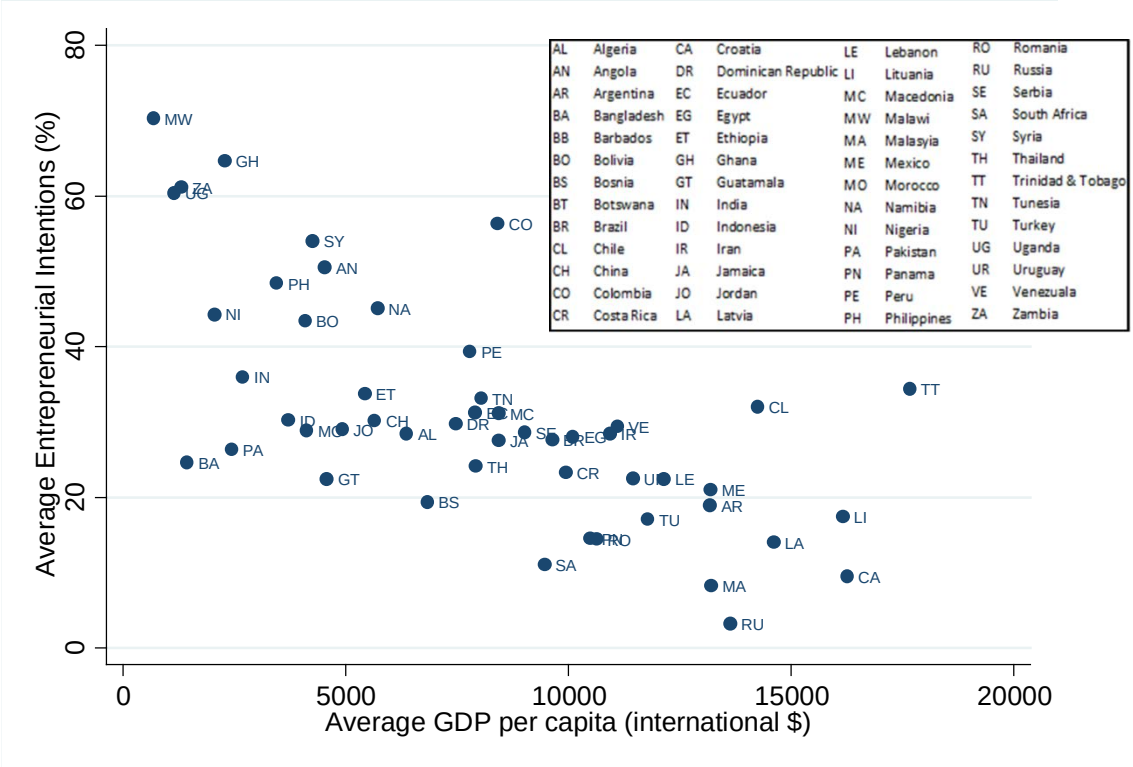


FIGURE 4: Plotted averages of IEA on GDP per capita, country specific.

In figure 5, the country-specific average GDP per capita is plotted against the average rates of total early-stage entrepreneurship (TEA). This graph seems to suggest a negative relationship between rates on average GDP and average TEA. This would be consistent with the results found in the literature review (Carree et al., 2002). The evidence for the negative relation with TEA seems less strong than the relation observed in figure 4. The observations in figure 5 are less clustered but more spread; the evidence for a negative slope could be less strong. Bosma et al. (2008) found that countries with similar geographical backgrounds tend to cluster together in entrepreneurial rates. Indeed, the African countries cluster together in the left top, when leaving out this clustered group of observations, the suggested relation seems not very downwards sloping anymore. The observation on effect of TEA rates on GDP per capita does not seem to be as conclusive as the results in figure 5.

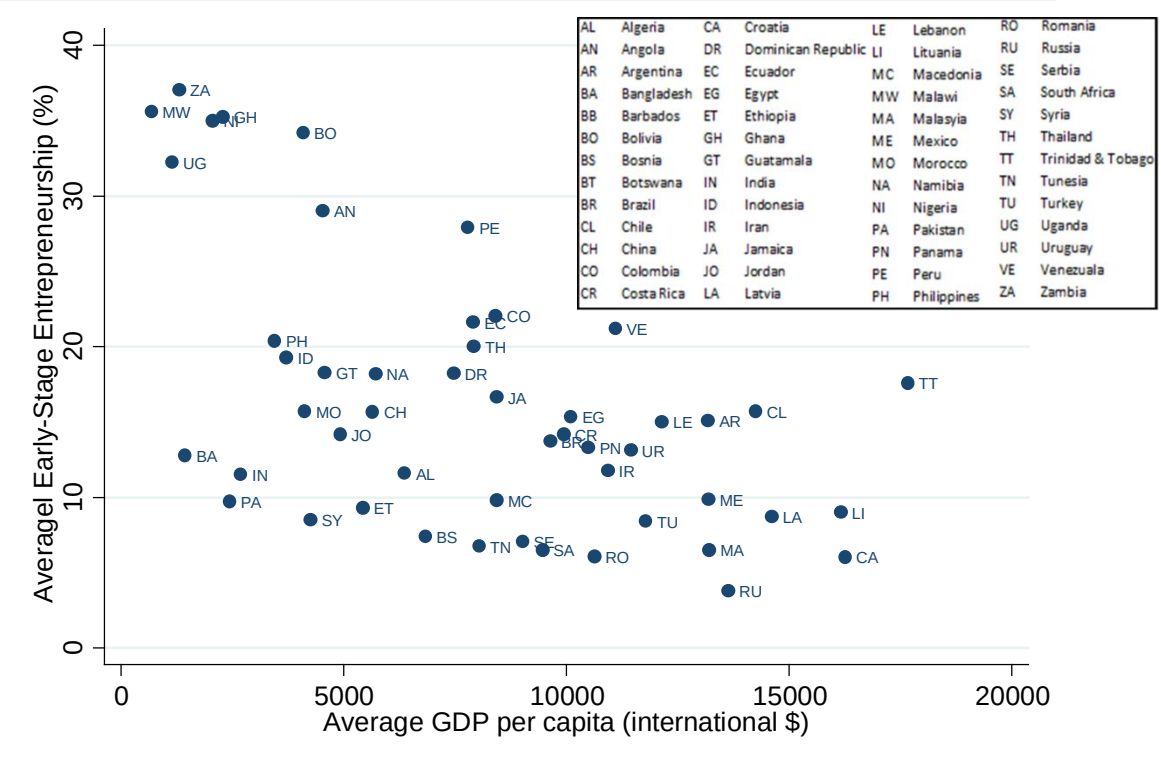


FIGURE 5: Plotted averages of TEA on GDP per capita, country specific.

A third graph is plotted to investigate the direction of the relationship between average established business ownership (EST) rates and the average GDP per capita. Figure 6 shows that the relationship between the two variables is also negative. But the graph does not indicate a very strong negative patron between the two variables average GDP and EST. Although the data points suggest a more curved relation than the correlation displayed in figure 5, still the graph suggests less strong correlation between average levels of EST and GDP. The calculated average data points are more scattered. To obtain an optimal graphical illustration, the outlier Ghana with an average of 36.2% EST measurement[8] has been left out. This observation is likely to be biased during the deducted survey (Kelley et al., 2012).

[8] The average EST of Ghana was based on 2 observations only.

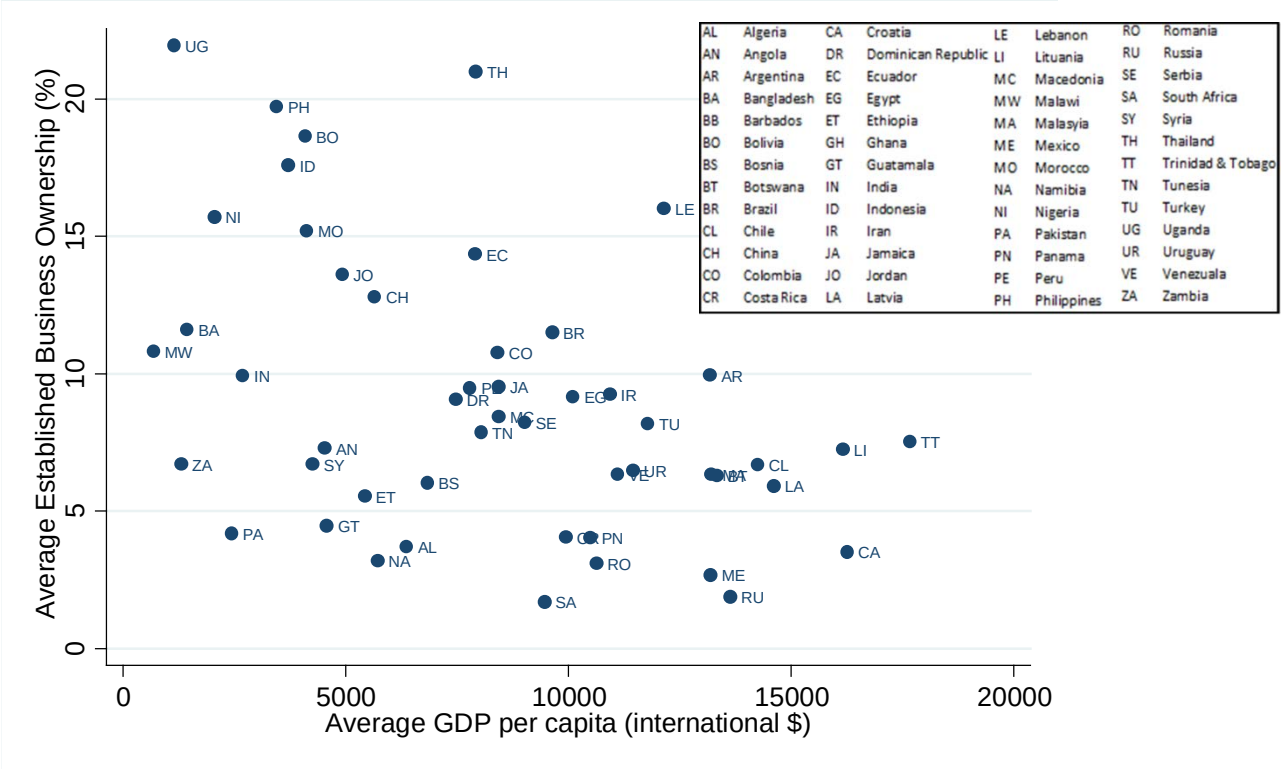


FIGURE 6: Plotted averages of EST on GDP per capita, country specific.

Based on the descriptive evidence from the figures above, the following expectations are made on the outputs of further statistical testing. The level of GDP per capita is expected to have a negative correlation with all three phases of entrepreneurial activity. The evidence on IEA, with strong clustering, suggested the clearest and strongest negative relation. The relation of TEA and EST with GDP per capita is expected to be less evident and significant. The non-clustered data of EST indicate a less strong correlation with GDP per capita. Also the graph TEA indicates less conclusive results.

The strength of the correlation between the variables will be investigated in further statistical modeling. The statistical tests are expanded to regressing GDP per capita in their correlation with the three phases of entrepreneurship. The testing will focus on the direction of the coefficient, the significance and correlation between variables. First, a regression will be done on the combined relation of the three phases of entrepreneurial activity on GDP per capita. Secondly, regressions are done to derive separate correlations. IEA, TEA, EST and GDP are the variables. The regression output will determine the direction of the coefficients. The R-squared test statistic provides the explanatory power of the statistical returns. The significant value is set at level of 5%. During the testing the data set is corrected for inter-dependence within the observations. This means that the standard error is corrected for country clusters, as it is a panel dataset with multiple observations over a time-range (year) per individual (countries). Most changes in entrepreneurial rates within a country are probably due to measurement errors, the changes are unlikely to correctly reflect the changes in a country (Kelley et al., 2012). The testing is done on absolute level of GDP to eliminate the business cycle effect.

First of all, a correlation matrix is provided between the three phases of entrepreneurship and GDP per capita to derive a deeper insight.

	GDP	IEA	TEA	EST
GDP	1.0000			
IEA	-0.5549 0.0000	1.0000		
TEA	-0.5539 0.0001	0.7856 0.0000	1.0000	
EST	-0.4461 0.0010	0.4445 0.0011	0.5665 0.0000	1.0000

TABLE 2: Correlation matrix phases of entrepreneurial activity and GDP per capita.

Table 2 provides the correlation matrix between all the variables. The summarized return statistics show a matrix correlation with rates between -0.5549 and 0.7856. The independent variables all have a negative correlation coefficient with GDP per capita. These rates vary between -0.44 and -0.55, indicating a medium strong correlation effect with GDP (Field, 2009). The correlations between the different phases of entrepreneurial activity are not too high, but still strongly ranging between 0.4445 and 0.7856. The phases IEA and TEA are correlated the strongest with each other.

First, the linear regression defined by (3) is conducted to test the combined effect of the three entrepreneurial phases on GDP per capita. GDP per capita is set as the dependent variable. Entrepreneurial intentions (IEA), early-stage activity (TEA) and established business ownership (EST) are set as the independent variables. The regression measures the direct relation of IEA, TEA and EST on GDP per capita. The linear regression is corrected for country clustering of standard errors. The testing of formula (3) gave us the following output found in table 3. The output will only attempt to provide a clearer suggestion of the relation between the variables; again no causal conclusion can be derived.

$$GDP_i = \beta_0 + \beta_1 IEA_{i,t} + \beta_2 TEA_{i,t} + \beta_3 EST_{i,t} + \varepsilon(i,t) \qquad (3)$$

Standard Error adjusted for 52 country clusters

GDP	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	16399.6	983.7849	15.22	0.000
IEA	-93.82442	34.61406	-2.71	0.009
TEA	-51.37391	64.32971	-0.80	0.428
EST	-153.4888	72.37395	-2.12	0.039
R-squared = 0.2730				

TABLE 3: Simple linear regression output on combined relation entrepreneurial phases.

The regression output in table 3 gives negative coefficients for the independent variable of entrepreneurial activity IEA, TEA, EST. The combined entrepreneurial activity relation with GDP per capita is negative. The correlation coefficients of IEA and EST are significant at a critical value

of 5%. The coefficient of TEA is not significant at 5% level. The explanatory power, R-squared, of the regression is 27.30%.

To investigate the relation with GDP per capita separately at each phase of entrepreneurial activity, other regressions are conducted. In the following steps the regression method chosen are quadratic formulas, the least squared regression quadratic curve. A similar testing approach has been used in the research on OECD countries (Carree et al., 2002). Quadratic formulas may improve the fit of the model (Moore et al., 2009). More important, they allow us to model a parabola relation, similar as the slope observed by Bosma et al. (2008). The entrepreneurial phases (IEA, TEA and EST) will be set separately as the independent variable and GDP per capita is defined as the dependent variable. According to the literature review the plotted regression slopes should display a negative/downwards sloping relation. It is expected that β_1 will be negative and β_2 to be positive, likely displaying a negative relation curved but slightly curving up at the right end. In the quadratic regression a new variable is created, the square of the independent variable GDP is taken as second independent variable and is included in the regression. Also year dummies variables (Y) are included in the tests to incorporate year effects. The inclusion of year dummies corrects for possible business cycle fluctuations affecting the correlation between the variables. Each of the three phases of entrepreneurial activity will be investigated separately on the correlation with GDP per capita. The figures 7-9 display the plotted regression equation from the GDP per capita on IEA, TEA and EST.

First the relationship between entrepreneurial intentions and GDP per capita is regressed by (4). The output is showed in table 5. The quadratic regression will be able to provide a curved relation, if existing, between IEA and GDP.

$$IEA_{\,i} = \beta_0 + \beta_1 GDP_{\,i,t} + \beta_2 GDP_{i,t}^2 + \delta_1 Y_{03} + \delta_2 Y_{04} + \delta_3 Y_{05} + \delta_4 Y_{06} + \delta_5 Y_{07} + \delta_6 Y_{08} + \delta_7 Y_{09} + \delta_8 Y_{10} + \delta_9 Y_{11} + \delta_{10} Y_{12} + \varepsilon(i) \quad (4)$$

Standard Error adjusted for 52 country clusters

IEA	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	48.3524	5.514287	8.77	0.000
GDP	-0.003549	0.0010512	-3.38	0.001
GDP squared	8.23e-08	4.69e-08	1.75	0.085
Year 2003	-8.037792	2.885772	-2.79	0.007
Year 2004	0.866128	4.218986	0.21	0.838
Year 2005	-0.215029	4.666798	-0.05	0.963
Year 2006	0.361657	4.420505	0.08	0.935
Year 2007	4.221857	4.988932	0.85	0.401
Year 2008	4.575216	4.434069	1.03	0.307
Year 2009	2.138229	4.317451	0.5	0.623
Year 2010	8.301983	5.129549	1.89	0.065
Year 2011	7.987053	4.782136	1.56	0.126
Year 2012	10.37396	5.514287	2.17	0.035
R-squared = 0.3518				

TABLE 4: Regression output of GDP per capita on entrepreneurial intentions.

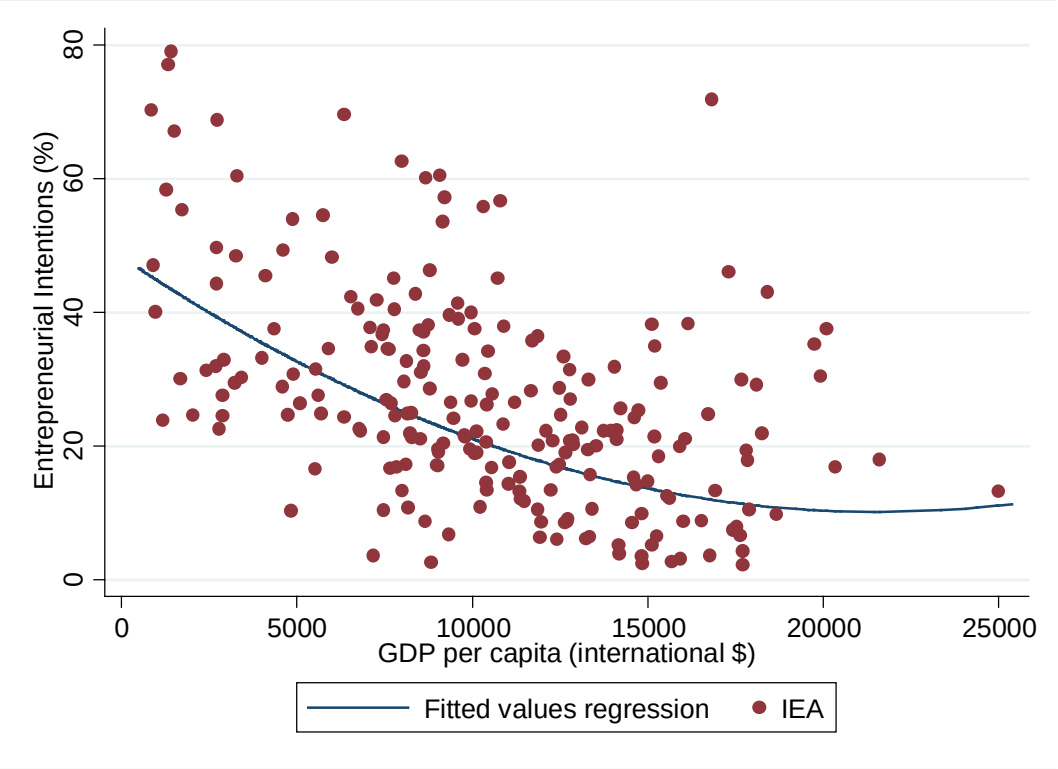


FIGURE 7: Quadratic regression GDP per capita and entrepreneurial intentions.

The coefficient of GDP in table 4 is negative and significant, indicating that GPD per capita is indeed negatively correlated with entrepreneurial intentions (IEA). The coefficient of GDP squared is positive and significant at a 10% alpha. This means that after a certain level of GDP per capita is obtained the relation becomes positive. The explanatory power of the IEA model, R-squared, 35.18% is sufficient. The significant negative effect of the dummy variable for the year 2003 indicates that controlling for the effects of GDP, IEA is significantly lower in that year compared to the baseline year (2002). Similarly, the significant positive effect of the dummy variable for the year 2012 indicates IEA is significantly higher in 2012 compared to the baseline year (2002). The significance of these year dummies indicate that there were unobserved shocks that effected IEA. The regression of formula (4) is plotted in figure 7. The graph clearly displays a downwards sloping regression line between the GDP per capita and entrepreneurial intentions, the slope curves up slightly after the inflection point of GDP per capita. The relationship between intentions and GDP per capita is negative and curved in a convex manner. When the model is not corrected for year dummies, the squared coefficient becomes significant and the inflection point moves to the left hand side. The regression output without year dummy variables can be found in the appendix (6.1).

Secondly, a similar formula is conducted, taking the rate of total early-stage entrepreneurial activity as the dependent variable, formula (5). The output is found in table 6.

$$TEA_{\,i} = \beta_0 + \beta_1 GDP_{\,i,t} + \beta_2 GDP_{i,t}^2 + \delta_1 Y_{02} + \delta_2 Y_{03} + \delta_3 Y_{04} + \delta_4 Y_{05} + \delta_5 Y_{06} + \delta_6 Y_{07} + \delta_7 Y_{08} + \delta_8 Y_{09} + \delta_9 Y_{10} + \delta_{10} Y_{11} + \delta_{11} Y_{12} + \varepsilon(i) \quad (5)$$

Standard Error adjusted for 52 country clusters

TEA	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	21.86319	4.8373215	4.52	0.000
GDP	-0.001789	-0.0006855	-2.62	0.011
GDP squared	4.54e-08	2.86e-08	1.59	0.118
Year 2002	0.1598385	2.606757	0.06	0.951
Year 2003	4.034948	3.695885	1.09	0.280
Year 2004	7.246662	4.418537	1.64	0.107
Year 2005	3.259647	3.404876	0.96	0.343
Year 2006	3.912419	3.179076	1.23	0.224
Year 2007	4.797467	3.024843	1.59	0.119
Year 2008	4.900279	2.81388	1.74	0.880
Year 2009	4.287762	3.028753	1.45	0.154
Year 2010	5.970315	3.028753	1.81	0.077
Year 2011	7.208163	3.307191	2.19	0.033
Year 2012	7.524139	3.327589	2.26	0.028
R-squared =0.2802				

TABLE 5: Regression output of GDP per capita on total early-stage entrepreneurship.

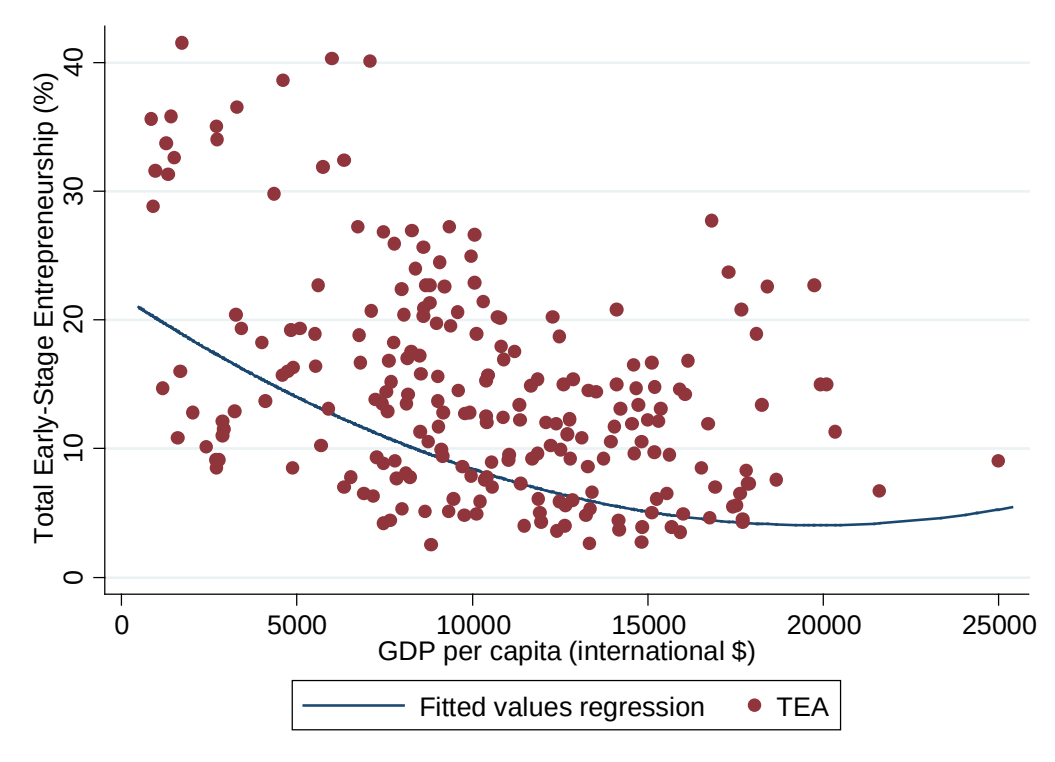


FIGURE 8: Quadratic regression GDP per capita and total early-stage entrepreneurship.

The statistical output found in table 5 has negative coefficients for GDP, GDP squared is positive. The negative coefficient of GDP also suggests a negative correlation with levels of TEA. The relation found between GDP and TEA is significant, but GDP squared is insignificant. The explanatory power is 28.02%. The dummy variables for the year 2011 and 2012 is positive and significant. The year dummies variables for 2011 and 2012 are significant. The plotted regression (figure 8) also indicates a negative relation between GDP per capita and TEA. The results are similar to the U-shaped results of Bosma et al. (2008). The graph displays a curved relationship; the

slope is less strong than the slope in figure 1. The rates of TEA decrease less strong as GDP per capita increases, compared to levels of IEA. The output does not change when year dummies are excluded from the regression, only the inflection point in figure 8 shifts to the left-hand side.

Thirdly, a quadratic regression of (6) is done in order to derive the relationship between GDP per capita and levels of established business ownership. Output results are displayed in table 7.

$$EST_{\,i} = \beta_0 + \beta_1 GDP_{\,i,t} + \beta_2 GDP_{i,t}^2 + \delta_1 Y_{02} + \delta_2 Y_{03} + \delta_3 Y_{04} + \delta_4 Y_{05} + \delta_5 Y_{06} + \delta_6 Y_{07} + \delta_7 Y_{08} + \delta_8 Y_{09} + \delta_9 Y_{10} + \delta_{10} Y_{11} + \delta_{11} Y_{12} + \varepsilon(i) \quad (6)$$

EST	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	11.35713	2.679126	4.24	0.000
GDP	-0.0012119	-0.0005209	-2.33	0.024
GDP squared	3.15e-08	2.12-08	1.48	0.144
Year 2002	2.386524	1.399745	1.70	0.094
Year 2003	3.653874	1.004936	3.64	0.001
Year 2004	5.454872	1.731466	3.15	0.003
Year 2005	4.313927	1.48919	2.90	0.006
Year 2006	5.966939	1.481706	4.03	0.000
Year 2007	5.467127	1.703223	3.21	0.002
Year 2008	5.861827	1.361181	4.31	0.000
Year 2009	6.159086	1.428021	4.31	0.000
Year 2010	6.545126	1.832595	3.57	0.001
Year 2011	5.235866	2.002557	2.61	0.012
Year 2012	6.144441	1.946628	3.16	0.003
R-squared =0.2278				

TABLE 6: Quadratic regression GDP per capita and established business ownership.

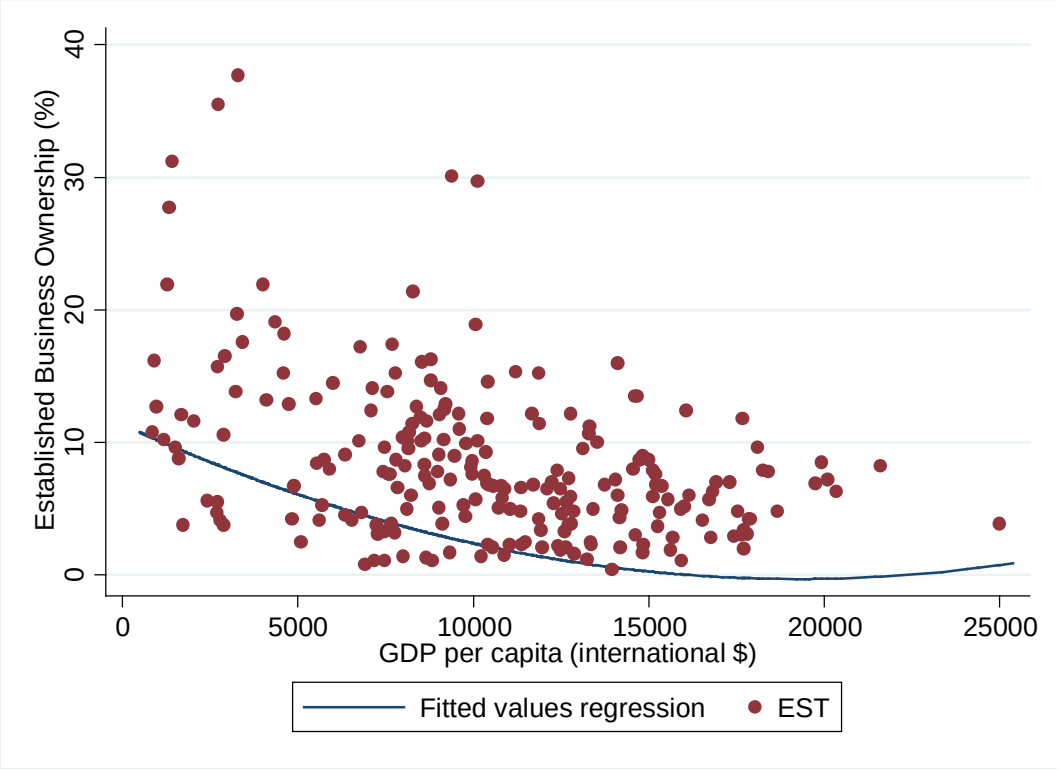


FIGURE 9: Quadratic regression GDP per capita and established business ownership.

The results in table 6 show that the coefficient for GDP is negative and significant, also suggesting a negative correlation between GDP per capita and EST. The coefficient of GDP squared is positive, but not significant. The explanatory power of the model is 22.78%. All the year dummy variables are significant at a 5% alpha, indicating a significant correlation between EST and GDP in every year. The fitted regression (figure 9) also shows a negative curved relation between the variables GDP per capita and established business ownership. The fitted line is less curved but more flat, than the regression lines of IEA and TEA. An increase in GDP per capita will lead to a less strong decrease in level of established business ownership. Similar output results are found if year dummies are excluded from the regression. But the fitted regression line shifted more upwards.

Moreover, there has been done other empirical research on the quadratic testing model. Each one of phases of entrepreneurship has been taken separately as the explanatory variable. Their squared variable has been added as the second independent variable in the regression. The GDP per capita becomes the dependent variable. Three formulas were developed to derive this reversed relationship, formulas 7-9.

$$GDP_i = \beta_0 + \beta_1 IEA_{\,i,t} + \beta_2 IEA_{i,t}^2 + \varepsilon(i,t) \qquad (7)$$

The regression evidence of formula (7) on entrepreneurial intentions (IEA) is negatively related with GDP per capita. The slope is slightly curved and the results were significant. As levels of IEA decrease the GDP per capita increases fast, this relation is found to be the strongest.

$$GDP_i = \beta_0 + \beta_1 TEA_{\,i,t} + \beta_2 TEA_{i,t}^2 + \varepsilon(i,t) \qquad (8)$$

The test results of formula (8) on total early-stage entrepreneurship (TEA) also indicate a negative relation between TEA and GDP per capita, but the results were insignificant. The plotted regression between the variables displayed concave downward-sloping regression line. This finding is in contradiction with the findings of Bosma et al. (2008) who found a U-shaped relation.

$$GDP_i = \beta_0 + \beta_1 EST_{\,i,t} + \beta_2 EST_{i,t}^2 + \varepsilon(i,t) \qquad (9)$$

The regression of formula (9) on established business ownership (EST) also results in a negative relationship between the variables. The evidence was significant[9], yet the regression slope was barely curved. The existence of a strong (curved) negative correlation was not found. The GDP per capita increases the least as level of EST increase. When applying the formulas 7-9, none of the graphical illustrations indicated the strong U-shaped correlation between the variables as found by Carree et al. (2002). The detailed statistical outputs and graphical illustrations can be found in the appendix (6.2).

[9] At a 10% significance level

4. Results

4.1 Discussion

The literature review provided several sources in order to explain the research question: 'how do levels of entrepreneurial activities relate with economic development in developing countries'. The relationship between entrepreneurship and economic development is negative. The empirical review remodels the relation with rates on total early-stage entrepreneurship and is extended to test whether a similar negative relation is found when testing on the other phases of entrepreneurial activity: intentions and established business ownership. No causal conclusions can be derived from results.

The theory has already indicated a negative correlation between economic development and all three phases of entrepreneurial activity. Levels of entrepreneurial intentions in developing countries are the highest but decrease fast along with an increase in GDP per capita. The percentage of people indicating to have entrepreneurial intentions in a country decrease the fastest as the economy develops. The rates on entrepreneurial intentions slowly start increasing again after a certain level of GDP per capita is reached, approximately $21.500 The relationship between intentions and GDP per capita is U-shaped.

The relation between total-early stage entrepreneurial and economic development is also negative. As GDP per capita increases the levels of total-early stage entrepreneurial activity decrease, until the inflection point is reached of approximately $20.000. Thereafter the level of total early-stage entrepreneurship slowly starts increasing again. The rates on total early-stage entrepreneurship are only about half of the rates on entrepreneurial intentions in the factor- and efficiency-driven countries. The decline of rates of TEA along with the increasing economic development is less strong than the decline in rates of entrepreneurial intentions.

The rates on established business ownership also decrease as economies develop, but the decrease in rates is the smallest as GDP per capita increases. This finding is consistent with the GEM data (table 1). The inflection point is around $19.500.The highest rates of established business ownership are observed in factor-driven economies but the differences in rates on established business ownership between the economic development stages is small. The established business ownership rates also decline as GDP per capita increases, yet the declining relationship is not as strong as in the other two phases. Also a U-shaped relation is found.

The findings of the negative relation between entrepreneurial activity and economic development in factor-driven and efficiency-driven countries are consistent with the literature review. The lack of wage-employment options and the high self-employment in the agricultural sector lead to high rates of entrepreneurial activity in the lowest developed countries. The necessity to become self-employed is very high in low developed countries also leading to high levels of entrepreneurial activity. As economies start to develop industries start changing. The economy becomes more dependent on

economies of scale. The industry-dependency on economies of scale is a huge entry barrier for entrepreneurs. The share of agriculture will decrease and the share of manufacturing will increase (van Stel et al., 2004). Also, the necessity to become self-employed will decrease as economies become more industrialized, more wage-employment options become available and less necessity-based self-employment is needed to fill the gaps of the markets. The occurring entrepreneurial activities are not characterized by innovativeness.

The decreasing rates of entrepreneurial activity in developing countries could be seen as an indication of economic development. The necessity-opportunity ratio might indicate how well developed a country is. Especially the decrease in rates on entrepreneurial intentions might signal increasing economic development. Also a decline in level of total-early stage entrepreneurship is related with economic development. A decrease in the established business ownership rates is an indicator of economic development but less strong.

The levels of entrepreneurial activities decline strongly as economies develop from factor-driven to efficiency-driven economy. The declining rates can be understood by the change of a country's industries and (entrepreneurial) activities as GDP per capita increases. Also the changing motivational reason behind entrepreneurial business provides an attempting explanation on the negative relation between entrepreneurship and economic development in developing countries. The highest rates of entrepreneurial activity on all three phases are observed in factor-driven economies and decline over stages of economic development. As the entrepreneurial activity develops and matures to higher entrepreneurial phases, the rates on entrepreneurial activities decline. The higher the stage of economic development a country is, the less the decline between the entrepreneurial phases is.

4.2 Limitations

As any other study, this research is subject to a number of limitations. Even though it was attempted to cover the most relevant aspects, there are areas available in which the research can be expanded. The limitations listed below were necessarily taken due to the limited length of my thesis.

First of all, the research could be expanded geographically. By including data and literature on developed countries the comparison between the effects of entrepreneurship dependency on GDP per capita could have been improved. A deeper understanding could have been derived of how entrepreneurship may lead/cause economic development.

The literature can be extended by deriving a deeper understanding of the differences in entrepreneurial activities and personal motivations per stage of economic development. The entrepreneurial activity can be split in more subdivisions; occupational-behavioral entrepreneurship and dynamic-static entrepreneurship. Secondly, new research can include other economic and non-economic factors in the relation with levels of entrepreneurial activity. Factors as the role of

governments and institutions, rule of law and availability on capital, might improve our understanding of the level of entrepreneurial activities. The rule of law has shown to have a significant effect in provision of basic fundamentals to stimulate entrepreneurship (Levie & Autio, 2011). Also, academic research could be done to understand the differences of entrepreneurial intentions and established business ownership rates in relation with stages of economic development.

The empirical model was also limited in several manners. Due to limited inclusion of independent variables the model is limited to descriptive analyses; no causal conclusion could be made. Stronger causal evidence could be found when extending the model towards the inclusion of more explanatory variables. The statistical modeling could be extended to include the relation of necessity and opportunity entrepreneurship with economic development. Similarly, the model can also be extended by including the GEM rates on “perceptions and attitudes” and “business discontinuity”. Also rates on “growth aspirations” of entrepreneurs could be included. The growth aspirations are perceived by the GEM as an indicator for successfulness and a more significant one in their economic contribution. Other limitations are rooted in the availability of information; the GEM data base is marked by large amounts of missing measurements and data. Also, the period covered by the database is no sufficiently large to conclude strong time-development effects. The database is not suitable for a time-series analysis. The differences in entrepreneurial rates within a country are due to measurement errors instead of time-development variation.

5. Resources

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6. Appendix

6.1 Quadratic Regression without year dummies

The output results are displayed in table 7 and figure10 on the regression between GDP per capita and entrepreneurial intentions.

$$IEA_{\ i} = \beta_0 + \beta_1 GDP_{\ i,t} + \beta_2 GDP_{i,t}^2 + \varepsilon(i,t) \qquad (10)$$

Standard Error adjusted for 52 country clusters

IEA	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	53.70633	5.499203	9.77	0.000
GDP	-0.0039988	0.0010902	-3.67	0.001
GDP squared	1.13e-07	4.96e-08	2.28	0.027
R-squared =0.2752				

TABLE 7: Regression output quadratic equation without year dummies on entrepreneurial intentions

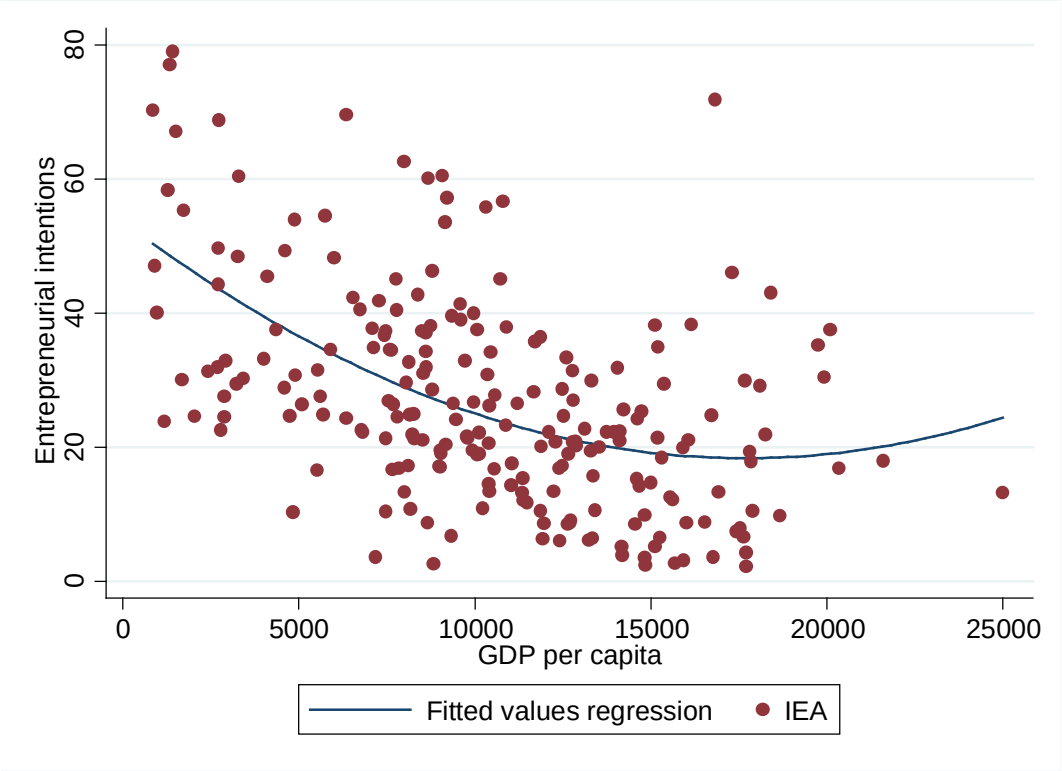

FIGURE 10: Plotted quadratic regression without year dummies of entrepreneurial intentions.

$$TEA_{\ i} = \beta_0 + \beta_1 GDP_{\ i,t} + \beta_2 GDP_{i,t}^2 + \varepsilon(i,t) \qquad (11)$$

The results are displayed in table 8 on the regression between GDP per capita and total early-stage entrepreneurship.

Standard Error adjusted for 52 country clusters

TEA	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	27.44901	4.19737	6.54	0.000
GDP	-0.001998	0.00072	-2.74	0.008
GDP squared	5.88e-08	3.03e-08	1.94	0.057
R-squared =0.2297				

TABLE 8: Regression output quadratic equation without year dummies on total early-stage entrepreneurship.

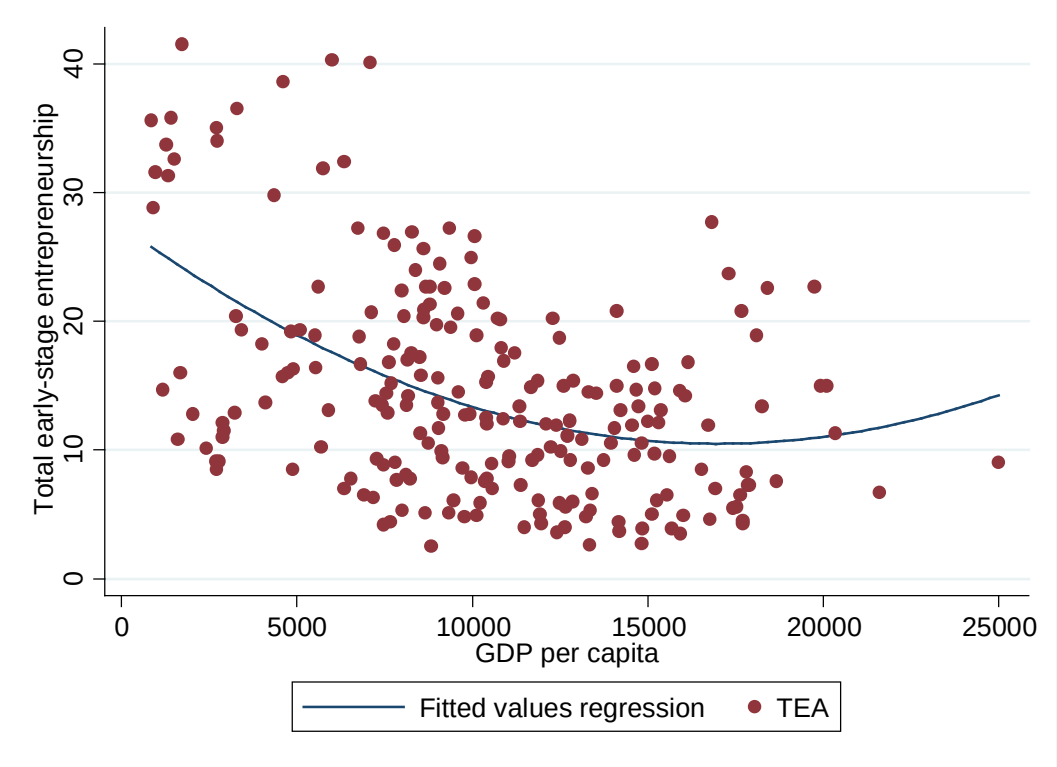

FIGURE 11: Plotted quadratic regression without dummies of total early-stage entrepreneurship.

In table 9 the results are displayed on the regression between GDP per capita and established business ownership.

$$EST_{\,i} = \beta_0 + \beta_1 GDP_{\,i,t} + \beta_2 GDP_{i,t}^2 + \varepsilon(i,t) \qquad (12)$$

EST	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	16.60415	3.045625	5.45	0.000
GDP	-0.0121	0.00072	-2.27	0.027
GDP squared	3.88e-08	3.03e-08	1.55	0.127
R-squared =0.1852				

TABLE 9: Regression output quadratic equation without year dummies on established business ownership.

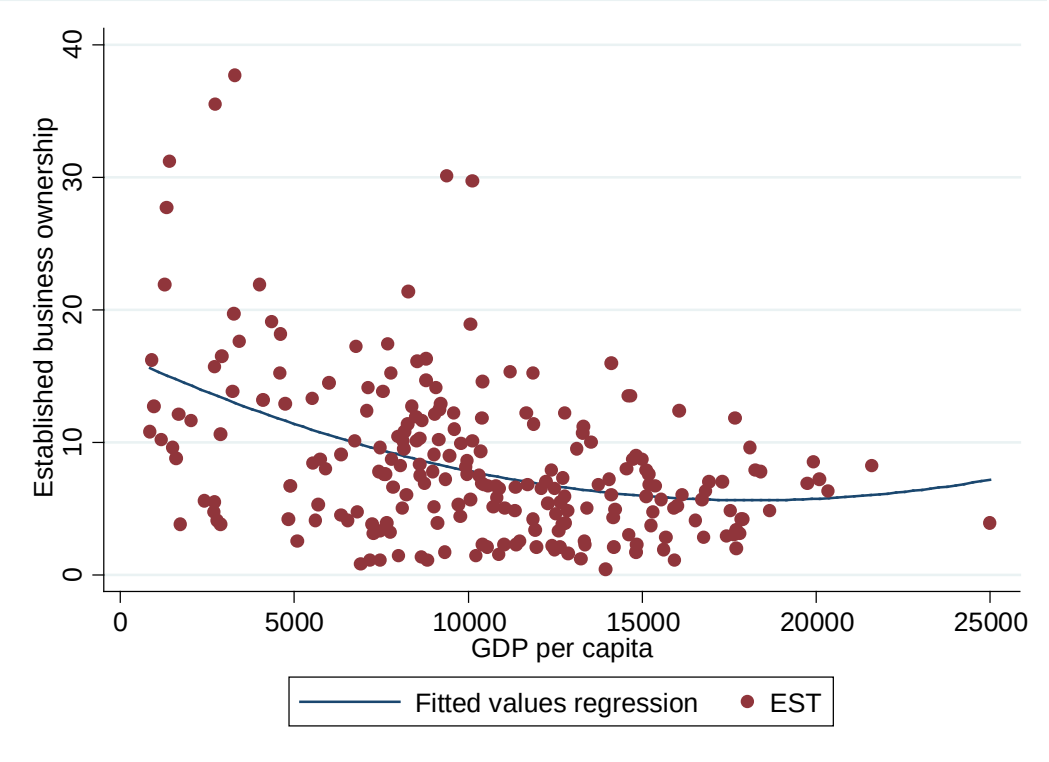

FIGURE 12: Plotted quadratic regression without year dummies of established business ownership.

6.2 Other empirical results

The empirical testing results to derive the effect of phases on entrepreneurial activity as the independent variable on GDP per capita as dependent variable are displayed below. The formulas 7-9 from the empirical model are used to obtain the following outputs.

First the quadratic relationship with IEA as independent variable is regressed. Outputs are found in table 10.

Standard Error adjusted for 52 country clusters

GDP	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	15075.13	1295.477	11.64	0.000
IEA	-207.2982	87.75709	-2.35	0.022
IEA squared	0.9280707	1.209999	0.77	0.447
R-squared = 0.2377				
Adjusted R-squared = 0.2227				

TABLE 10: Regression output quadratic equation on entrepreneurial intentions

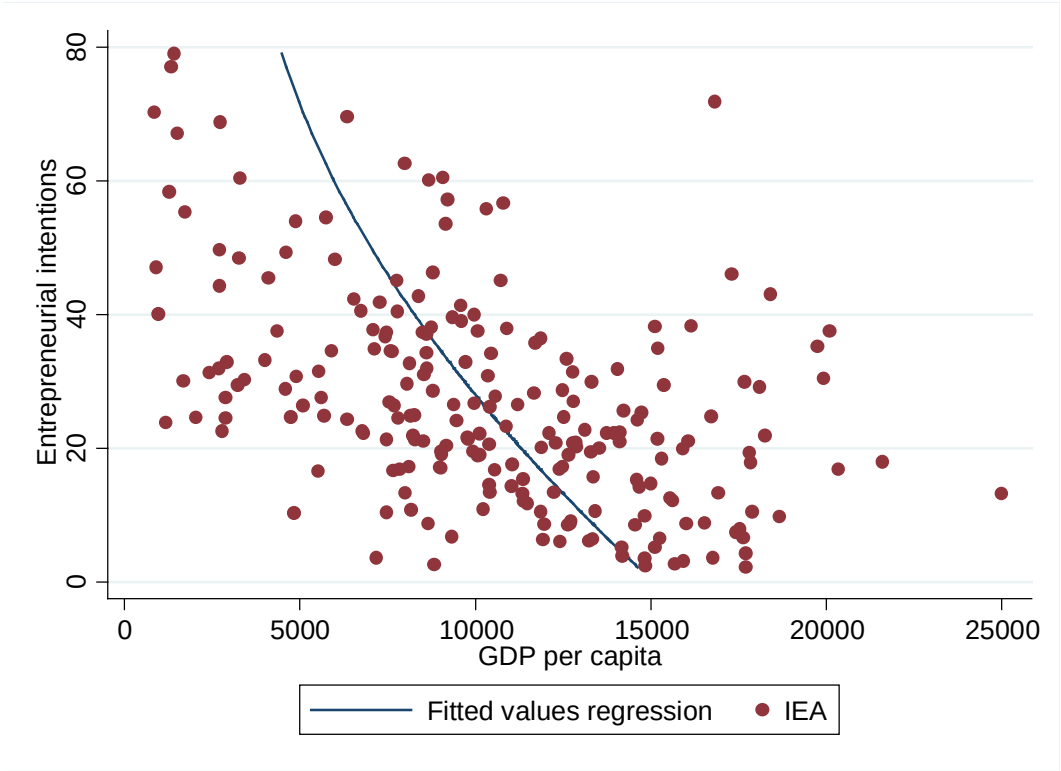

FIGURE 13: Plotted quadratic regression of entrepreneurial intentions.

Secondly, a similar regression was computed but with (8), using the rates of TEA as independent variable, to compute the output in table 11.

Standard Error adjusted for 52 country clusters

GDP	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	13034.14	1645.101	7.92	0.000
TEA	-124.5144	183.6592	-0.68	0.501
TEA squared	-3.272714	4.336302	-0.75	0.454
R-squared =0.1922				
Adjusted R-squared =0.1763				

TABLE 11: Regression output quadratic equation on total early-stage entrepreneurship.

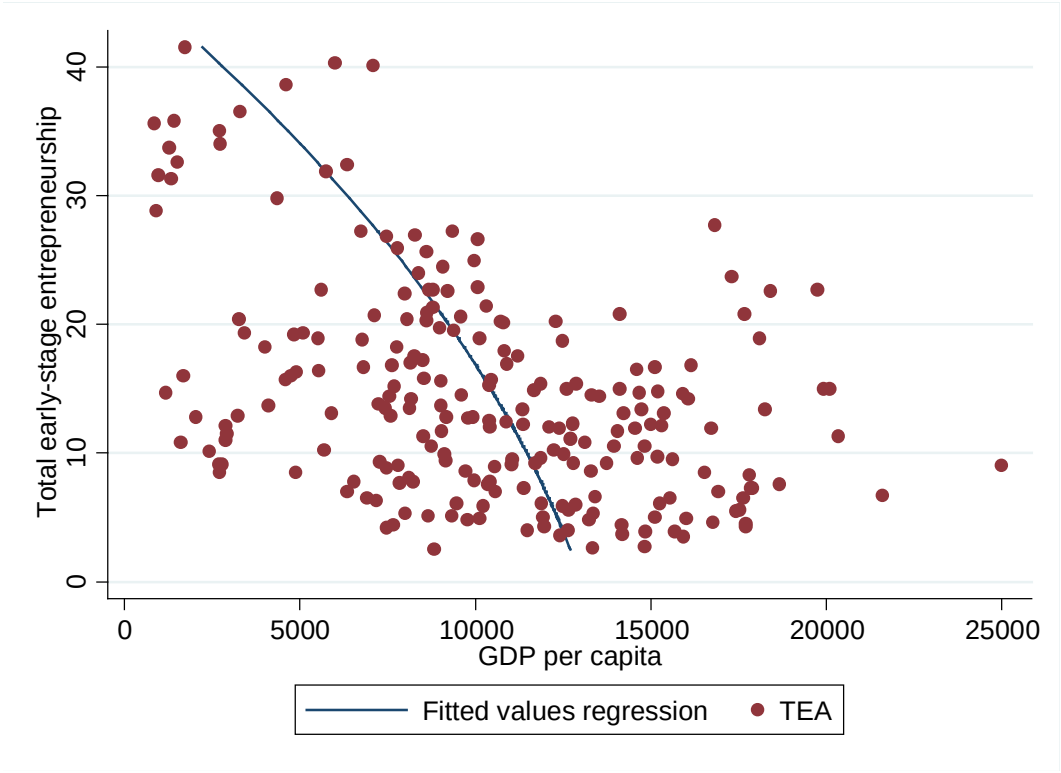

FIGURE 14: Plotted quadratic regression of total early-stage entrepreneurship.

At last, also formula (9) has been used to test on the correlation between EST, as independent variable and GDP per capita.

Standard Error adjusted for 52 country clusters

GDP	**Coefficient**	**Standard Error**	**T-value**	**P-value**
Intercept	13261	1350.496	9.82	0.000
EST	-377.2764	200.4351	-1.88	0.066
EST squared	2.279363	5.633541	0.40	0.687
R-squared =0.1611				
Adjusted R-squared = 0.1446				

TABLE 12: Regression output quadratic equation on established business ownership.

FIGURE 15: Plotted quadratic regression of established business ownership.