ESCOLA
SUPERIOR
DE TECNOLOGIA
E GESTÃO
POLITÉCNICO
DO PORTO

M

MESTRADO
GESTÃO E INTERNACIONALIZAÇÃO DE EMPRESAS

An International Approach To High-growth Business

Maria Máximo Queirós

11/2017

Maria Máximo Queirós. Nome. An International Approach To High-growth
11/2017
ESCOLA SUPERIOR DE TECNOLOGIA E GESTÃO POLITÉCNICO DO PORTO
MESTRADO EM GESTÃO E INTERNACIONALIZAÇÃO DE EMPRESAS
An International Approach To High-growth Business
Maria Máximo Queirós

ESCOLA
SUPERIOR
DE TECNOLOGIA
E GESTÃO
POLITÉCNICO
DO PORTO

M

MESTRADO
GESTÃO E INTERNACIONALIZAÇÃO DE EMPRESAS

An International Approach To High-growth Business

Maria Máximo Queirós

11/2017

MASTER DISSERTATION ELABORATED UNDER THE SUPERVISION OF:
Professor Dr. Vítor Braga ;
Professor Dr. Aldina Correia.

Agradecimentos

A presente dissertação é testemunho de como o esforço, colaboração e trabalho conjunto resultam na concretização de objetivos e satisfação de todos os intervenientes, “a união faz a força”.

Existem várias pessoas que, direta ou indiretamente, contribuíram e tornaram possível a concretização desta dissertação. Para todos, em geral, quero expressar o meu sincero agradecimento. No entanto, quero deixar uma palavra de gratidão a certas pessoas e entidade.

Agradeço à Escola Superior de Tecnologia e Gestão, a *mui nobre* academia que me acolheu ao longo do meu percurso académico e me disponibilizou todas as condições para a minha formação académica, durante os três anos de licenciatura e pelos dois anos de mestrado.

Uma palavra de agradecimento genuíno e de admiração ao Professor Doutor Vítor Braga, orientador desta dissertação, por me ter acompanhado, contribuindo com toda a sua sabedoria, disponibilidade, críticas e assertivas sugestões. Agradeço a sua paciência com as minhas inúmeras questões, por acreditar em mim e no resultado final deste trabalho. Agradeço à Professora Doutora Aldina Correia, co-orientadora desta dissertação, por aceitar o desafio, por todo o apoio, colaboração e conhecimento compartilhado; o compromisso e a motivação para completar este processo; pela sua presença constante e amigável, e as intermináveis palavras de encorajamento que possibilitaram acreditar na possibilidade de realização. Agradeço a ambos pelo apoio e confiança que sempre depositaram em mim, pela paciência, pela conquista e por tudo o que com eles aprendi.

Aos meus pais, José e Rosa pelas palavras de incentivo e encorajamento valorizando o meu potencial, por me ajudarem a concretizar este objetivo, partilhando todas as minhas conquistas e hesitações como sendo suas. Às minhas irmãs Diana, Catarina e Conceição pelo apoio, confiança e motivação incondicional.

A todas as minhas amigas e amigos que de uma forma direta ou indiretamente, contribuíram, agradeço por acreditarem em mim, por acreditarem que sou capaz, por me fazerem sorrir, pela paciência, atenção e força que prestaram em momentos menos fáceis. Para não correr o risco de não enumerar algum não vou identificar ninguém, aqueles a quem este agradecimento se dirige sabê-lo-ão, desde já os meus agradecimentos.

Ao Jorge, ouvinte atento de algumas dúvidas, inquietações, desânimos e sucessos, pelo apoio, pela confiança e pela valorização sempre tão entusiasta do meu trabalho, dando-me, desta forma, coragem para concretizar esta etapa.

Expresso o meu agradecimento a todos por todo o apoio, carinho e amizade , palavras de incentivo constantes, pela oportunidade de crescimento académico e também pessoal.

Abstract

Entrepreneurship has attracted the attention of many authors, and indeed the role of this phenomenon in the economy is remarkable, this is considered a motor for the growth of economy and wealth.

Some importance has already been given to this phenomenon, but not enough, because there are still difficulties / inequalities in the capacity to start and manage businesses with a considerable level of growth.

The literature underlines some determinants for the high growth of firms such as the characteristics that the entrepreneurs hold as the education that they have, as well as, the entrepreneurial experiences already acquired; the size and the age of the firms, in general, it is perceived that it is unanimous that smaller and younger firms grow faster than larger and older firms.

Innovation is also present in the literature, many authors emphasize the role of innovation as the engine of the superior performance of firms. And yet culture is referred to as the key to the high growth of firms, there are several studies on how citizens of ethical origin can embark on business. Still in the line of culture is crucial to understand the influence of culture in the work environment and consequently in the performance of firms.

In order to investigate the impact of the aforementioned aspects on high growth firms, two different research formats were used. In the first phase, a research program was used which includes annual assessments of levels of business activity (perceptions) in several countries, the Global Entrepreneurship Monitor (GEM), which is currently one of the main international research databases, with the in order to verify if there is statistical evidence to affirm that the determinants mentioned by the authors influence individuals in certain countries to show higher levels of initiative to manage or create a high growth business. To achieve this objective, multivariate analysis techniques were used, in particular multiple linear regression analysis, cluster analysis and discriminant analysis.

In a second phase, in order to prove the determinants mentioned by the authors with real data, a database was created that includes country data from three databases, namely: OECD database; EUROSTAT database and HOFSTEDE database; in which data from more than 35 countries were subjected to various multivariate analysis techniques, in particular multiple linear regression analysis.

The results obtained in the first article allow us to conclude that individuals who react quickly to opportunities seem to show better abilities to start and manage a high growth business; Smaller and younger firms appear to be a factor influencing the initiative to start and run a high growth business; The resources and public policies available in the countries are central to the initiative level of starting and managing a high growth

business; National culture is also proven to influence the level of individual capacity to initiate and manage high growth business.

In the second article, there is a statistically significant relation between the distance of power in the society with the high growth of the firms; Uncertainty in the workplace has a negative impact on growth rates in countries; Masculinity has a negative relation with the high growth of firms, and; contrary to what was verified in the first article, there is statistical evidence to affirm that the bigger size of the firms influences the growth rates of the firms.

Keyword: Entrepreneurship; High growth; Business; GEM; OECD; EUROSTAT; HOFSTEDE

Resumo

O empreendedorismo tem merecido a atenção de muitos autores, e realmente é notável o papel deste fenómeno na economia. Este é considerado um motor para o crescimento da economia e riqueza.

Alguma importância já tem sido dada a este fenómeno, mas não a suficiente, pois ainda persistem dificuldades/desigualdades em relação à capacidade de iniciar e gerir negócios com um considerável nível de crescimento.

A literatura sublinha alguns determinantes para o alto crescimento das empresas tais como as características dos empreendedores, como o nível de educação, bem como, as experiências empresarias já adquiridas; o tamanho e a idade das empresas. De forma geral, percebe-se que as empresas mais pequenas e mais jovens crescem mais rapidamente que as empresas maiores e com mais idade.

Muitos autores enfatizam o papel da inovação como motor do desempenho superior das empresas. A cultura é, também referida como chave para o alto crescimento das empresas. Existem diversos estudos sobre como os cidadãos de diferentes origens éticas conseguem enveredar no mundo dos negócios. Ainda na linha da cultura é crucial entender a sua influência no ambiente de trabalho e consequentemente no desempenho das empresas.

De forma a investigar o impacto dos aspetos supracitados nas empresas de alto crescimento, utilizou-se dois formatos diferentes de investigação. Numa primeira fase, utilizou-se um programa de pesquisa que inclui avaliações anuais de níveis de atividade empresarial (perceções) em vários países, o *Global Entrepreneurship Monitor (GEM)*, que atualmente é uma das principais bases de dados internacionais de pesquisa, com o intuito de verificar se há evidências estatísticas para afirmar que os determinantes mencionados pelos autores influenciam os indivíduos de certos países a mostrar níveis de iniciativa mais altos para gerenciar ou criar um negócio de alto crescimento. Para atingir este objetivo utilizaram-se técnicas de análise multivariada, em particular análise de regressão linear múltipla, análise de clusters e análise discriminante.

Numa segunda fase, com o propósito de comprovar os determinantes mencionados pelos autores com dados reais, criou-se uma base dados que inclui dados de país de três bases de dados: base de dados da OCDE; base de dados EUROSTAT e base de dados HOFSTEDE; em que os dados foram submetidos a várias técnicas de análise multivariada, em particular a análise de regressão linear múltipla.

Os resultados obtidos no primeiro artigo permitem concluir que os indivíduos que reagem rapidamente a oportunidades parecem mostrar melhores habilidades de iniciar e gerir um negócio de alto crescimento; As empresas menores e mais novas parecem mostrar mais inicitiva de gerir um negócio de alto crescimento; Os recursos e as politicas públicas disponíveis nos países são fulcrais para o nível de iniciativa de iniciar e gerir um negócio de alto crescimento, e; A cultura nacional também é comprovada como fator influenciador no nível de capacidade individual de iniciar e gerenciar negócios de alto crescimento.

No segundo artigo, verifica-se uma relação estatisticamente significativa entre a distância de poder na sociedade com o alto crescimento das empresas; A incerteza no local de trabalho parece influenciar negativamente as taxas de crescimento nos países; A masculinidade detém uma relação negativa com o alto crescimento das empresas, e; ao contrário do verificado no primeiro artigo, há evidências estatísticas para afirmar que quanto maior o tamanho das empresas mais as suas taxas de crescimento.

Palavras-Chave : Empreendedorismo ; Alto crescimento; Empresas ; GEM; OECD; EUROSTAT ; HOFSTEDE

Table of Contents

PART I

Introduction

Problem Statement

Entrepreneurship and its impact on business performance has become an increasingly relevant phenomenon based on several studies.

The scientific literature is unanimous in considering that the high growth of firms is influenced by several factors. Many authors have investigated the impact of education and previous work experience on business performance, and this becomes one of the characteristics of entrepreneurs (Sluis et al., 2004).

Other authors approach the concept of innovation as a factor influencing high-growth firms; researchers emphasize the role of innovation as the engine of higher-end business (Tidd 2001) (Cobbenhagen 2000), adding that innovation is responsible for continued success, while Cobbenhagen (2000) shows that there is some disagreement among economists about the importance of innovation in economic growth.

Most of the empirical studies have rejected Gibrat's law and support the proposition that small firms show display higher growth rates growth. It is unanimous amongst the authors that older firms grow less than younger ones, and this is another factor affecting the high growth firms (Calvo2006).

Literature is, to some extent, unanimous that entrepreneurship is highly dependent on context and therefore dependent on culture (Ng and Hamilton 2016). There are still those who study how values in the workplace are influenced by the culture (Hofstede, 1991).

As for the resources available in firms and in the countries, this factor shows a factor that significantly influences the high performance of firms, as well as the available support in each country, designing appropriate measures to support these initiatives Lee (2014).

The economic effect of the proliferation of high growth firms justifies its relevance to the practice of economic and business decision making and therefore justifies the academic and scientific relevance in the attempt to provide information that can support the economic growth of business activity.

Objectives

The general objective of this research is to analyze the external economic and social factors that influence the initiative to start and manage a high growth business, as well as, which lead the firms to high growth rates.

In order to achieve this general objective, the following specific objectives were outlined: (1) To verify, in the literature, what the various authors consider to be the economic and social factors for entrepreneurs to start and generate a high growth business; (2) Perceive, through data analysis, if the factors identified in the literature are verified; (3) Explore the measurement of the variables used by the various authors in their studies and the in results (4) Explore and identify through data analysis if the factors identified and measured in the literature are verified.

Considering the problem addressed and the objectives of this research, the following research questions were defined: (1) What economic and social factors influence the citizens of several countries to start and manage a high growth business? (2) What are the determinants that influence the high growth rates of firms? (3) What is the economic contribution of the results in both articles?

Methodology

Taking into account the area under study and the objectives of the research quantitative data was collected from four databases. As a result, two studies were conducted.

In the first empirical study titled "High-Growth Business Creation and Management: A Multivariate Quantitative Approach Using GEM Data" a literature review is presented in order to determine the factors influencing the initiative to start and manage a high growth business. As well as, an approach to generate on the topics already studied through GEM Data. After exploring the determinantsin the literature, a set of research hypotheses was formulated that relates the individuals' perception in the GEM database about the capacity to start and manage a high growth business (independent variable), with several variables of the GEM data (dependent). With regards to the analysis of data in this research, several techniques of multivariate analysis were used, in particular the analysis of multiple linear regression, cluster analysis and the discriminant analysis with the referred variables of the GEM database that allowed drawing conclusions on the objectives that were proposed to achieve.

In the second empirical study entitled "Cross-country Analysis To High-growth Business: Unveiling Its Determinants", a literature review is presented in to investigate how previous studies measured the variables defined through the determinants in the first article. After the measurement of the variables was defined, a database was created with variables from three databases, namely EUROSTAT, OECD and HOFSTEDE indexes. Regarding the analysis of results in this research, two analyzes of multiple linear regressions were used for two similar variables, but from two databases – EUROSTAT and OECD- which allowed understand what leads firms to levels of high growth rates.

Structure

The dissertation is organized in three fundamental parts, the first section includes the introduction, which provides overview of the dissertation, incending the objectives, the research questions as well as the methods used throughout the dissertation. The second section includes the articles entitled "High-Growth Business Creation and Management: a Multivariate Quantitative Approach Using GEM Data" and "Cross-country Analysis to High-Growth Business: Unveiling Its Determinants". Finally, in the third section, the final considerations, conclusions and contributions of the dissertation research are presented.

PART II

High-Growth Business Creation and Management: a Multivariate Quantitative Approach Using GEM Data

Braga, V.; Queirós, M. J.; Correia, A.; Braga, A. (2017). High-Growth Business Creation and Management: A multivariate quantitative approach using GEM data. Journal of the Knowledge Economy.

J Knowl Econ
DOI 10.1007/s13132-017-0490-0

High-Growth Business Creation and Management: a Multivariate Quantitative Approach Using GEM Data

Vítor Braga[1] · Maria Queirós[1] · Aldina Correia[1] · Alexandra Braga[1]

Received: 26 September 2016 / Accepted: 26 May 2017

Abstract Entrepreneurship is defined as the effort to generate and create jobs and innovate leading to economic growth. Despite the importance that has been given to this phenomenon, inequalities regarding the ability to trigger and manage the entrepreneurial activity remain. This research aims to describe and account for the entrepreneurship levels, particularly in order to understand what leads certain countries' individuals to display higher levels of initiative to manage or create a high-growth business. In order to achieve this goal, a research program that includes annual assessments of entrepreneurial activity levels in several countries has been used—The Global Entrepreneurship Monitor (GEM), which is, currently, one of the main international research databases aiming to describe, analyse and compare the entrepreneurial process in a wide range of countries. The database studied in this work is the 2011 NES, containing 144 variables in which 136 are qualitative (97 ordinal qualitative and 39 nominal qualitative). The data were analysed transforming the ordinal qualitative variables in ordinal quantitative, where the answers were given in a Likert scale from 1 to 5. The sample of the database consists of 1852 national and regional

✉ Vítor Braga
vbraga@estg.ipp.pt

Maria Queirós
8120111@estg.ipp.pt

Aldina Correia
aic@estg.ipp.pt

Alexandra Braga
abraga@estg.ipp.pt

[1] Centre for Innovation and Research on Business Sciences and Information Systems (CIICESI), Polytechnic of Porto, Rua do Curral, Casa do Curral, Margaride, 4610-156 Felgueiras, Portugal

Published online: 14 June 2017

entrepreneurship experts selected on the basis of reputation and experience (through a convenience sample approach). Our research used several multivariate analysis techniques, in particular the multiple linear regression analysis, the cluster analysis and the discriminant analysis. In general, our conclusions suggest that individuals who react quickly to opportunities seem to display better abilities of time management and are more willing to start a business. Our results also show that the national culture does not influence the individual ability of managing the personal life.

Keywords Business · Entrepreneurship · GEM · Management

Introduction

One important aspect of economic and business theory is to understand the conditions that allow individuals to have the initiative to manage or to create business and, in order, to induce higher levels of economic growth, attention to high-growth businesses becomes critical. Despite the obvious relevance of high-growth businesses for the economy, as they are considered as a key force driving economic growth in modern advanced economies (Mason and Brown, High Growth Firms in Scotland Crook et al. 2010), some consider that the research development in the area has been relatively slow (Segarra and Teruel 2014).

Innovation is a process that is also related to the high-growth firms, although, as pointed out by Hölzl and Friesenbichler (2010), R&D and innovation are important features of high-growth firms but only in countries that are adjacent the technological frontier. In high-growth firms located in countries that are located further away from the technological frontier, such features are not commonly present.

The importance of high-growth business can be demonstrated by the fact that it has deserved the attention of public policy measures in Scotland, in line with Mason and Brown (2010), who referred that these policies have a very important focus on technology and they are justified on the basis of the potential impact they have on the local and regional economic growth (Mason and Brown 2010). Despite their importance on the local economy, the literature is not unanimous is establishing such relationship, with Mason et al. (2015a, b) acknowledging that they may be of limited effectiveness in terms of the promotion of economic development and job creation in peripheral economies, as the Scottish experience demonstrates; although, the authors also recognize that their findings differ from the stylized facts in the literature (Mason et al. 2015a, b). Such findings suggest that the impact of high-growth business on the local economy is dependent of the context of such economies. This justifies the study of cross-countries differences on the high-growth business and on how they are perceived by the economic agents.

The economic effect of the proliferation of the high-growth businesses justifies its relevance for the economic decision-making practice and, therefore, it justifies the academic and scientific relevance in an attempt to provide evidence that may further support public policy.

In line with such arguments, the aim of this paper is to explore the entrepreneurial initiative to create or manage high-growth business, with a special emphasis on cross-country perceptions of such economic activity, carrying out a statistical study, using multivariate analyses, in particular, multiple linear regression, discriminant and cluster analysis, for a database under the GEM project (Global Entrepreneurship Monitor), which allows a deeper understanding of the entrepreneurship environment.

After a brief literature review and the description of the methodology employed in this research, the forth and following section include the three multivariate statistical tools. The findings section refers to a multiple linear regression, which aims to explore how the perception of high business is associated to the perceptions on a number of variables. The cluster analysis allowed grouping countries in terms of the individuals' perception of their countries' national abilities to start and manage high-growth business. Both groups are then subject to a discriminant analysis, and, finally, a linear regression for the two groups is provided. Our paper concludes with a summary of the findings and suggestions for further research in this area.

Brief Literature Review: GEM and Previous Research

Determinants of High-Growth Business: Unveiling the Literature

Many of the studies on firms' growth show a wide dispersion of growth rates. Many factors are not identified and are not observable such as firm specific factors. These are responsible for the large difference in the firms' growth performance. However, according to a study by Jovanovic (1982), the growth of the business has been increasingly modelled as a learning process to explain why small businesses grow faster (Jovanovic 1982).

There are many factors that are not identified or observable when it addresses the issue of sharp growth of some firms, but they are responsible for the business growth and performance. This is strongly recognized in the literature on the growth of firms in relation to "the law of proportional effect" (Gibrat 1931), which states that the growth of companies is completely random. Despite this theory (Gibrat 1931), many studies reject the law of complete randomness growth and provide evidence of observable and systematic factors that justify such growth, as it is the case of size, age, innovation, entrepreneurial characteristics and resources. Therefore, the average growth of the firms is expected to change with the magnitude of such factors. However, the literature does not draw attention to the possible interactions of these factors with the particular characteristics of the firms (Goedhuys and Sleuwaegen 2009). Another perspective is studied by Coad and Rao (2008), who relate innovation with the American high-technology firms and show that, although the innovation returns display a very unequal distribution, innovation is one of the critical factors in the rapid growth of "superstar" firms (Coad and Rao 2008).

The aim of our study is to evaluate a high-growth business on a macroeconomic perspective, looking into the context and national level determinants that may impact on the proliferation of high-growth businesses. To our knowledge, no literature has addresses such issues from the experts' perception perspective. This is particularly important to the extent that using GEM database restricts the analysis to the perceptions of individuals to their countries' conditions that may be conducive and supportive to high-growth firms development. Nonetheless, an analysis of the microeconomic factors impacting on high-growth firms is important, and thus, such analysis is expected to be provided in further research.

Firm Size and Age

There are a significant number of empirical studies showing a significant negative relationship between growth and firm size and between the variability in growth and the firm size (Mansfield 1962) (Mengistae 1999) (Evans 1987) (Dunne and Hughes 1994) (Calvo 2006). However, studies also point out to higher growth rates taking place in small businesses as a consequence of the "minimum efficient scale" (MES), which is the volume of production that minimizes the average cost of production in the long term. This allows firms taking advantage of economies of scale, but avoiding diseconomies of scale. Facing this scale, small businesses grow rapidly to achieve MES (Goedhuys and Sleuwaegen 2009). To Variyam and Kraybill (1992) all corporate growth models are estimated for a production sample, sales and service companies demonstrating that business growth is negatively related to firm size and age of the company (Variyam and Kraybill 1992).

Smaller and younger firms grow faster than larger and older firms; however, the volatility in growth rates is also higher, as well as risk rates (Variyam and Kraybill 1992). This observation supports the study of Jovanovic (1982) that proposes a theory explaining the reason for the smaller firms to display higher growth rates (although more volatile) than larger ones. Based on the heterogeneity of the employers and market selection to generate employers' growth patterns, the model states that efficient firms grow and survive while inefficient firms decline and fail, regardless of the size of the company (Jovanovic 1982).

Similarly, Calvo's (2006) study examines whether small young and innovative businesses display higher growth than their counterparts. Most empirical studies have rejected the law of Gibrat (firm random growth) and support the proposition that small businesses show higher growth. In addition, the results show that older firms grow less than younger ones, and that innovation activities are a strong positive factor in businesses survival.

Characteristics of the Entrepreneur

Many authors have investigated the impact of education and experience on business performance, and this becomes one of the characteristics of entrepreneurs (Sluis et al. 2004). In addition, the literature also suggests that the effect of education that separates workers in "self-employment" and "wage employment" is more critical for women entrepreneurship, stronger in urban areas and stronger in less developed economies, where agriculture is more dominant and literacy rates are lower (Sluis et al. 2004). These results provide evidence that supports the idea that the most qualified entrepreneurs are able to achieve superior business performance. The analysis of the impact of education on entrepreneurship also suggests that higher education not only stimulates the entrepreneurial ability but also impacts on the decision over the trade-off between "wage employment" and "self-employment", assuming that it has an impact on the wage levels. Evidence supporting this discussion is provided by Sleuwaegen and Goedhuys (2000), where lower levels of education and training positively influences the likelihood of becoming entrepreneurs, but higher education seems to support the growth of businesses (Sleuwaegen and Goedhuys 2000).

On the other hand, there is also a considerable amount of the literature examining ethnic entrepreneurship, and how minorities are able to engage in networks, overcoming the constraints of the lack of information, leading to higher levels of success (Evans 1987).

Finally, gender also impacts on entrepreneurship, with a considerable amount of literature on the subject, with some studies linking female entrepreneurship and firm growth. Although the complexity of this issue does not lead to strong conclusions the literature—for example it refers that only a small percentage of entrepreneurs in manufacturing activities are women, and their businesses show lower levels of growth, suggesting additional barriers for women to engage in formal industrial enterprises (Mead and Liedholm 1998).

Innovation

Drucker refers that the common characteristic of successful entrepreneurs not a particular personality, but a personal commitment to a systematic practice of innovation. Innovation is the specific function of the entrepreneur, whether arising in a classic business, a public agency or a newly created company in a garage (Praag and Versloot 2007).

Several authors emphasise the role of innovation as a driver of superior performance of firms (Tidd 2001) (Cobbenhagen 2000) (Chaney et al. 1991). Chaney et al. (1991) add that innovation is responsible for corporate success, while Cobbenhagen (2000) shows that there is little disagreement among economists about the importance of innovation on economic growth.

However, in spite of emphasizing the importance of innovation, the literature also highlights the difficulty in measuring and establishing the relationship between the innovation and the firm performance. So the question turns to the empirical verification of the positive relationship between these constructs. According to both the economic and management literature, there are many different authors that investigated the relationship between innovation and economic and financial performance of companies (Walker et al. 2002) (Gopalakrishnan 2000) and under different perspectives. Studies on the influence of innovation in growth or performance of firms show inconsistent results, which, in many cases, do not confirm the relationship between these two factors, but confirming the difficulties in measuring the actual relationship between innovation and growth or financial performance of firms (Pakes 1985).

Innovation is considered by Praag and Versloot (2007) as supporting firm growth, where statistically significant evidence on the positive impact of innovation, in various forms, for growth of products, productivity and employment is provided (Praag and Versloot 2007). The results of the study (Praag and Versloot 2007) provide a solid support to several attempts of modelling of this phenomenon in the context of the Theory of Economic Growth, in particular with regard to the role of the entrepreneur in the innovation process, which ultimately leads the process of economic growth (Marques 2014a, b).

The GEM and Previous Contributions

According to Alvarez et al. (2013), the GEM has not produced many results yet; however, they have risen in recent years. For an understanding of entrepreneurship, this author, after some research, identified a general perspective including four approaches within this field (Alvarez et al. 2013):

1. The economic approach, in which researchers emphasise aspects of economic rationality and broadly argue that new ventures creation is mainly due to economic issues (Audretsch and Thurik 2001) (Parker 2004) (Wennekers et al. 2005)

2. The psychological approach, where individual or psychological factors are seen as determinants of entrepreneurial activity (Carsrud and Johnson 1989)among others)
3. The organisational or resource-based approach, in which scholars focus on the characteristics of the organisation or, specifically, on the resources and capabilities of the firms (e.g. human, physical, financial, technological) as the main determinants of the entrepreneurial process (e.g. (Álvarez and Busenitz 2001) (Ucbasaran et al. 2008)
4. The sociological or institutional approach, which argues that the sociocultural environment determines an individual's decision to start a business (e.g. Manolova et al. 2008).

Research produced by several researchers resulted in studies that meet the parameters to be studied in this paper, as exemplified by Arenius and Minniti (2005), who investigate the variables related to the individual decision to become an entrepreneur using sociodemographic features (e.g. age, sex, education), economic factors (e.g. household income, employment status) and perceptive variables (e.g. the recognition opportunity, fear of failure and entrepreneurial skills) (Arenius and Kovalainen 2006). Another study from Ramos-Rodríguez et al. (2012) assesses the impact of certain factors (i.e. age, gender, income, perception of opportunities, fear of failure, entrepreneurship, models and business angels) on the probability of becoming an entrepreneur (Ramos-Rodríguez et al. 2012).

Several authors analyse the relationship between entrepreneurship and economic growth, which is a major goal of the GEM project. For example, van Stel et al. (2005) show the influence of entrepreneurship on economic growth, finding that this relationship depends more on the total per capita income of the countries with significant levels of innovation (Stel et al. 2005).

As previously mentioned, the research based on this database has been growing and gradually gaining greater global legitimacy in the field of entrepreneurship as demonstrated in Alvarez et al. (2013) paper analysed the articles using the GEM database that were published in journals indexed by the Social Sciences Citation Index. They concluded that there was no GEM reference project in articles in important journals in the business and management literature, not only in journals with high SSCI impact factors but also in journals the scholar community considered of a high standard, showing a possible challenge regarding consolidation of GEM research (Alvarez et al. 2013).

Another important issue is to understand what are the variables used and how they are analysed. Mueller and Dato-on (2013), aimed to show what these dependent variables are and which are the most widely chosen and investigated, given the substantial number of variables in the set of GEM data. As expected, the vast majority of articles attempt to explain some form of entrepreneurial activity. Only a few contributions used entrepreneurial intentions or business perceptions, attitudes or networks as the dependent variable. However, a closer look at the variables used in such studies reveals that, in most cases, the measures "nascent entrepreneur", "young business owner-manager" and the combination of both—the total early stage entrepreneurial activity (TEA)—are being used. GEM APS database captures all types of entrepreneurial activity including any type of self-employment (full-time and part-time) and being an owner-manager of an established firm.

As Crook et al. (2010) underline, it is important to have a proper fit between design research and methods and measures used in entrepreneurship and a reflection on whether the measures used often defined by business activity and calculated by the

GEM coordination team are suitable for all different research questions is necessary (Bergmann et al. 2013).

In what regards the independent variables, Mueller and Dato-on (2013) agree that there is a substantial amount of variables that were used as independent in the existing research. The variables that are, more often, used as independent are the ones that explain the business activities, entrepreneurial attitudes and perceptions. While there are a growing number of articles based on GEM data that have been published, there is still potential for future research because the issues that are less surveyed are innovation and internationalization (Bergmann et al. 2013).

Methodology

In this study, we apply the multivariate statistical analysis tools, to study the database GEM (Global Entrepreneurship Monitor) which allows a deeper understanding of the entrepreneurship environment (Álvarez et al. 2014). Given the necessity for endogenous development strategies for countries and regions, entrepreneurship has emerged as one of the main mechanisms for social and economic growth (Acs and Armington 2006; van Stel et al. 2005; Wennekers and Thurik 1999; Wennekers et al. 2005). As a result, there is a growing interest in several public and private initiatives for promoting entrepreneurial activity, as well as in the academic community for analysing this phenomenon further (Alvarez et al. 2013).

Seeking to provide internationally comparable data on entrepreneurial activity (Reynolds et al. 1999) created the Global Entrepreneurship Monitor (GEM) in 1999. The purpose of the GEM project is to use empirical data to assess the level of entrepreneurial activity across countries, to understand how entrepreneurial activity varies over time and to understand why some countries are more entrepreneurial than others. In addition, GEM researchers seek to explore the relationship between entrepreneurial activity and economic growth and to identify which public policies boost entrepreneurship (Alvarez et al. 2013).

To analyse these two elements, the database evaluates the opinion of a group of citizens in relation to entrepreneurship through their opinion about the support to new enterprises and growing businesses, the approach to stimulate innovative initiatives, restrictions for starting-up a business, government subsidies and among other factors that help to understand entrepreneurship.

The sample of the database includes 1852 individuals, and it can be considered as objective since it is established for studying entrepreneurship. The database contains 144 variables in which 136 are qualitative (97 ordinal qualitative) and (39 nominal qualitative), based on 5-point Likert scale questions. For the purpose of the multivariate analysis, we will consider that the NES variables in ordinal Likert scale are continuous. This is a common procedure when working with real-world data, such as GEM data, (Correia et al. 2016).

Research Hypothesis

In order to reach the proposed objective, a set of research hypotheses was formulated that relates individuals' perception, in the GEM database, on the ability to starting and managing a high-growth business (dependent variable), with several variables (independent). The goal is to study if entrepreneurship can be linked to conditions that increase (or inhibit) the creation of new high-growth businesses.

Competencies

The existence of an association between the level of perception of starting or managing a high-growth business and the education system, namely, schooling and experience of business performance, are characteristics that have been identified as essential for an entrepreneur. Sluis et al. (2004) states, in his study, the evidence that supports the idea that the most qualified entrepreneurs show superior business performance (Sluis et al. 2004). Likewise, Sleuwaegen and Goedhuys (2000) have also already shown, in their study, that higher education is necessary for business growth (Sleuwaegen and Goedhuys 2000). Besides that, prior entrepreneurship-related experiences should influence entrepreneurial intentions indirectly through these perceptions. Perceived feasibility was significantly associated with the breadth of prior exposure (Krueger 1993). Then, skills acquired through experience can contribute (positively or not) to the propensity to the creation of new high-growth businesses. Moreover, Dwyer and Kotey (2016) refer to the “key markers” of high-growth business, identifying training and experience in entrepreneurship and management as much as the employee organisational learning. However, the exception is made to postgraduate education in management as, according to the study, it is not effective identifiers of high-growth firms. Nonetheless, Lee (2014) refers that the lack of management skills is perceived by the UK entrepreneurs as holding them back for high-growth levels of businesses.

In light with this discussion, the first research hypothesis is defined as follows:

> **H1**: The initiative level for starting or manage a high-growth business is greater in individuals with higher academic and professional competences.

Size

The existence of a relationship between the level of perception of starting or managing a high-growth business and the size of these businesses has been analysed by several authors, namely Calvo (2006), who in his study analyses whether small innovations have more growth than others. This through its results affirmed the proposition that small businesses have more growth (Calvo 2006).

In the same sense, Goedhuys and Sleuwaegen (2009) have shown that the higher growth rates of small firms are related to the volume of production, since they take advantage of economies of scale, thus proving that smaller and younger companies grow faster than the larger companies (Goedhuys and Sleuwaegen 2009).

Furthermore, like we said before, according with (Krueger 1993), the experience can contribute to the propensity to the creation of new high-growth businesses, even if it has been in small companies.

In this way, the second hypothesis of investigation is defined as follows:

> **H2:** The initiative level for starting or managing a high-growth business is greater when the entrepreneurs hold smaller companies.

Culture

Culture is often related to the growth of enterprises. There are a large number of studies that investigate the performance of entrepreneurs of ethnic minorities and in particular how they manage to use this minority in networks in order to overcome the constraints of lack of information, leading to higher levels of success (Evans 1987). In addition, the literature is, to some extent, unanimous that entrepreneurship is highly context dependent and, thus, culture dependent (Ng and Hamilton 2016). In addition, common languages, common business practices and common areas of economic interest may result in an effect of genetic proximity to high-growth economies and business (Chaudhry and Ikram 2015). In addition, (Chelariu et al. 2008) refer to the differences between the individual cultural values approach that generated weak results regarding the association to high-growth business, while the organisational culture approach showed strong support for the hypotheses defined by the authors.

Thus, the third hypothesis of investigation arises that is defined as follows:

> **H3:** The initiative level for starting or managing a high-growth business is influenced by the culture of individuals.

Resources

There is an obvious relationship between the existence of resources and the growth of firms. However, one very pertinent question is what is the amount of resources necessary for firms to achieve high-growth levels. In addition, as previously mentioned, there is a potential difference between the perception of the resources necessary and the potential for high growth. Lee (2014) analysed what factors UK firms perceive as holding them back from growth. Among these factors, the authors mention several resources, such as access to finance and cash flow and finding suitable permises.

> **H4:** The available resources of the individuals influence the initiative level for starting or managing a high-growth business.

Government Policies

Although culture may foster high-growth firms and entrepreneurship in general, in addition to the cultural environment, it is also critical that governments support such environments designing the appropriate measures for supporting such initiatives. Lee (2014) refers that the way entrepreneurs perceive the problems of high-growth business is very informant for the policy-making (Ng and Hamilton 2016).

> **H5:** Public policies influence the initiative level for starting or managing a high-growth business.

In Table 1, we present a summary of the variables in our study and of the predicted associations with the dependent variable.

Table 1 Independent variables and expected association

Variables	Authors	Expected association	Hypotheses	Statistical technique
Competencies	(Sluis et al. 2004); Sleuwaegen and Goedhuys (2000); Dwyer and Kotey (2016); Krueger (1993)	+	H1	Linear regression
Size	Goedhuys and Sleuwaegen (2009); Calvo (2006); Krueger (1993)	−	H2	Linear regression
Culture	Evans (1987); Ng and Hamilton (2016); Chelariu et al. (2008); Chaudhry and Ikram (2015)	+	H3	Cluster analysis, discriminant analysis, linear regression
Resources	Lee (2014)	+	H4	Linear regression
Government policies	Ng and Hamilton (2016); Lee (2014)	+	H5	Discriminant analysis

Descriptive Analysis

Throughout this paper, the dependent variable "NES_L01" which will be named as "variable y" refers to "In my country, many people know how to start and manage a high-growth business". This variable is measured in a Likert scale, where 1 = completely false, 2 = somewhat false, 3 = neither true nor false and 4 = somewhat true, completely true. The selection of this variable is related to the aims of this paper, allowing a deeper understanding of the contextual factors that are associated to the existence of high-growth business under the perception of national experts. This is an interesting aspect of economics growth, as previously mentioned, and based on the assumption that there are important national and cultural aspects of high-growth business. Therefore, understanding the factors that influence the initiation and management of a high-growth business seems to be critical.

Analysing the frequencies of the variable "NES_L01", from the opinion of 1852 individuals, the highest percentage of answers are "somewhat false" (47.4%), followed by the answer "completely false" (27.3%) and then "neither true nor false" (with 14.4% of answers). On the other hand, the average of the variable "NES_L01" is approximately 2, which shows that in many countries people do not perceive their country's entrepreneurs ability to know how to start and manage a high-growth business. The median is 2; therefore, 50% of the experts consider that in their countries many people do not know how to start and manage a high-growth business. The value that appears most frequently (mode) is 2, confirming the previous analysis. We are in the presence of a symmetric distribution, because the mode and median are the same. The standard deviation is 0.944 showing that the mean distance of the data from the average of the data is, approximately, 1. The distribution of the variable is approximately normal, according to one-sample Kolmogorov-Smirnov normality test, which p value is approximately $0.083 > 0.05$, and then the normality is not rejected, for a 5% significance level.

Linear Regression

Model Analysis

With this multivariate linear regression, it is aimed to observe which variables influence the opinion of 1852 individuals, on their perception on the individuals' ability to initiate or manage a high-growth business. The dependent variable is "NES_L01" ("In my country, many people know how to start and manage a high-growth business"). Initially, all NES variables included in the Entrepreneurial Framework Conditions (EFCs) (from NES_A1 to NES_I05) and the other variables (from NES_K01 to NES_U04) are used as independent variables. The choice of dependent variables to consider in the analysis was made based on an exploratory analysis. Afterwards, it was necessary remove some of them, using a stepwise method, according to the information in Table 2. All of these variables are related with the dimensions under study: competencies, size, culture, resources and government policies are also considered.

Table 2 Dependent variables

Dimensions	Variables	Description
Government policies	NES11_B01	In my country, government policies (e.g. public procurement) consistently favour new firms.
Government policies	NES11_B03	In my country, the support for new and growing firms is a high priority for policy at the local government level.
Competencies	NES11_D02	In my country, teaching in primary and secondary education provides adequate instruction in market economic principles.
Competencies	NES11_E06	In my country, there is good support available for engineers and scientists to have their ideas commercialized through new and growing firms.
Culture	NES11_G02	In my country, the markets for business-to-business goods and services change dramatically from year to year.
Culture	NES11_I05	In my country, the national culture emphasises the responsibility that the individual (rather than the collective) has in managing his or her own life.
Resources	NES11_K05	In my country, there are plenty of good opportunities to create truly high-growth firms.
Size	NES11_L02	In my country, many people know how to start and manage a small business.
Competencies	NES11_L03	In my country, many people have experience in starting a new business.
Competencies	NES11_L04	In my country, many people can react quickly to good opportunities for a new business.
Resources	NES11_L05	In my country, many people have the ability to organise the resources required for a new business.
Culture	NES11_N04	In my country, new and growing firms can trust that their patents, copyrights, and trademarks will be respected.
Culture	NES11_N05	In my country, it is widely recognized that inventors' rights for their inventions should be respected.
Culture	NES11_R05	In my country, established companies are open to using new, entrepreneurial companies as suppliers.
Culture	NES11_R06	In my country, consumers are open to buying products and services from new, entrepreneurial companies.

The coefficients of the final model are presented in Table 3. This model has an adjusted R square of, approximately, 58%, meaning that it is the expected percentage of the total variability in the level of creation and high-growth business management initiative explained by the independent variables included in the adjusted linear regression model (X's). This table also shows the standard coefficients. Such results show that all dimensions considered (competencies, size, culture, resources, government policies) are significant to explain the experts' perception on the individuals' ability to start and manage a high-growth business, because, as shown in Table 2, the dimensions of the significant independent variables are as follows:

The model can be written as below:

$$\begin{aligned} NES\_L01 = -2,8 + 0,279\ \ NES11\_L02 + 0,217\ \ NES11\_L05 + 0,141\ \ NES11\_L04 + 0,08\ \ NES11\_D02 \\ +0,08\ \ NES11\_K05 + 0,076\ \ NES11\_L03 + 0,072\ \ NES11\_I05 - 0,089\ \ NES11\_N05 \\ +0,063\ \ NES11\_E06 - 0,086\ \ NES11\_B03 + 0,066\ \ NES11\_B01 - 0,086\ \ NES11\_R06 \\ +0,069\ \ NES11\_R05 + 0,054\ \ NES11\_N04 + 0,054\ \ NES11\_G02 \end{aligned}$$

Although, all dimensions were considered as significant, some variables display more importance in the model than others. The analysis of standardised regression coefficients shows that the variables NES11_L02, NES11_L05 and NES11_L04 are those that show a higher relative contribution to explain the dependent variable. This leads to conclude that experts agree that the variables that are mostly associated with the ability to create or manage high-growth businesses are the knowledge to manage and organise resources for starting-up a small business and the ability to react to good opportunities (dimensions: competencies, size and resources). In this way, **H2:** The initiative level for starting or managing a high-growth business is greater when the entrepreneurs hold smaller firms is validated by the coefficient of the variable NES11_L02. Through analysis to the coefficient of variable NES11_L05, it is possible to show statistic evidence confirming that identifying

Table 3 Coefficients

Model		Unstandardised coefficients		Standardised coefficients	t	Sig.
		B	Std. error	Beta		
15	(Constant)	−.280	.123		−2284	.023
	NES11_L02	.279	.029	.310	9542	.000
	NES11_L05	.217	.037	.214	5896	.000
	NES11_L04	.141	.035	.147	4077	.000
	NES11_D02	.080	.027	.080	2933	.003
	NES11_K05	.080	.022	.094	3607	.000
	NES11_L03	.076	.030	.082	2544	.011
	NES11_I05	.072	.022	.088	3224	.001
	NES11_N05	−.089	.023	−.119	−3768	.000
	NES11_E06	.063	.026	.072	2456	.014
	NES11_B03	−.086	.023	−.107	−3742	.000
	NES11_B01	.066	.024	.077	2794	.005
	NES11_R06	−.086	.028	−.086	−3052	.002
	NES11_R05	.069	.028	.074	2436	.015
	NES11_N04	.054	.024	.071	2212	.027
	NES11_G02	.049	.022	.053	2198	.028

Dependent variable: In my country, many people know how to start and manage a high-growth business opportunities is important to promote the number of people that know how to start and manage a high-growth business. There is also statistics evidence to validate **H1**: The initiative level for starting-up or manage a high-growth business is greater in individuals with higher academic and professional competences. Variable NES11_L04 importance in the model reveals that initiative to initiate or to manage a business of high-growth rate is dependent of the ability to manage resources, validating the **H4:** The available resources of the individuals influence the initiative level for starting or managing a high-growth business.

Validation of Assumptions of the Linear Regression Model

In order to analyse the residues, linear regression assumes that errors display a normal distribution with zero mean and constant variance and that they are independent. Our analysis included normal probability plot, a scatterplot and leverage graphic, and, in order to validate the assumption of normality, the one-sample Kolmogorov test shows that there is statistical evidence not to reject the hypothesis that the residual variable follows a normal distribution, for a significance level of 10% therefore $p = 0.083$.

For the second assumption, the analysis of residues is included in Table 4 "model summary" where the Durbin-Watson test displays 1895, (approximate to 2), and thus, it is expectable that the residuals are not correlated.

Table 4 displays the maximum and minimum values of "residual" and the values of the "std. predicted value" which are approximate suggesting the inexistence of "outliers".

When the independent variables are highly correlated to each other (multicollinearity), the analysis of the adjusted regression model can be confusing. The values of tolerance and VIF for each independent variable show that there is statistical evidence to support the inexistence of multicollinearity. These results validate the coefficients obtained in the regression analysis and presented above.

Cluster analysis

Model analysis

The variables with greater impact on the ability to initiate or manage a high-growth business were studied with a multivariate linear regression based on the opinion of 1852 experts. Cluster analysis is an exploratory data analysis method that allows organising different objects (or variables) into homogeneous groups, using predefined similarity measures. The degree of association between two objects in the same group is maximized and minimized otherwise.

Table 4 Residuals statistics

	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	0.24	4.46	2.13	0.726	1329
Residual	−3.024	2.323	−0.036	0.662	1329
Std. predicted value	−2.625	3.251	0.013	1.011	1329
Std. residual	−4.995	3.836	−0.059	1.094	1329

In this section, the aim is analyse the validity of **H3**: The initiative level for starting or managing a high-growth business is influenced by the culture of individuals, using the 2011 GEM NES AGGREGATED NATIONS dataset. We want to investigate if there are differences between countries, considering the variable "NES_L01—In my country, many people know how to start and manage a high-growth business"—the dependent variable in the analysis above. The aim was to group countries using the K-means clustering method and to discover structures in data separating the countries depending on the variables "NES11_L01_MEAN" and "NES11_L01_SD", the mean and standard deviation of the dependent variable "NES_L01". These measures are dissimilar in the two final clusters, with means 2.43 in cluster 1 and 1.88 in the cluster 2 and standard deviation 0.97 in cluster 1 and 0.83 in cluster 2. The number of clusters used in K-means clustering method (two clusters) is based on the dendrogram that previously resulted of hierarchical cluster analysis.

This study is relevant since it was not possible to confirm the hypothesis of the high relevance of countries and cultures in the perception of experts about the individuals' knowledge of starting and managing a high-growth business.

In Table 5 we present descriptive statistics for NES11_L01—In my country, many people know how to start and manage a high-growth business. LNES11_L01 has mean 2.08, median 2.00, mode 2 and standard deviation 0.944. In order to identify differences between countries about the knowledge of starting and managing a high-growth business, Table 5 shows the means and standard deviations for the two groups of countries, where group I includes countries with a higher propensity for the creation and management of high-growth business, and group II includes countries performing poorly in that perspective.

The composition of both clusters is shown in Table 6. This table displays the results of cluster membership, with17 countries in the cluster 1 and 32 in the cluster 2:

- Cluster 1 includes, mostly, countries from emerging economies where, in fact, over the last years the growth rate of their economies has been above the average. It also includes northern Europe counties, also known for a particular dynamism on their economies and where the growth has been consolidated.
- Cluster 2 includes central and southern Europe countries that, usually, show a more modest economic growth and some developing economies, but where the growth of the economic activity has not been as impressive as other emerging economies. In fact, the groups of countries are more related to the reputation of growth of the business rather than on the actual growth of their economies and of their firms.

In order to understand the extent to which the division of countries within groups is statistically significant, the table, below, presents the dispersion analysis of clustering results. The differences between the F-ratios (F column in the Table 7) allow drawing general conclusions about the role of the different mean variables in the construction of

Table 5 Final cluster centres

	Cluster 1	Cluster 2
NES11_L01_SD	0.97	0.83
NES11_L01_MEAN	2.43	1.88

Table 6 Cluster membership

Cluster 1		Cluster 2	
NES participating countries, regions (name of the country, region)	Distance	NES participating countries, regions (name of the country, region)	Distance
Russia	0.213	Netherlands	0.084
South Africa	0.231	Switzerland	0.210
Greece	0.204	Peru	0.180
France	0.294	Argentina	0.101
Spain	0.359	Malaysia	0.084
Hungary	0.115	Thailand	0.208
UK	0.206	Korea SR	0.237
Sweden	0.255	Pakistan	0.328
Norway	0.018	Algeria	0.737
Poland	0.036	Nigeria	0.273
Germany	0.340	Ireland	0.227
Mexico	0.172	Finland	0.215
Brazil	0.076	Slovenia	0.243
Chile	0.283	Slovakia	0.178
Colombia	0.059	Bangladesh	0.253
Australia	0.042	Taiwan	0.238
Singapore	0.237	UAE	0.436
Turkey	0.385		
Iran	0.679		
Portugal	0.121		
Lithuania	0.113		
Latvia	0.058		
Croatia	0.313		
Bosnia and Herzegovina	0.041		
Czech RP	0.127		
Guatemala	0.175		
Panama	0.038		
Venezuela	0.226		
Uruguay	0.052		
Jamaica	0.449		
Barbados	0.154		
Trinidad and Tobago	0.095		

the clusters. The results show that “NES11_L01_MEAN” have the greatest influence on the clusters and “NES11_L01_SD” has the least important influence.

Cluster analysis is a descriptive multivariate technique, but additional validation techniques are required to validate this procedure. In the next section, a discriminant analysis is presented in order to distinguish countries in cluster 1 and cluster 2, allowing

Table 7 ANOVA

	Cluster		Error		*F*	Sig.
	Mean square	df	Mean square	df		
NES11_L01_SD	0.224	1	0.029	47	7.782	0.008
NES11_L01_MEAN	3.301	1	0.041	47	80.731	0.000

two linear regressions using the same variables as in the previous section on multivariate linear regression.

Discriminant Analysis

This section will explore how the independent variables with greater differentiation capacity used previously are able to classify the sample into two groups based on a dummy variable constructed from the two clusters of countries.

Examining the differences between groups, through the analysis of Table 8, some variables were considered as not contributing for the model, because their difference between the two clusters is not statistically significant. In addition, some values of "Wilks Lambda" are approximately equal to 1, indicating that the average of both groups is identical.

The examination of Table 8 shows that some "F" values are relatively low, indicating that when independent variables are individually considered they do not differentiate the groups. Therefore, some of the included variables do not influence the cluster; therefore, it is interesting to investigate which define both clusters.

There are some assumptions that must be verified before proceeding with the discriminant analysis: the share of observations in each group defined by the dependent variable, normality of independent variables, absence of multicollinearity and multivariate homoscedasticity—Box's M test. The size of the sample is N = 1852 cases, being 148 (8%) in cluster of countries 1 and 1704 (92%) in cluster 2, which are clearly greater than the number of independent variables (14).

The absence of multicollinearity was verified in the above Section 6—"Linear Regression" section. The homoscedasticity was also analysed based on the Box's test. A p value of 0.416 was obtained, leading to conclude that no homoscedasticity could be found.

The canonical correlation between discriminant functions is 0.26 meaning that, approximately, 5% of the variance of the clusters is explained by the discriminant function. Table 9, in particular "Wilk's Lambda," shows the test of the significance of the discriminant functions. As the p value is approximately 0, the null hypothesis (the

Table 8 Tests of equality of group means

	Wilks' lambda	F	df1	df2	Sig.
NES11_B01	.986	18,511	1	1331	.000
NES11_B03	1000	.010	1	1331	.920
NES11_D02	.995	6366	1	1331	.012
NES11_E06	.988	15,883	1	1331	.000
NES11_G02	.999	1836	1	1331	.176
NES11_I05	.998	2443	1	1331	.118
NES11_K05	.999	.759	1	1331	.384
NES11_L02	.996	5439	1	1331	.020
NES11_L03	.998	3057	1	1331	.081
NES11_L04	1000	.608	1	1331	.436
NES11_L05	.999	1934	1	1331	.165
NES11_N04	.998	2502	1	1331	.114
NES11_N05	.988	15,942	1	1331	.000
NES11_R05	1000	.053	1	1331	.818
NES11_R06	.999	.877	1	1331	.349

Table 9 Wilks' lambda

Test of function(s)	Wilks' lambda	Chi-square	df	Sig.
1	.932	93,244	15	.000

means in the two groups in the function are equal) is rejected and one can conclude that the discriminant function is highly significant.

Table 10 shows the classification results, with 70.2% of the cases grouped correctly, confirmed by the cross validation.

Table 10 shows the contribution of each variable to the discriminant function, that is, standardised canonical discriminant function coefficients.

The coefficient is relative to the importance of variable. NES11_B01 shows the greater contribution for the discriminant function definition, followed by NES11_L04, NES11_E06 and NES11_N05 (Table 11).

This shows that government policies (e.g. public procurement) consistently favour new firms seem to be the most important factors for distinguishing the group of countries and the hypothesis **H5:** Public policies can positively or negatively influence the initiative level for starting or managing a high-growth business, is verified.

Linear Regression for Two Clusters of Countries

The initial multivariate linear regression allowed observing which variables influence the opinion of 1852 individuals, to initiate or manage a high-growth business. The dependent variable was "NES_L01," as mentioned above (In my country, many people know how to start and manage a high-growth business), in order to validate the **H3**: The initiative level for starting or managing a high-growth business is influenced by the culture of individuals.

The goal of this section is to assess the potential existence of differences between the variables across the two clusters of countries defined above. In light with such aim, two linear regression models were estimated, one for each cluster defined in the previous sections. The independent variables considered for these regressions are the same considered, earlier, in the regression, described in Table 2.

Table 12 presents a summary of the two models. Being R^2 approximately 50% for the two models, the percentage of the total variability in the perceptions level of knowledge about creation of high-growth business management initiative is relatively good, and it is explained by the independent variables. This table also shows the

Table 10 Classification results

		Cluster	Predicted group membership		Total
			1.00	2.00	
Original	Count	1.00	63	35	98
		2.00	362	873	1235
	%	1.00	64.3	35.7	100.0
		2.00	29.3	70.7	100.0

70.2% of original grouped cases correctly classified

Table 11 Classification results—standardised canonical discriminant function coefficients

	Function 1
NES11_B01	−.687
NES11_B03	.061
NES11_D02	.295
NES11_E06	.501
NES11_G02	−.159
NES11_I05	−.307
NES11_K05	.087
NES11_L02	.241
NES11_L03	.266
NES11_L04	−.530
NES11_L05	.177
NES11_N04	−.208
NES11_N05	.465
NES11_R05	−.017
NES11_R06	−.176

standard error of the estimates. These models are significant because the p value of the ANOVA tests is, approximately, 0, which indicates a good fit.

Attending to the tables of coefficients of the models they can be written as:

Global model:

$$\begin{aligned} NES\_L01 = {} & -2,8 + 0,066\ \ NES11\_B01 - 0,086\ \ NES11\_B03 \\ & +0,08\ \ NES11\_D02 + 0,063\ \ NES11\_E06 \\ & +0,054\ \ NES11\_G02 + 0,072\ \ NES11\_I05 \\ & +0,08\ \ NES11\_K05 + 0,279\ \ NES11\_L02 \\ & +0,076\ \ NES11\_L03 + 0,141\ \ NES11\_L04 \\ & +0,217\ \ NES11\_L05 \\ & +0,054\ \ NES11\_N04 - 0,089\ \ NES11\_N05 \\ & +0,069\ \ NES11\_R05 - 0,086\ \ NES11\_R06 \end{aligned}$$

Model for cluster 1:

$$\begin{aligned} NES\_L01cluster1 = {} & -0.309 + 0.067 NES11\_B01 - 0.076\ \ NES11\_B03 \\ & +0.157\ \ NES11\_D02 - 0.089\ \ NES11\_E06 \\ & +0.098\ \ NES11\_G02 + 0.046\ \ NES11\_I05 \\ & -0.038\ \ NES11\_K05 + 0.063\ \ NES11\_L02 \\ & -0.059\ \ NES11\_L03 + 0.487\ \ NES11\_L04 \\ & +0.278\ \ NES11\_L05 + 0.074\ \ NES11\_N04 \\ & -0.145\ \ NES11\_N05 - 0.152\ \ NES11\_R05 \\ & +0.297\ \ NES11\_R06 \end{aligned}$$

Table 12 Model summary for clusters 1 and 2

R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson	Cluster
.737	.544	.459	.742	2099	1
.732	.536	.530	.648	1880	2

Model for cluster 2:

$$
\begin{aligned}
NES\_L01cluster2 = & -0.275 + 0.042 NES11\_B01 - 0.050\ \ NES11\_B03 \\
& +0.075\ \ NES11\_D02 + 0.031\ \ NES11\_E06 \\
& +0.032\ \ NES11\_G02 + 0.039\ \ NES11\_I05 \\
& +0.056\ \ NES11\_K05 + 0.264\ \ NES11\_L02 \\
& +0.064\ \ NES11\_L03 + 0.171\ \ NES11\_L04 \\
& +0.216\ \ NES11\_L05 + 0.042\ \ NES11\_N04 \\
& -0.047\ \ NES11\_N05 + 0.032\ \ NES11\_R05 \\
& -0.017\ \ NES11\_R06
\end{aligned}
$$

The analysis of the absolute values of standardised regression coefficients, for the global model, shows that the variables NES11_L02, NES11_L04 and NES11_L04 are those that have higher relative contributions to explain what makes a country's citizens know how to manage/initiate a high-growth business. Therefore, it is safe to say that experts consider that the ability that mostly contributes to explain the independent variable NES_L01 is the ability to react to good opportunities, wisdom and organise them. However, as it can be seen in the model, the variables that negatively influence the model show have little significance.

The next two equations define the models for cluster 1 and cluster 2, respectively. Note that only the bold variables are significant in the model.

One needs to, however, highlight the main differences found in the two models, as these show the contradictory positions across de different clusters of countries. A few variables show contradictory signs in the two models:

- NES11_E06: In my country, there is good support available for engineers and scientists to have their ideas commercialized through new and growing firms
- NES11_K05: In my country, there are plenty of good opportunities to create truly high-growth firms
- NES11_L03: In my country, many people have experience in starting a new business.
- NES11_R05: In my country, established companies are open to using new, entrepreneurial companies as suppliers.
- NES11_R06: In my country, consumers are open to buying products and services from new, entrepreneurial companies.

This shows that the influence of these variables in the perceptions of experts about the knowledge to manage and create a high-growth business is contradictory in the two clusters of countries.

In cluster 1, experts recognize that consumers are open to buying products and services from new, entrepreneurial companies is important for levels of high-growth business creation ability.

It is important to mention that the significant variables, with greater association with the dependent variable (high-growth business creation and management), for cluster 1 (countries from emerging economies) are variables related with competencies, resources and culture: NES11_L04—In my country, many people can react quickly to good opportunities for a new business; NES11_L05—In my country, many people have the ability to organise the resources required for a new business and NES11_R06—In my country, consumers are open to buying products and services from new, entrepreneurial companies. Although in the cluster 2 (includes central and southern Europe countries), the significant variables are almost all the dimensions considered in the global model excluding the variables NES11_G02—In my country, the markets for business-to-business goods and services change dramatically from year to year, NES11_R05—In my country, established companies are open to using new, entrepreneurial companies as suppliers and NES11_R06—In my country, consumers are open to buying products and services from new, entrepreneurial companies, all of them variables in the culture dimension, being verified the hypothesis H3. This seems to be coherent with the fact that cluster 1 includes the countries with higher propensity for the creation and management of high-growth business, and the cluster 2 seems that the emphasis is placed on the size of businesses rather than on their levels of growth.

Conclusions

High-growth businesses are a relevant phenomenon for economies as they represent an important driver for economic growth and they represent an efficient allocation of resources that can be inductive of wealth creation.

This paper has highlighted the variables that are associated to the entrepreneurial ability to create and manage high-growth businesses and clustered countries into two groups with different levels of high-growth entrepreneurship. Such clusters were used for the estimation of two linear regression models, highlighting the different contributions of the dependent variables.

It is important to note that our analysis has not been based on the actual existence of high-growth business but rather on the experts' perspective on their countries' entrepreneurial potential to create and manage high-growth business. This represents a limitation of this paper to the extent that it does not explore the real phenomenon, but, in a different standpoint, it offers insights about the experts' perspectives on the conditions of their economies and firms—this is also an interesting analysis. However, as a suggestion for further research, comparing the actual existence of high-growth business proliferation and the experts' perspective could provide interesting insights. Such analysis would allow exploring in which countries the experts underrate their country entrepreneurs' abilities to create and manage high-growth businesses and which ones overrate such skills. This can be the dependent variable of different models, in order to understand what explains such underrating or overrating attitude.

This paper sheds light into an important aspect of economic growth, and it is expected that it raises interests on the academia, in the governmental policy and amongst entrepreneurs.

Acknowledgements This research is supported by the FEDER component of the European Structural and Investment Funds, through the Operational Competitiveness and Internationalisation Programme's (COMPETE 2020) Project No. 006971 (UID/SOC/04011) and the Portuguese Foundation for Science and Technology's (Fundação para a Ciência e a Tecnologia) UID/SOC/04011/2013 Project. The authors also thank to comments given at Regional HELIX Conference 2016 – International Conference on Regional Triple Helix Dynamics. Any data or computational errors in this paper are our own.

References

Acs, Z. J., & Armington, C. (2006). *Entrepreneurship, geography and American economic growth*. New York, NY: Cambridge University Press.

Álvarez, C., Urbano, D., & Amorós, J. E. (2014). GEM research: achievements and challenges. *Small Business Economics, 42*(3), 445–465.

Alvarez, C., Urbano, D., & Amoro's, J. E. (2013). GEM research: achievements and challenges. *JEL*.

Álvarez, S. A., & Busenitz, L. W. (2001). The entrepreneurship of resource-based theory. *Journal of Management, 27*(6), 755–775.

Arenius, P., & Kovalainen, A. (2006). Similarities and differences across the factors associated with women's self-employment preference in the Nordic countries. *International Small Business Journal*.

Arenius, P., & Minniti, M. (2005). Perceptual variables and nascent entrepreneurship. *Small Business Economics, 24*(3), 233–247.

Audretsch, D. B., & Thurik, R. (2001). What's new about the new economy? Sources of growth in the managed and entrepreneurial economies. *Industrial and Corporate Change, 10*(1), 267–315.

Bergmann, H., Mueller, S., & Schrettle, T. (2013). The use of global entrepreneurship monitor data in academic research: a critical inventory and future potentials. *Entrepreneurial Venturing*.

Calvo, J. L. (2006). Testing Gibrat's law for small, young and innovating firms. *Small Business Economics, 26*(2), 117–123.

Carsrud, A. L., & Johnson, R. W. (1989). Entrepreneurship: a social psychological perspective. *Entrepreneurship & Regional Development, 1*(1), 21–31.

Chaney, P. K., Devinney, T. M., & Winer, R. S. (1991). The impact of new product introductions on the market value of firms. *The Journal of Business, 64*(4), 573–610.

Chaudhry, A., & Ikram, R. (2015). Does genetic proximity to high growth countries affect a country's own growth? *Economic Modelling, 51*, 444–453.

Chelariu, C., Brashear, T., Osmonbekov, T., & Zait, A. (2008). Entrepreneurial propensity in a transition economy: exploring micro-level and meso-level cultural antecedents. *Journal of Business & Industrial Marketing, 23*(6), 405–415.

Coad, A., & Rao, R. (2008). Innovation and firm growth in high-tech sectors: a quantile regression approach. *Research Policy, 37*(4), 633–648.

Cobbenhagen, J. (2000). Successful Innovation. Edward Elgar Publishing.

Correia, A., Silva, E. C., Lopes, I., & Braga, A. (2016). MANOVA for distinguishing experts' perceptions about entrepreneurship using NES data from GEM. *AIP Conference Proceedings*.

Crook, T. R., Shook, C. L., Morris, M. L., & Madden, T. M. (2010). Are we there yet?: an assessment of research design and construct measurement practices in entrepreneurship research. *Organizational Research Methods, 13*(1), 192–206.

Dunne, P., & Hughes, A. (1994). Age, size, growth and survival: UK companies in the 1980s. *The Journal of Industrial Economics, 42*(2), 115–140.

Dwyer, B., & Kotey, B. (2016). Identifying high growth firms: where are we? *Journal of Management & Organization, 22*(4), 457–475.

Evans, D. E. (1987). The relationship between firm growth, size and age: estimates for 100 manufacturing industries. *The Journal of Industrial Economics, 35*(4), 567–581.

Gibrat, R. (1931). *Les Ine'galite's Economiques*. Paris: Sirey.

Goedhuys, M., & Sleuwaegen, L. (2009). High-growth entrepreneurial firms in Africa: a quantile regression approach. *Springer Science Business, 34*(1), 31–51.

Gopalakrishnan, S. (2000). Unraveling the links between dimensions of innovation and organizational performance. *The Journal of High Technology Management Research, 11*(1), 137–153.

Hölzl, W., & Friesenbichler, K. (2010). High-growth firms, innovation and the distance to the frontier. *Economics Bulletin, 30*(2), 1016–1024.

Jovanovic, B. (1982). Selection and the evolution of industry. *Econometrica, 50*(3), 649–670.

Krueger, N. (1993). The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability. *Entrepreneurship: Theory and Practice, 18*(1), 5–22.

Lee, N. (2014). What holds back high-growth firms? Evidence from UK SMEs. *Small Business Economics, 43*(1), 183–195.

Manolova, T. S., Eunni, R. V., & Gyoshev, B. S. (2008). Institutional environments for entrepreneurship: evidence from emerging economies in Eastern Europe. *Entrepreneurship: Theory & Practice, 32*(1), 203–218.

Mansfield, E. (1962). Entry, Gibrat's law, innovation and the growth of firms. *The American Economic Review, 52*(5), 1023–1051.

Marques, R. G. (2014a). *O IMPACTO DO EMPREENDEDORISMO NO CRESCIMENTO ECONÓMICO: UM ESTUDO EMPÍRICO PARA OS PAÍSES DA OCDE.* Faculdade de Economia do Porto: Tese de Mestrado.

Marques, R.G. (2014b) O impacto do empreendedorismo no crescimento económico: um estudo empírico para os países da OCDE, Faculdade de Economia do Porto: Tese de Mestrado.

Mason, C. and Brown, R. (2010) High Growth Firms in Scotland. Strategy, October.

Mason, C., Brown, R., Hart, M., & Anyadike-Danes, M. (2015a). High growth firms, jobs and peripheral regions: the case of Scotland. *Cambridge Journal of Regions, Economy and Society, 8*(2), 343–358.

Mead, D. C., & Liedholm, C. (1998). The dynamics of micro and small enterprises in developing countries. *World Development, 26*(1), 61–74.

Mengistae, T. (1999). Indigenous ethnicity and entrepreneurial success in Africa: some evidence from Ethiopia. *WB policy research working paper.*

Mueller, S. L., & Dato-on, M. C. (2013). A cross cultural study of gender-role orientation and entrepreneurial self-efficacy. *International Entrepreneurship and Management Journal, 9*(1), 1–20.

Ng, P., & Hamilton, R. (2016). Experiences of high-growth technology firms in Malaysia and New Zealand. *Technology Analysis & Strategic Management, 28*(8), 901–915.

Pakes, A. (1985). On patents, R&D, and the stock market rate of return. *Journal of Political Economy, 93*(2), 390–409.

Parker, S. C. (2004). *The economics of self-employment and entrepreneurship*. Cambridge, UK: Cambridge University Press.

Praag, C.M., and Versloot, P.H. (2007) What is the value of entrepreneurship? A review of recent research, *Small Business.*

Ramos-Rodríguez, A. R., Medina-Garrido, J. A., & Ruiz-Navarro, J. (2012). Determinants of hotels and restaurants entrepreneurship: a study using GEM data. *International Journal of Hospitality Management, 31*, 579–587.

Reynolds, P. D., Hay, M., & Camp, S. M. (1999). GEM Global 1999 Executive Report, Kansas City: Kaufman Center.

Segarra, A., & Teruel, M. (2014). High-growth firms and innovation: an empirical analysis for Spanish firms. *Small Business Economics, 43*(4), 805–821.

Sleuwaegen, L., & Goedhuys, M. (2000). *Barriers to growth of firms in developing countries evidence from Burundi. Innovation, industry evolution and employment* (pp. 297–314). Cambridge: Cambridge University Press.

Sluis, J. V., Praag, M. V., & Vijverberg, W. (2004). Entrepreneurship selection and performance: a meta-analysis of the impact of education in less developed countries. *World Bank Economic Review, 19*(2), 225–261.

Stel, A. V., Carree, M., & Thurik, R. (2005). The effect of entrepreneurial activity on national economic growth. *Small Business Economics*.

Tidd, J. (2001). Innovation management in context: environment, organization and performance. *International Journal of Management Reviews, 3*(3), 169–183.

Ucbasaran, D., Westhead, P., & Wright, M. (2008). Opportunity identification and pursuit: does an entrepreneur's human capital matter? *Small Business Economics, 30*(2), 153–173.

van Stel, A., Carree, M., & Thurik, R. (2005). The effect of entrepreneurial activity on national economic growth. *Small Business Economics, 24*(3), 311–321.

Variyam, J. N., & Kraybill, D. S. (1992). Empirical evidence on determinants of firm growth. *Economics Letters, 38*(1), 31–36.

Walker, R. M., Jeanes, E., & Rowlands, R. (2002). Measuring innovation—applying the literature-based innovation output indicator to public services. *Public Administration, 80*(1), 201–214.

Wennekers, S., & Thurik, R. (1999). Linking entrepreneurship and economic growth. *Small Business Economics, 13*(1), 27–56.

Wennekers, S., van Stel, A., Thurik, R., & Reynolds, P. (2005). Nascent entrepreneurship and the level of economic development. *Small Business Economics, 24*(3), 293–309.

Cross-country Analysis To High-growth Business: Unveiling Its Determinants

Braga, V.; Queirós, M. J.; Correia, A. (Forthcoming). Cross-country Analysis To High-growth Business: Unveiling Its Determinants. Journal of Innovation & Knowledge

CROSS-COUNTRY ANALYSIS TO HIGH-GROWTH BUSINESS: UNVEILING ITS DETERMINANTS

Maria Queirós – 8120111@estg.ipp.pt
Vítor Braga – vbraga@estg.ipp.pt
Aldina Correia – aic@estg.ipp.pt

CIICESI – Center for Research and Innovation in Business Sciences and Information Systems, ESTG - School of Management and Technology, P.PORTO - Polytechnic of Porto

CIICESI – ESTG, Rua do Curral - Margaride, 4610-156 Felgueiras, Portugal

ELSEVIER

Abstract:

High-growth businesses are a relevant phenomenon for economies as they represent an important driver for economic growth and an efficient allocation of resources that can be inductive of wealth creation. Despite the importance that has been given to this phenomenon, inequalities regarding the ability to trigger and manage the entrepreneurial activity remain. In light of previous research, where perceptions of specialists from different countries through the Global Entrepreneurship Monitor (GEM) were analysed, this research aims to describe and account for the entrepreneurship levels, particularly those influencing the high growth of the businesses. In order to compare, real data contrasts the experts' perceptions confirming the conclusions found through the analysis of the firms across different countries.

In order to achieve this goal, our database combines country data from three databases, namely: OECD database; EUROSTAT database and HOFSTEDE database; in which observations from more than 35 countries was subjected to several multivariate analysis techniques, in particular the multiple linear regression analysis.

In general, our results show that the high growth of business is positively related to the size of firms, the power distance index and negatively related to masculinity.

Keywords: HIGH GROWTH BUSINESS; OCDE; EUROSTAT; HOFSTEDE

1. Introduction

For a long time, academic, policy makers and business practitioners have sought for growth both on a macroeconomic and a microeconomic level. As such, growth is not only sought as a constant and sustainable growth, but rather high growth rates have been sought. Therefore, understanding the conditions necessary to achieve high growth rates or the mechanisms that allow business to grow more are of significant importance and deserve the attention of the academy.

Mason and Brown (2010); Amat, Renart, & Garcia (2013) or Marchese (2016) are just examples of the importance of the high-growth business phenomenon in the literature and where their importance for the formulation of policies is addressed. Georgallis & Durand (2017: p. 487) refer the importance of public policies for supporting the high-growth business to the extent that "*producers' growth is positively linked to policy generosity, and negatively linked to policy discontinuity […] corporate-backed ventures are less affected by policy generosity compared to entrepreneurial startups, and less impacted by policy discontinuity as well*". Other papers were able to demonstrate the importance of high-growth business through the channel of public efforts for its promotion, demonstrating that exploring the growth rates of business is pertinent and relevant. In addition, it is not clear that there is a single pattern of high-growth business across different countries and this justifies the study of cross-countries differences on the high growth business and on how they are perceived by the economic agents. The economic effect of the proliferation of the high-growth businesses justifies its relevance for the economic decision making practice and, therefore, it justifies the academic and scientific relevance in an attempt to provide evidence that may further support public policy.

In line with such arguments, the aim of this paper is to explore the determinants of high growth firms, in particular the dimensions previously surveyed by Braga, Queirós and Correia and Braga (2017), carrying out a statistical study, using multivariate analyses, in particular, multiple linear regression for a database based on three databases: OECD database; EUROSTAT database and HOFSTEDE database.

An analysis to the literature on the topic returns that there is a significant heterogeneity of measurement instruments, variables and databases. While, in many cases, the literature on high-growth business contribute with insights on public policy measures to promote such forms of entrepreneurship, others use perceptions as measurement. Our contribution reflects on real data for observed measures, including less orthodox approaches, such as the cultural dimension.

After a brief literature review and the description of the methodology employed in this research, the study is divided into two linear regression analyses that include two dependent variables that are measured differently. Our paper concludes with a summary of the findings and suggestions for further research in this area.

2. Literature Review

This section presents several scientific contributions, which study high-growth firms, in particular, presenting approaches concerning the variables and characteristics influencing their performance. In previous work, Braga, Queirós, Correia, & Braga (2017) described and accounted for entrepreneurship levels, particularly in order to understand what leads certain countries' individuals to display higher levels of initiative to manage or create a high-growth business. In order to achieve this goal, a research program that includes annual assessments of entrepreneurial activity levels in several countries has been used - The Global Entrepreneurship Monitor (GEM), which is, currently, one of the main international research databases aiming to describe, analyse and compare the entrepreneurial process in a wide range of countries. Their research used the 2011 NES (National Expert Survey) database. Their study identified perceptions concerning competencies, size, culture, resources and government policies as associated with the entrepreneur's perception of "In my country, many people know how to start and manage a high-growth business".

Our goal is to study if, with real data for firms (instead of perceptions of entrepreneurs), the same conclusions are achieved.

Size and Age

According to Alex Coad and Werner Holzl Gibrat's stochastic model of firms growth led to what is known as Gibrat's Law, which holds that firm growth rates are independent of firm size (Holzl & Werner, 2010). Gibrat's law is often observed to fail, under closer examination, because of a negative dependence of growth rates on size: smaller and younger firms have expected higher growth rates than older and larger firms (Mansfield E. , 1962) (Oulton, 1996). Given the close relationship between firm size and firm age, researchers have also considered the effect of firm age on expected growth rate. A firm's age has also been observed to have an influence on its growth, with the majority of studies reporting that older firms experience slower growth (Evans D. , 1987; Hughes, 1994). Lotti, Santarelli, and Vivarelli (2008) show that Gibrat's law cannot be rejected once they account for learning and selection processes of younger and/or smaller firms (Vivarelli, 2007).

There are a significant number of empirical studies showing a significant negative relationship between growth and firm size and between the variability in growth and the firm size (Mansfield, 1962; Mengistae, 1999; Calvo, 2006). Previously, it has been verified that there is a close relationship between the size and age of the firm laeding to the first and second research hypotheses arise: In microeconomic terms it makes sense to consider the age of firms but as our approach is macroeconomic and, therefore, it does not make sense to consider age. Taking into account the previous arguments, our first research hypothesis is:

H1: Size firms influence their growth rates.

Innovation and growth

According Holzl (2010), a number of theoretical models have stated a positive relationship between innovation and firm growth. Empirical work on the firm-level innovation has investigated these processes, usually measuring innovation in terms of R&D expenditure, number of patents, or in terms of responses to innovation questionnaires such as the CIS surveys. Empirical work on the matter has shown difficulties confirming the theoretical findings. On average, innovation doesn't impact much on firm growth, and some studies fail to find a significant effect of innovation on subsequent growth of sales (Geroski & Walters, 1997); (Bottazzi, Dosi, Lippi, & Riccaboni, 2001).

One possible explanation for this lack of empirical confirmation can be the growth rate distributions. It has been observed that the average firm does not show high levels of growth and so it might not be useful to search for the determinants of growth of the average firm. Instead our approach goes beyond the average, looking into the determinants of growth for the fastest growing firms. Empirical results from quantile regressions has shown that, while innovation has a limited impact on the sales growth rates of average firms, it is more important for the fastest-growing firms (Coad, 2008) (Holzl, 2009) (Goedhuys, 2009) (Stam, 2009). This characterization of the relationship between innovation and firm growth is consistent with the characterization of innovation as a highly uncertain activity, with the returns to innovation being remarkably unequal (some firms benefit greatly from innovation while many others are less fortunate). Another aspect of the relationship between innovation and firm growth concerns the phenomenon of technological unemployment –innovative firms display a lower demand for labour because they apply new technologies (such as robots) to reduce their labour requirements. The aggregate analysis of the impact of technical change on employment is, however, risky. There may well be many indirect feedback effects operating through numerous 'substitution channels' – for instance, new technologies may lead to changes in employment elsewhere in the economy (upstream sectors), and they may affect demand by lowering prices, or increasing wages and investment (Holzl & Werner, 2010).

Investigations at the firm-level have, generally, found a positive influence of innovation on employment growth (Holzl & Werner, 2010). Many authors have found useful to distinguish between product innovation, which is usually associated with employment creation via increased demand, and process innovation, which is often characterised as labour saving. While process innovation is usually found to be associated with employment growth at the firm-level, the effect of process innovation is less clear, being associated with job destruction in some cases (Harrison, Jaumandreu, Mairesse, & Peters, 2005) (Hall, H., Lotti, & Mairesse, 2008).

Several authors emphasise the role of innovation as a driver of superior performance of firms (e.g. Tidd, 2001; Cobbenhagen, 2000). Chaney et al. (1991) add that innovation is responsible for corporate success, while Cobbenhagen (2000) shows that there is little disagreement amongst economists about the importance of innovation on economic growth (Chaney, Devinney, & Winer, 1991).

Aiming to explore, through real data, how innovative firms influence their growth, our second research hypothesis is:

H2: Innovation firms influence their growth rates.

Profits performance and growth

A large number of theoretical models assume that the more profitable firms will grow while less profitable firms will decline. In this view, selection pressures operate to redistribute market share to the more profitable firms. In fact, one would expect that profitable firms have not only the means to finance expansion, but also the motivation to grow, since they can obtain a larger amount of profits from a larger sales base (Holzl & Werner, 2010). In addition, it has been observed that, while profit rates are heterogeneous across firms, they display a high degree of persistence (Mueller, 1977) (Dosi, 2007), while firm growth rates do not display much persistence. This leads to question the expected relationship between profits and growth (Geroski & Mazzucato, 2002). Further investigation, based on regression analysis, has generally shown that firm growth rates cannot be explained in terms of financial performance, whether the latter is measured in terms of profit rates (Coad, 2007); (Bottazzi, Secchi, & Tamagni, 2008) or growth rates of the amount of profits (Coad & Rao, 2010). While there may be a statistically significant relationship between the two, the magnitude of the effect is so low that it would be a valid approximation to view the two variables as independent. Furthermore, advanced econometric techniques also show that profits have a negligible causal effect on firm growth rates (Coad, 2007). Instead, it appears that growth has more of a positive effect on profits, than does profits on growth (Coad, 2007; 2010).

National Culture

Geert Hofstede conducted one of the most comprehensive studies of how values in the workplace are influenced by culture. He defines culture as “the collective programming of the mind distinguishing the members of one group or category of people from others” (Hofstede, 1991). During 1978-83, he conducted detailed interviews with hundreds of IBM employees in 53 countries. Through standard statistical analysis of large data sets, he determined patterns of similarities and differences among the replies. From this data analysis, he developed five dimensions of culture (Hofstede G. , 1991).In the 1990s, Hofstede published results of his research, initially he developed four dimensions in culture, but added a fifth dimension in 1991.

In the 2000s, research by Minkov (2007) using data from the World Values Survey allowed a new calculation of the fifth, and the addition of a sixth dimension (Hofstede, Hofstede, & Minkov, 2010). The six dimensions are: Power Distance, related to the different solutions to the basic problem of human inequality; Uncertainty Avoidance, related to the level of stress in a society in the face of an unknown future; Individualism versus Collectivism, related to the integration of individuals into primary groups; Masculinity versus Femininity, related to the division of emotional roles between women and men; Long Term versus Short Term Orientation, related to the choice of focus for people's efforts: the future or the present and past; Indulgence versus Restraint, related to the gratification versus control of basic human desires related to enjoying life (Hofstede, 2011).

As found in the Hofstede study, each country has been positioned relative to other countries through a score on each dimension. The dimensions are statistically distinct and do occur in all possible combinations, although some combinations are more frequent than others. After the initial confirmation of the country differences in IBM in data from management trainees elsewhere, the Hofstede dimensions and country scores were validated through replications, using the same or similar questions with other cross-national populations. Between 1990 and 2002 six major replications (14 or more countries) used populations of country elites, employees and managers of other corporations and organizations, airline pilots, consumers and civil servants (Hofstede G. , 2011).

Power Distance has been defined as the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally. It suggests that a society's level of inequality is endorsed by the followers as much as by the leaders. Power and inequality, of course, are extremely fundamental facts of any society. All societies are unequal, but some are more unequal than others (Hofstede G. , 2011).

Uncertainty Avoidance is not the same as risk avoidance; it deals with a society's tolerance for ambiguity. It indicates to what extent a culture programs its members to feel either uncomfortable or comfortable in unstructured situations. Unstructured situations are novel, unknown, surprising, and different from usual. Uncertainty avoiding cultures try to minimize the possibility of such situations by strict behavioral codes, laws and rules, disapproval of deviant opinions, and a belief in absolute truth (Hofstede G. , 2011).

Individualism on the one side versus its opposite, Collectivism, as a societal, not an individual characteristic, is the degree to which people in a society are integrated into groups. On the individualist side we find cultures in which the ties between individuals are loose: everyone is expected to look after him/herself and his/her immediate family. On the collectivist side we find cultures in which people from birth onwards are integrated into strong, cohesive in-groups, often extended families (with uncles, aunts and grandparents) that continue protecting them in exchange for unquestioning loyalty, and oppose other ingroups.

Masculinity versus its opposite, Femininity, again as a societal, not as an individual characteristic, refers to the distribution of values between the genders which is another fundamental issue for any society, to which a range of solutions can be found. The IBM studies revealed that women's values differ less among societies than men's values; men's values from one country to another contain a dimension from very assertive and competitive and maximally different from women's values on the one side, to modest and caring and similar to women's values on the other. The assertive pole has been called '*masculine*' and the modest, caring pole '*feminine'* (Hofstede, Hofstede, & Minkov, 2010).

The dimension Long-Term versus Short-Term Orientation turned out to be strongly correlated with recent economic growth. As none of the four IBM dimensions was linked to economic growth, obtain Bond's permission to add his dimension as a fifth to four (Hofstede & Bond, 1998).

Lastly, the sixth and new dimension, it was also based on recent World Values Survey items and is more or less complementary to Long-versus Short-Term Orientation; in fact, it is weakly negatively correlated with it. It focuses on aspects not covered by the other five dimensions, but known from literature on "happiness research". Indulgence stands for a society that allows relatively free gratification of basic and natural human desires related to enjoying life and having fun. Restraint stands for a society that controls gratification of needs and regulates it by means of strict social norms (Hofstede G. , 2011).

Some societies are unequal, but the degree of inequality varies considerably. Power can also be distributed unevenly and thus influence the high growth of business. In line with this argument, our third hypothesis has tried to explore the impact of Power Distance on the firm growth rates:

H3: Power Distance influences businesses' growth rates.

As referred Hofstede (2011) uncertainty avoiding cultures try to minimize the possibility of uncomfortable situations. We aim to explore how uncertainty avoiding culture influence the growth of firms, thus, the fourth research hypothesis is:

H4: Uncertainty avoiding culture influences businesses' growth rates.

In Hofstede's (1991) study, one of the influential cultural values in the workplace was individualism. Our aim is to verify the impact of individualism on the growth rates of firms. The fifth research hypothesis is, thus:

H5: Individualism influence businesses' growth rates.

A crucial question in any society is the distribution of values between genders, in this sense, Hofstede (2010) suggests masculinity as a social characteristic. Therefore, our aim is to understand to what extent such characteristic influences the growth rates of firms.

H6: Masculinity influence businesses' growth rates.

Hofstede (1998) presented the dimension Long-Term Orientation as an aspect correlated to economic growth. Thus, it is aimed to verify the impact of this variable on the growth rates of firms through the following investigation hypothesis:

H7: Long-Term Orientation influence businesses' growth rates.

Finally, based on Hofstede's (2011) study, it was aimed to verify if the dimension Indulence, suggested by the author, influences the growth rates of the firms.

Therefore, the last research hypothesis is as follows:

H8: Indulgence influence businesses' growth rates.

3. Research hypothesis

In order to reach the proposed objective, a set of research hypotheses was formulated that relate the firm growth rates, with several variables (independent). Our goal is to study if these variables (size and age; innovation and growth; profits and growth; and national culture) increase or refrain the creation of new high-growth businesses.

Table 1 presents a summary of the literature as well as the measurement used by the various authors in their studies. Table 2 provides an overview of the databases used to perform the statistical analysis displayed in the subsequent chapter.

Table 1-Independent variables and expected association

Variables	**Measure**	**Authors**	**Expected association**	**Hypothesis**
Growth rate (independent variable)	Expected growth rate			
Size	Expected growth rate; firm's age;	(Holzl & Werner, 2010); (Mansfield E. , 1962); (Oulton, 1996) (Evans D. , 1987);; (Hughes, 1994); (Vivarelli, 2007); (Braga, Queirós, Correia, & Braga, 2017)	+	H1: Size firms influence their growth rates;
Innovation and growth	R&D expenditure; Number of patents owned by the firm; Responses to innovation questionnaires;	(Holzl & Werner, 2010) (Geroski & Walters, 1997) (Bottazzi, Dosi, Lippi, & Riccaboni, 2001) (Coad A. a., 2008) (Holzl W. , 2009) (Goedhuys, 2009) (Stam, 2009) (Harrison, Jaumandreu, Mairesse, & Peters, 2005) (Hall, H., Lotti, & Mairesse, 2008) (Braga, Queirós, Correia, & Braga, 2017)	+	H2: Innovation firms influence their growth rates;
National Culture		(HOFSTEDE, 2017) (Hofstede & Bond, 1998) (Hofstede G. , 1991) (Hofstede, Hofstede, & Minkov, 2010) (Minkov, 2007) (Braga, Queirós, Correia, & Braga, 2017)	+	H3: Power Distance influence their growth rates;
			-	H4: Uncertainty avoiding culture influence their growth rates;
			-	H5: Individualism influence their growth rates.
			-	H6: Masculinity influence their growth rates.
			-	H7: Long-Term Orientation influence their growth rates.
			+	H8: Indulgence influence their growth rates.

This research strategy has allowed to construct a composite database, where the variables collected from the three databases were combined.

4. Methodology

In this study, we applied the multivariate statistical analysis tools to study the Organisation for Economic Co-operation and Development that OECD Countries covered include Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. Non-OECD countries include Brazil, China, India, Indonesia, Russia, and South Africa.

The OECD database includes information on a range of issues to assist governments to foster prosperity and fight poverty through economic growth and financial stability. It aims to help ensure the environmental implications of economic and social development are taken into account (OECD.Stat, 2017).

The OECD Factbook provides indicators selected from more than 40 OECD statistical databases for all OECD member countries and, when available and considered internationally comparable, for Brazil, India, Indonesia, the People's Republic of China, the Russian Federation and South Africa. The country statistical profiles provide a broad selection of indicators, illustrating the demographic, economic, environmental and social developments, for each of the 35 OECD members, and the Russian Federation. The dataset also covers the five key partner economies with which the OECD has developed an enhanced engagement program with (Brazil, China, India, Indonesia and South Africa) (OECD.Stat, 2017). Topics covered include population and migration; production; household income, wealth and debt; globalization, trade and foreign direct investment (FDI); prices, interest rates and exchange rates; energy and transportation; labor, employment and unemployment; science and technology including research and development (R&D); environment including natural resources, water, air and climate; education resources and outcomes; government expenditures, debt, revenues, taxes, foreign aid; and, health status, risk and resources (OECD.Stat, 2017). In total, it presents 447 subject that complement the aforementioned topics covered and it includes population and migration; production; household income, wealth and debt; globalisation, trade and foreign direct investment (FDI); prices, interest rates and exchange rates; energy and transportation; labour, employment and unemployment; science and technology including research and development (R&D); environment including natural resources, water, air and climate; education resources and outcomes; government expenditures, debt, revenues, taxes, foreign aid; and, health status, risk and resources (OECD.Stat, 2017).

The data provided by Geert Hofstede was also used. It was developed between 1967 and 1973, and has performed a large survey of the national subsidiaries of a multinational corporation: compared to the answers of 117,000 IBM matched employees on the same attitude survey in different countries. Initially, it focused his on the 40 largest countries, and then extended it to 50 countries and 3 regions.

Finally, the Eurostat database was used, with over 4 600 datasets containing more than 1.2 billion statistical data values, and covers all areas of European society (Eurostat, 2017). This database covers about 32 countries including the 28 EU member states as well as 4 EFTA Countries (Switzerland, Iceland, Liechtenstein and Norway).

With the multivariate linear regression, it is aimed to study which variables influence the high growth rates of firms. To meet this goal, one can use a linear regression model considering growth rate as the dependent variable. Given the limited number of countries in each database, the combination of two databases allowed using a larger number of observations, but it required using two linear multivariate models (given differences in the measurement of the two databases) for which the dependent variables were defined as follows:

Dependent variable: OCDEHighGrowth - which will be named as “variable y1” refers to rate of high growth enterprises (20% or higher growth based on employment): number of high growth enterprises as a percentage of the population of active enterprises with at least 10 employees of firms in countries, available in the OCDE site (OECD.Stat, 2017).

Dependent variable: EUROSTATHighGrowth – which will be named as "variable y2" refers to the share of high-growth enterprises measured in employment: number of high-growth enterprises divided by the number of active enterprises with at least 10 employees, i.e. high growth enterprises (growth by 10% or more) and related employment of firms in countries, available in the EUROSTAT site.

The choice of dependent variables to be considered in the analysis was based on the hypothesis formulated. Thus, all variables are related to the dimensions under analysis: size and age, Innovation and growth and National Culture, as summarized in Table 2.

Dimensions	Variables	Description	Database
Size	X1	Number of employees in manufacturing in enterprises with 10-19 persons engaged.	OCDE database
	X2	Number of employees in manufacturing in enterprises with less than 10 persons engaged.	OCDE database
	X3	Number of employees in manufacturing in enterprises with 20-49 persons engaged.	OCDE database
	X4	Number of employees in manufacturing in enterprises with 50-249 persons engaged.	OCDE database
	X5	Number of employees in manufacturing in enterprises with 250 or more persons engaged.	OCDE database
Innovation and growth	X6	Researchers.	OCDE database
	X7	Gross domestic expenditure on R&D.	OCDE database
Culture	X8	Power Distance.	HOFSTEDE database
	X9	Individualism.	HOFSTEDE database
	X10	Masculinity.	HOFSTEDE database
	X11	Uncertainty Avoidance.	HOFSTEDE database
	X12	Long-term Orientation.	HOFSTEDE database
	X13	Indulgence.	HOFSTEDE database

Table 2- Summary

5. Results and discussion

High Growth firms in OCDE data countries

Initially, a linear regression was performed with the dependent variable y1 (OCDEHighGrowth) in which the coefficients of the final model are presented in the table 4. This model, obtained using the stepwise method with all the variables in Table 3, displays an adjusted R square of, approximately, 79% representing the expected percentage of the total variability in the level of high growth firms explained by the significant independent variables.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson

4	0.916d	0.839	0.794	1.5060	2.007
d. Predictors: (Constant), Power Distance*, Uncertainty Avoidance*					
e. Dependent Variable: OCDE High Growth					

Table 3-Model Summary OCDE

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
4	(Constant)	3.174	1.544		2.055	0.079		
	Power Distance*	0.145	0.025	0.982	5.824	0.001	0.806	1.240
	Uncertainty Avoidance*	-0.092	0.023	-0.681	-4.037	0.005	0.806	1.240
a. Dependent Variable: OCDE High Growth								

Table 4: Coefficients OECD

It can be observed, in Table 4, that only *Power Distance* and *Uncertainty Avoidance*, are related with National Culture, and significant to explain the variation of the dependent variable - high growth level of firms in countries - available in the OCDE website. According to Table 4, the model can be written as below:

$$\boldsymbol{Y1 = 3.174 + 0.145\, X8 - \ 0.92\, X11}$$

The analysis of standardized regression coefficients, in Table 4, shows that the variable X8 – *Power Distance* is the one with the higher relative contribution to explain the dependent variable, i.e., the variable that most influences the growth rates of countries, and the influence is positive, therefore the greater the Power Distance the greater is the growth rate of firms in the country. This leads us to conclude that a power distance in the society implies a high growth in firms.

On the other hand X11 – *Uncertainty Avoidance* negatively influences the growth rates of firms in the countries. Thus H3 and H4 could be verified.

Validation of Assumptions of the Linear Regression Model

Linear regression application assumes that errors follow a normal distribution with zero mean and constant variance and that they are independent. Our analysis included normal probability plot, a scatterplot and leverage graphic, and, in order to validate the assumption of normality, the one-sample Kolmogorov-Smirnov and Shapiro-Wilk tests were used.

Table 5- Tests of Normality OCDE

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	0.223	15	0.043	0.896	15	0.083
a. Lilliefors Significance Correction						

The Kolmogorov-Smirnov results shows that there is statistical evidence for rejecting the hypothesis that the residual variable follows a normal distribution, for a significance level of 5% as the p-value = 0.043. Furthermore the Shapiro-Wilk test shows a different result, with a p-value = 0.083>0.05, then one can assume the normality hypothesis.

A residual analysis is included in Summary of the model, Table 3, where Durbin-Watson's statistics displays the value 2.007 and therefore is expected that the residuals are uncorrelated.

Table 6 shows the maximum and minimum values of residual and the values of the standard predicted values, suggesting the inexistence of outliers

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.875	13.012	4.577	2.7735	15
Residual	-7.1859	5.5151	0.210	2.8276	15
Std. Predicted Value	-0.927	2.740	-0.037	0.913	15
Std. Residual	-4.772	3.662	0.139	1.878	15
a. Dependent Variable: OCDE High Growth					

Table 6-Residuals Statistics OCDE

When the independent variables are highly correlated to each other (multicollinearity), the analysis of the adjusted regression model can be confusing. The values for tolerance and for Variance Inflaction Factor (VIF), for each independent variable show that there is statistical evidence to support the absence of multicollinearity, because tolerance values are not around zero and the VIF values are smaller than 5.

Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	Power Distance*	Uncertainty Avoidance*
4	1	2.861	1.000	0.01	0.01	0.01
	2	.080	5.984	0.24	0.98	0.15
	3	.059	6.974	0.75	0.01	0.84

Table 7-Collinearity Diagnostics OCDE

a. Dependent Variable: OCDE High Growth

Table 7 shows the variance proportions, the eigenvalues and the condition indexes. It is possible to observe that there is no indications of multicolinearity, since there is no null eigenvalues, neither condition indexes greater than 15. The variance proportions can indicate some problems, and this may be a limitation of the model.

High Growth firms in countries considering Eurostat data

The second linear regression was performed with the dependent variable y2 EUROSTATHighGrowth).

Table 8-Model Summary Eurostat

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
2	,718[b]	,515	,446	1,464390	1,977

a. Dependent Variable: Eurostat High Growth

The coefficients of the final model were presented in Table 8. This model displays an adjusted R square of, approximately, 45%, representing the expected percentage of the total variability of the level of high growth firms explained by the significant independent variables. It can be observed, in Table 9, that only *Number of employees in manufacturing in enterprises with 250 or more persons engaged* and *Masculinity* are significant to explain the variation of the dependent variable high growth level of firms in countries, available in the Eurostat site. According to Table 9, the model can be written as below:

$$\boldsymbol{Y2 = 5.860 + 0.127\,X5 - 0.32\,X10}$$

Table 9-Coefficients Eurostat

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
2	(Constant)	5.860	1.529		3.833	0.002		
	Number of employees in manufacturing in enterprises with 250 or more persons engaged	0.127	0.037	0.653	3.459	0.004	0.972	1.029
	Masculinity	-0.032	0.014	-0.426	-2.256	0.041	0.972	1.029
a. Dependent Variable: Eurostat High Growth								

The analysis of standardized regression coefficients, in Table 9, shows that the X5 - *Number of employees in manufacturing in enterprises with 250 or more persons engaged* variable is that which shows a higher relative contribution to explain the dependent variable. Thus, there are statistical evidences to validate hypothesis H1: Size firms influence their growth rates. On the other hand, Masculinity negatively influences the growth rates of firms. Thus H1 and H5 are verified.

Validation of Assumptions of the Linear Regression Model

Kolmogorov-Smirnov and Shapiro-Wilk tests allow validating the assumption of normality, for a significance level of 5% because for the Kolmogorov-Smirnov test the p-value equals 0.200. In the summary, in Table 8, Durbin-Watson's test displays the value 1.997 and therefore one can expect that the residuals are uncorrelated. Table 10 shows the maximum and minimum values of residuals and the values of the standard predicted values, which suggest the inexistence of outliers.

Table 10-Residuals Statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	6,61812	16,12968	9,78308	2,034733	19
Std. Predicted Value	-2,007	4,732	,236	1,441	19
Residual	-6,509682	2,644625	-,358340	1,972697	19
Std. Residual	-4,445	1,806	-,245	1,347	19
a. Dependent Variable: Eurostat High Growth					

The values of tolerance and VIF), Table 8, for each independent variable show that there is statistical evidence to support the absence of multicollinearity, because tolerance values are not around zero and the VIF values are less than 5.

Similar to the previous model, the eigenvalues and the condition indexes do not indicate existence of multicolinearity, since there is no null eigenvalues, neither condition indexes greater than 15. The variance proportions can indicate some problems, and this may be a limitation of the model.

In general, the results were as follows:

- Only the variables *Power Distance* and *Uncertainty Avoidance* can be related with National Culture, as others are not statistically significant to explain the variation of the dependent variable high growth level of firms, available in the OCDE site.
- *Power Distance* shows a higher relative contribution to explain the dependent variable, i.e., it is the variable that mostly influences the growth rates of countries (positively).
- *Uncertainty Avoidance* negatively influences the growth rates of firms in the countries. This has allowed to verify H3 and H4.
- The Eurostata data shows that only the *Number of employees in manufacturing in enterprises with 250 or more persons engaged* and *Masculinity* are significant to explain the variation of the dependent variable, but the *Number of employees in manufacturing in enterprises with 250 or more persons engaged* is the one that most contributes to the explanation of the high growth of businesses. Thus, there are statistical evidence to validate the hypothesis H1: Size firms influence their growth rates.
- H5 is also verified, as Masculinity negatively influences the growth rates of firms.

These results allow to verify H1; H3; H4; and H5. This confirms the literature, that suggests that the growth of firms is influenced by their size. In addition, high growth firms prevail in countries is influenced by power distance; uncertainty avoidance; and individualism. Such findings suggest that there is a certain cultural environment that is conducive to growth, and in cultures where these conditions are met it seems to exist a higher prevalence for high-growth business. Therefore, our results suggest that high-growth firms seem to find their conditions in countries where there are low levels of masculinity; small levels of uncertainty avoidance and higher power distance. These results are, to some extent, coincident with the literature on entrepreneurship and support that taking risks and power distance provide the conditions for the growth of businesses. The remaining hypothesis could not be confirmed.

6. Conclusions and Future Research

The main objective of this paper was to explore the contribution of certain dimensions studied in previous research. In particular, we have analysed the literature the size and age of the companies, as well as the contribution of innovation and growth and the well-known study of Geert Hofstede to explain the high growth businesses.

One important contribution of this paper is to relate power distance in the society with high growth in firms, showing a statistically significant relationship. On the other hand, Uncertainty Avoidance influences negatively the growth rates of firms in the countries, as well, there is a negative relation with Masculinity because it negatively influences the high growth of the business.

This paper sheds light on an important aspect of economic growth, and it is expected that it raises interests in the academy, in the governmental policy and amongst entrepreneurs, because it exploits real data of three databases with great impact in the measures adopted by the different countries associated, includes information on the range of issues to help governments foster prosperity and fight poverty through economic growth and financial stability.

One of the main limitations of this study is the heterogeneity in the measurement of the variables found in the databases and used in the statistical analyses. Such limitation did not allow basing the empirical results on one single database with a larger number of observations, but rather it had to be based into two smaller databases. This limitation may have impacted on the significance of the different variables, and, as a consequence, other variables could have shown statistical significance for a higher number of observations.

In addition to our contribution, further research may explore the same relationships on an individual country basis, in order to test if different relationships may emerge from the data (in this case a higher number of observations may be found). This is based on the fact that the national economic environment may be conducive to further growth, while in others limitations may be found. It is important to note that the institutional and legal framework may help explaining such differences, but mostly the expectations of the economic agents may contribute with significant insights.

References

Amat, O., Renart, M., & Garcia, M. (2013). Factors that determine the evolution of high-growth businesses. *Intangible Capital, 9*(2), 379-391.

Bottazzi, G., Dosi, G., Lippi, M., & Riccaboni, F. P. (2001). Innovation and Corporate Growth in the Evolution of the Drug Industry. *International Journal of Industrial Organization*, 1161-1187.

Bottazzi, G., Secchi, A., & Tamagni, a. F. (2008). Productivity, Profitability and Financial Performance. *Industrial and Corporate Change*, 711-751.

Braga, V., Queirós, M. J., Correia, A., & Braga, A. (2017). HIGH-GROWTH BUSINESS CREATION AND MANAGEMENT: A multivariate quantitative approach using GEM data. *Journal of the Knowledge Economy*, (to appear).

Calvo, J. L. (2006). Testing Gibrat's law for small, young and innovating Firms. *Small Business Economics*.

Chaney, P., Devinney, T., & Winer, R. (1991). Chaney,P.K.,Devinney,T.M.,&Winer,RThe impact of new producti ntroductions on the market value of firms. *The Journal of Business*, 64(4), 573–610.

Chelariu, C., Brashear, T., Osmonbekov, T., & Zait, A. (2008). Entrepreneurial propensity in a transition economy: exploring micro-level and meso-level cultural antecedents. *JOURNAL OF BUSINESS & INDUSTRIAL MARKETING, 23*(6), 405-415.

Coad, A. (2007). Testing the principle of 'growth of the fitter': the relationship between profits and firm growth. *Structural Change and Economic Dynamics*, 370-386.

Coad, A. (2010). Exploring the processes of firm growth: evidence from a vector autoregression. *Industrial and Corporate Change*.

Coad, A. a. (2008). Innovation and Firm Growth in HighTech Sectors: A Quantile Regression Approach. *Research Policy*.

Coad, A., & Rao, R. (2010). Firm growth and R&D expenditure. *Economics of Innovation and New Technology*, 127–145.

Cobbenhagen, J. (2000). Successful Innovation. *Edward Elgar Publishing.*

Dosi, G. (2007). Statistical Regularities in the Evolution of Industries: A Guide through some Evidence and Challenges for the Theory. *Perspectives on Innovation.* F. Malerba, and S. Brusoni: Cambridge University Press, Cambridge, UK.

Eurostat. (2017). *Eurostat Your Ket*. Retrieved from http://ec.europa.eu/eurostat/web/main/home

Evans, D. (1987). The Relationship between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries. *Journal of Industrial Economics*, 567-581.

Evans, D. E. (1987). The relationship between firm growth, size and age : Estimates for 100 manufacturing industries . *The Journal of Industrial Economics*, 567-581.

Evans, D. E. (1987). The relationship between firm growth, size and age: estimates for 100 manufacturing industries. . *The Journal of Industrial Economics*, 35(4), 567–581. .

Georgallis, P., & Durand, R. (2017). Achieving High Growth in Policy-Dependent Industries: Differences between Startups and Corporate-Backed Ventures. *Long Range Planning*, *50*(4), 487-500.

Geroski, P. A., & Walters, S. J. (1997). Corporate GrowthandProfitability. *Journal of Industrial Economics*, 171-189.

Geroski, P., & Mazzucato, a. M. (2002). Learning and the sources of corporate growth. *Industrial and Corporate Change*, 623–644.

Goedhuys, M. a. (2009). High-growth entrepreneurial firmsinAfrica: aquantileregressionapproach. *Small Business Economics*.

Hall, H., B., Lotti, F., & Mairesse, a. J. (2008). Employment, innovation and productivity: evidence from Italian microdata. *Industrial and Corporate Change*, 813-839.

Harrison, R., Jaumandreu, J., Mairesse, J., & Peters, B. (2005). Does innovation stimulate employment? A firm-level analysis using comparable micro data on four European countries. *Mimeo, Universidad Carlos III.* Madrid.

Hofstede, G. (1991). Cultures and organizations: Software of the mind. London: McGraw-Hill.

Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context.

HOFSTEDE, G. (2017, 05 27). *https://www.geert-hofstede.com/organisational-culture.html*. Retrieved from https://www.geert-hofstede.com/organisational-culture.html: https://www.geert-hofstede.com/organisational-culture.html

Hofstede, G., & Bond, M. H. (1998). The Confucius connection: from cultural roots to economic growth. Organizational Dynamics, 16, 4-21.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). Cultures and Organizations: Software of the Mind (Rev. 3rd ed.). New York: McGraw-Hill.

Holzl, A. C., & Werner. (2010). Firm growth: empirical analysis. *Econstor*.

Holzl, W. (2009). Is the R&D behaviour of fast-growing SMEs different? Evidence from CIS III data for 16 countries. *Small Business Economics*, 59-75.

Hughes, J. D. (1994). Age, Size, Growth and Survival: UK companies in the 1980s. *Journal of Industrial Economics*.

Krueger, N. (1993). The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability. *Entrepreneurship: Theory and practice, 18(1)*, 5-22.

Mansfield, E. (1962). Entry, Gibrat's law, innovation and the growth of firms. . *The American Economic Review*, 52(5), 1023–1051.

Mansfield, E. (1962). Entry, Gibrat's Law, Innovation, and the Growth of Firms. *American Economic Review*, 1023-1051.

Marchese, M. (2016). Commentary: High-Growth Firms: Why They Matter and What Public Policy Can Do. *Public Administration Review, 76*(2), 239-240.

Maso, C., Brown, R., Hart, M., & Anyadike-Danes, M. (2015). High growth firms, jobs and peripheral regions: the case of Scotland. *Cambridge Journal of Regions, Economy and Society, 8(2)*, 8(2), 343–358.

Mason, C., & Brown, R. (2010). High Growth Firms in Scotland. *Strategy, October*.

Mengistae, T. (1999). Indigenous ethnicity and entrepreneurial success in Africa: some evidence from Ethiopia. *WB policy research working paper*.

Minkov, M. (2007). What makes us different and similar: A new interpretation of the World Values Survey and other cross-cultural data. Sofia, Bulgaria: Klasika i Stil.

Mueller, D. C. (1977). The persistence of profits above the norm. *Economica*, 369-380.

Ng, P., & Hamilton, R. (2016). Experiences of high-growth technology firms in Malaysia and New Zealand. *TECHNOLOGY ANALYSIS & STRATEGIC MANAGEMENT, 28*(8), 901-915.

OECD.Stat. (2017, 09 10). Retrieved from OECD.STAT: http://stats.oecd.org/#

Oulton, P. E. (1996). The Growth and Size of Firms. *Economic Journal*, 1242-1252.

Sluis, J. V., Praag, M. V., & Vijverberg, W. (2004). Entrepreneurship Selection and Performance: A Meta-analysis of the Impact of Education in Less Developed Countries. *World Bank Economic Review*.

Stam, E. a. (2009). The roles of R&D in new firm growth. *Small Business Economics*, 77-89.

Tidd, J. (2001). Innovationmanagement in context: environment, organization and performance. *International Journal of Management Reviews*, 3(3), 169–183. .

Vivarelli, E. S. (2007). Entrepreneurship and the process of firms' entry, survival and growth. *Industrial and Corporate Change*.

PART III

Conclusions

In order to respond to the four specific objectives of this research, two studies were carried out.

The first article "High-Growth Business Creation and Management: the Multivariate Quantitative Approach Using GEM Data" answered the following specific research objective : (1) To verify, in the literature, what the various authors consider to be the economic and social factors for entrepreneurs to start and generate a high growth business. Our results show that the factors considered as influencers of the initiative to manage and start a business of high growth are: the governmental policies, competences of individuals, the in cultural setting, available resources and size of firms.

With this study it was also possible to answer a central question of the investigation, namely, to the second specific objective: (2) Perceive, through data analysis, if the factors identified in the literature are verified. In this article we used several statistical analyzes in order to investigate whether these factors are verified through linear regression analysis: there is statistical evidence to support that the level of initiative to start or manage a high growth business is greater when entrepreneurs hold smaller firms; the level of initiative to initiate or manage a high growth business is greaterfor individuals with higher academic and professional skills; and the initiative to start or manage a high-growth enterprise depends on the ability to identify the resources available in the countries.

As it was not possible to verify if the determinants of government policies and culture influence the level of initiative to manage and start a high growth business, it was necessary to conduct a cluster analysis complemented by linear regression. It was necessary to perform a discriminant analysis to cluster analysis to prove that the government policies adopted in the countries influence the initiative to start a high growth business.

Finally, a linear regression analysis was performed and with the results presented, it was verified that the cultural settings influence the initiative to manage and start a high growth business.

The third specific research objectives (3) Explore the measurement of the variables used by the various authors in their studies and the in results; obtained in order to be a starting point for the study, to answer was addressed in the second study. Several aspects were mentioned about the measurement in their studies about the determinants identified in the first article, amongst them, expected growth rate; expected growth rate; fi rm's age; r & D expenditure; number of patents owned by the fi rm; responses to innovation issues; power distance; uncertainty; individualism; masculinity; long-term orientation; and, indulgence.

In order to reach the last specific objective (4) The results of the linear regressions presented in the second study were and we verified that there is statistical evidence to support that the larger the size the higher the firm´s growth rate. On the other hand, the masculinity negatively influences the growth rates of firms. We also find that the power distance in the society implies high growth rates and uncertainty avoidance negatively influences the growth rates .

Responding to the first central question of the study- (1) What economic and social factors influence the citizens of several countries to start and manage a high growth business- the economic and social factors are associated to the initiative to start a high growth business in young and small firms and government policies, the skills of individuals, the cultural settings and the resources available, also seem to influence the initiative to start high growth firms.

Na investigation to the second question (2) What are the determinants that influence the high growth rates of firms? – shows that the size of firms (mensured by number of employees) influences the in growth rates; the level of masculinity of countries has a negativ influence; countries displaying high of power show more high growth firms; and, uncertainty negatively influences corporate growth rates.

Finally, with regards to the third question (3), the following conclusions could be reacherd: identification of the variables associated with entrepreneurial capacity to create and manage high growth and clustering firms in two groups with different levels of high growth entrepreneurship; and the study shows an important aspect of countries' economic growth, as it explores actual data from three databases with significant impact on the measures adopted by the different associated countries.

Limitations and future research

Some limitations were identified during the processo f research. In the first empirical study, the main limitation is that the results were not based on the actual existence of high growth businesses, but tather based on the perspective of experts about the entrepreneurial potential of their countries to create and manage high growth firms.

Therefore, this study offers insights on the experts' perspectives on the conditions of their economies and enterprises.

With regard to the second empirical study, the heterogeneity of data formal in the measurement of the variables limited the statistical analyzes. However, using real data was based on na attempt to overcome the limitations offered by a study exploring the individuals perpectives of experts.

This limitation is associated to using three diffeerent databases, ith the use of three databases such na approach way lead to biages in the results given the potential of the different institutions using different concepts and definitions. However, the trade-off was between using a smaller number of observations or collecting data from different sources.

Another limitation is associated to the use of quantitative data (from secondary sources). This approach allows using a larde database and it reflects gain in time. Nontheless, a more through investigations of this aspect would receive triangution of data, using qualitative data.

A qualitative approach eould allow exploring high-growth firms enterpreneurs insights about starting-up and more ga high growth business. However, such approach would not allow international comparisons and it would be limited in the number of observations. Nonetheless, it remains as an opportunity for future research.

Exploring the different economic and enterprevensional contexts was central to this research. Hofstede database offers such an opportunity, but it isn't critique-free. This also remains as a limitation as the limits of such data were incorporated in our research.

This study has attempted to explore the determinants of high-growth business. Our contribution may, however , the basis for the construction of a survey to be , in the future, administrated to a larger number of firms, allowing collecting variables that are more adequate to explore the initiative to start-up and nerege a high-growth firms.