The success factors for SMEs: Empirical evidence

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Abstract

This paper empirically analyzes the success factors for SMEs. Particularly, the paper intends to analyze if firm age, human resource costs, debt, venture capital funding, investment in innovation and productivity are success factors for SMEs. The effects were tested using static and dynamic panel data, on a data set of 200 Portuguese SMEs. The use of dynamic panel data is important in order to control for: endogeneity; time-invariant characteristics; possible collinearity between independent variables; effects from possible omission of independent variables; elimination of non-observable individual effects; and, the correct estimation of the relationship between the dependent variable in the previous and current periods. Our results reveal a positive impact on success of: human resource costs; investments in innovation; productivity; and, venture capital funding. We also confirm the negative impact of firm age and debt. Also, the results show evidence of persistence in success for the case of one of the success proxies used.

Keywords: firm age, human resource costs, debt, venture capital funding, investment in innovation and productivity, success

JEL classification: C23, G30, L25, L26, M50, O31, O32.

1. Introduction

Small and medium-sized enterprises (SMEs) are important agents in a country's development and expansion, according to Fritsch (2008) companies' survival and growth have positive effects on employment in the region where the company is located. The latest data for European Union shows that SMEs contribute to over 99% of all enterprises and represent almost 67% of the private sector employment. On the other hand, is known wide there is great difficulty in the SMEs early stages, with Boeri and Cramer (1992) and Fritsch and Weyh (2006) reporting that only a proportion of new businesses survive for long periods of time due to strong market competition.

It seems necessary to contribute to SMEs' understanding of the important factors for their growth and success, because their existence makes an important contribution to a country's development and increased innovation. According to Burki and Terrell (1998, p. 155), "the creation of jobs is among the top priorities of policy makers in most countries and small companies are the ones that are creating a greater number of jobs." Fritsch (2008) stated that companies are part of the market process, while for Coad and Tamvada (2008) small companies play a critical role in the development of industries and economies.

SMEs' specific contribution to overall economic performance means it is crucial for researchers to analyse and study the main determinants of their success. Therefore, it is extremely important

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to identify the factors that lead SMEs to survive and succeed. The results of these studies are useful for both individual entrepreneurs and policy makers (Wijewardena and Tibbits, 1999).

Analysing the literature, one can see that there is reference to a variety of factors and some of them with a mix of impacts (since those factors also depends on the industry and country, that is, business environment and of their persistence), but, as Lampadarios et al (2017) argue, there is no conceptual research framework that globally analyses the SMEs success factors considering their changing and dynamic environment.

This study aims to empirically analyze if the enterprise factors: firm age, human resource costs, debt, venture capital funding, investment in innovation and productivity, are success factors for SMEs, resorting to static and dynamic panel data (both, GMM system (1998) and Roodman (2006) corrections). The use of dynamic panel data is important in order to control for: endogeneity; time-invariant characteristics; possible collinearity between independent variables; effects from possible omission of independent variables; elimination of non-observable individual effects; and, the correct estimation of the relationship between the dependent variable in the previous and current periods. So, using dynamic panel data models, the changing and dynamic behaviour of the used factors will be capture, also by using GMM system (1998) and Roodman (2006) corrections for GMM system the persistence of the success will be tested. To the best of our knowledge, this is the first study that will using these models to analyze the success factors for SMEs.

To achieve the objective of this study, data on non-financial Portuguese SMEs for the period 2006−2014 were used, taken for an initial research sample from the AMADEUS database as supplied by Bureau van Dijk. The European definition of SME was considered, in order to allow for the comparison of the findings with the ones from other studies on this subject. This study makes a particular contribution to the literature on SMEs success factors by empirically analyse enterprise factors considering not only their changing and dynamic but also the persistence effect of success.

Our results reveal a positive impact on success of: human resource costs; investments in innovation; productivity; and, venture capital funding. We also confirm the negative impact of firm age and debt. Also, the results show evidence of persistence in success for the case of one of the success proxies (ROA). The results are important for individual entrepreneurs and policy makers, in that it demonstrates the potential impacts to achieve with management in terms of human resources policies, innovation, productivity and measurement of success, but also suggests possible incentives that governments can take in terms of financing of SME (eg promotion of venture capital market).

The remainder of this paper is organized as follows: Section 2 presents the literature review and establish hypotheses for investigation. Section 3 presents the methodology concerning the sample, the variables used in this study and the econometric methods used. In Section 4 are presented and discussed the results of our empirical model and Section 5 summarizes the main findings of our work.

2. Literature review

From the literature, it is not possible to say that there is only one determinant factor of success, but a multiplicity and variety of factors (Dobbs and Hamilton, 2007; Lampadarios, 2016; Lampadarios et al 2017; Lussier, 1995; Lussier and Corman, 1995), i.e., these factors can vary significantly from one country to another and from one sector to another, whether for economic, geographical or cultural reasons (Alasadi and Abdelrahim, 2007). So, empirical investigation of the factors that lead to the success or failure of SMEs in different countries is required for better and healthy economic development. It seems to us that study the success factors of non-financial Portuguese SMEs can contribute to the SME literature, in face of the recent financial

crisis that the country had been confronted and of their implications on credit rationing to SMEs.

Several theoretical perspectives have been developed, one of the reasons, according to Wiklund et al. (2009), being that the existing literature is highly fragmented, as each study on SMEs' growth covers only one of the variables considered important in previous studies. Nevertheless, most studies on growth, explicitly or implicitly, refer to various theoretical perspectives.

Brockhaus and Horwitz (2002) reported that business success is the result of interacting factors. Duchesneau and Gartner (1990) identified three categories of crucially important factors for SMEs' success: managers' entrepreneurial characteristics; SME characteristics; and variety in business development strategies. They concluded that factors such as: the effort to reduce the business risk; good communication; the number of working hours; planning and organization; and quality service to customers, contribute greatly to SMEs' development and success.

Barkham et al (1996) and Storey (2016) agree with Duchesneau and Gartner (1990) and confirm the importance of those three categories of factors, but Storey (2016) added that these three factors require well-planned and homogeneous integration to achieve adequate growth. In that study, Storey (2016) introduced other factors related with the manager, such as: motivation[2]; level of education[3]; and, age. Acar (1993) classified success factors as internal and external. However, that study focused only on internal factors, using those in accordance with the categories presented by Duchesneau and Gartner (1990).

Lussier (1995) developed a model which incorporated fifteen explanatory variables of different natures (non-financial) and tested it using logistic regression. Only four variables were considered significant for success, these being planning, professional support, qualification and recruitment of workers. The same conclusion was reached by Lussier (1996), Lussier and Pfeifer (2001) for the Croatian retail sector, and Pfeifer (2000). Lussier and Corman (1996), in a study based on questionnaires sent to U.S. SME owners/CEOs, concluded that the variables distinguishing successful companies from failed ones are: capital; accounting information and financial control; experience in the sector; planning; professional support; qualifications; employee recruitment; the economy; the country where they do business; and nationality.

Yusuf (1995) asked entrepreneurs about the importance they attributed to a certain number of factors for SMEs' success. Those factors were: good management; good government support; marketing; external exposure; education and training; access to finance and initial investment level; personal characteristics; previous experience in management; and party affiliation. Among the factors, only marketing was not considered relevant. After this work, many others have been arising studying the perceptions of the entrepreneur for the success of the business, as well as studying the characteristics of the entrepreneur himself.

As mentioned previously, some studies focus essentially on one factor or category of factors. For instance, Wijewardena and Tibbits (1999), for Australian SMEs, found that older firms had poorer performance than younger ones, so they concluded that the older the company the less likely it is to grow. A similar conclusion was reached by Kangasharju (2000) in his study on the determinants of SME growth at different stages of the life-cycle, finding that younger firms had higher growth rates than older ones.

Blackwood and Mowl (2000), using data from Spain, concluded that success or failure depends not only on the entrepreneurs/managers' behavior, but also on the economic and social cycle, and the environment in which these companies operate. The same line of research was

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[2] Van Praag and Carmer (2001) and Van Praag (2003) concluded that positive motivation at the beginning of business activity positively affects entrepreneur/manager performance and therefore the probability of company success.

[3] Kangasharju (2000) found that, among other things, more educated managers improve the growth probability of companies they manage.

followed by Rauch et al (2000)[4] with emphasis on planning as an important factor of SMEs' success. Their sample included SMEs located in Ireland and Germany, and concluded that the companies' cultural context and environment were crucial for success.

Considering SMEs' entrepreneurial orientation, Wiklund and Shepherd (2005) found that access to capital and dynamism, combined with entrepreneurial orientation, increase SMEs' probability of success. Some recent work study the gender effect on SME performance, with Du Rietz and Henrekson (2000) and Litz and Folker (2002) being examples. In general, they conclude that gender equilibrium in the management team is the optimal situation for improved profits, since both found that entrepreneur/manager gender has an impact on company performance. Khalife e Chalouhi (2013), however, find strong evidence that female-owned small firms differ from male-owned small firms according to their gross revenues.

The size effect on SMEs' performance and success has been also analyse it. Some studies argue that large companies are able to grow faster than small ones, due to their ability to hire highly-skilled managers and workers, as well as investing in innovation that will make their work more efficient. Serrasqueiro and Nunes (2008) concluded that performance is related positively to size, suggesting the greater relevance of scale effects, diversification and the greater ability of larger companies to cope with market changes. But the performance increases associated with the size become smaller above a certain size (Russeeuw, 1997; Yoon, 2004).

To conclude this general literature review, it is important to see how the definition of success has been made. In fact, we find that there is no consensus on how to define a company's success, being that a company that performs well, grows and survives in the early stages of its life cycle is a successful company. Thus, we find in the literature authors who use proxies to measure the success of the company using the usual proxies to measure the company's performance, growth and / or survival. We observe that much of the literature tend to focus on financial indicators, state of stability indicators, but even so non-financial indicators can also be equally important to analyze SME success. Nevertheless, a valid measure of success is essential to help identify the critical success factors for SMEs (Gray et al, 2012).

Roger (1998) tell us that firm success can be proxied by profits, revenue growth, share performance, market capitalization, productivity, and others. Equally, Simpson et al (2012), in a study that intended to develop an academic theoretical framework relating success and performance in SMEs, reported us that the dependent variable used in the literature is usually a single one-dimensional measure such as growth (number of employees), profit, turnover, profitability or return on capital employed (ROCE) or return on investment (ROI), and not variables that consider the multi-dimensional nature of performance. Lussier and Halabi (2010), in a study where they want to test the validated Lussier (1995) model in Chile, used as profitability measurement a dichotomous nominal measure: success or failure. Simpson et al (2012) recommended measures of performance that can "consist of monetary or non-monetary parameters" (Olve et al., 2000, p. 175, in Simpson et al, 2012). Gray et al (2012) conducted survey questionnaires, depth interviews and focus groups to UK SMEs, and they found that, for the interviewees, success can be achieved by: recurring revenues, growth, maintaining cash flow and creating shareholder value; but also, based upon non-financial measures such as a sense of fulfilment or challenge, or building a lifestyle business and work-life balance. Lampadarius (2016), in a study that intend to identify the factors critical to the success of SMEs operating in the UK chemical distribution Industry, used the traditional financial criteria sales growth (increase in sales turnover) and/or increase in profitability (profits and/or margin), particularly turnover and margin (traditionally used in that sector).

As pointed out, several factors are associated with business success. This study only analyses some of the enterprise factors, including: firm age, human resource costs, debt, venture

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[4] Who conducted a study on SMEs' probability of success.

capital funding, investment in innovation and productivity. Next, it will be analyzed the literature review for each of these possible factors and will be presented the hypotheses.

2.1 Firm Age

Firm age in itself is a decisive factor for success, with company growth arising from knowledge of the market where the company operates. Burki and Terrell (1998, p. 156) stated that "younger firms grow faster than older ones," and justified this statement by saying that older firms fail to invest in new technologies and new products, so this is a likely cause of older firms being overtaken. This statement was corroborated by Wijewardena and Tibbits (1999). The higher capacity of younger firms to invest in innovation will be the main cause of their greater growth compared to older ones (Honjo and Harada, 2006). More recently, La Rocca et al. (2011) argue that firms in the early stages of their life cycle tend to have higher levels of information asymmetry, greater opportunities for growth and smaller size. Lotti et al (2009), for the Italian SMEs, did also find a negative relationship between age and growth in the first years of activity, observing that the level of that relationship dwindling as age increases to the extent of being statistically insignificant when firms reach more advanced stages of their life-cycle (Nunes et al, 2013). This negative relationship between age and growth was also reported by Nunes et al (2013) for the young Portuguese SMEs. The authors concluded that in the first years of activity, Portuguese SMEs record high rates of growth, with growth diminishing as they approach the minimum scale of efficiency that allows them to survive in their markets. The study intends to confirm that companies lose the ability to grow as they become older, either because they are overtaken by newer companies' capacity to innovate, or through a lack of efficiency in their work due to using archaic methods, so our first hypothesis is:

Hypothesis 1: Firm age negatively influences SME's success.

2.2 Human Resources Costs

A firm's employees are a critical resource in the achievement and maintenance of rapid growth, but nevertheless most small companies use informal human resource management practices, with small companies that have developed good practices in human resources presenting a greater potential for competitive advantage, because investment in this area helps to leverage the small entrepreneur. Bonet et al (2011) said that the SMEs that have a human resources department display a higher minimum cost output than the others.

Lampadarios et al (2017) report us that there is an academic consensus to the fact that the ability of a firm to attract and retain skilled and capable employees have a positive effect on growth (Barringer and Jones, 2004; Ichniowski et al., 1997; Pena, 2002). For Jackson et al. (1989), SMEs do not concentrate on the formalization of performance evaluation or employee training, so compared to large firms their employees are less likely to receive bonuses based on productivity, and this implies a net loss in SME growth. Ferligoj et al. (1997), using data on SMEs in Slovenia, showed that proper use of human resources increased company competitiveness, and consequently increased company performance. This finding was also supported in other studies (Acar (1993), Heneman III and Berkley (1999), Lussier (1996), Lussier and Pfeifer (2001) and Pfeifer (2000)), which also found that SMEs were more dependent on the use of their human capital to survive and that this was an important factor in their growth. De Kok and Uhlaner (2001) argue that when workers are well paid and well-motivated, in an atmosphere of reciprocity and mutual trust, this will generate more profit and a unit cost reduction to the company, leading to company growth. With this second hypothesis, the study intends to verify the influence of human resources costs on SME success, confirming the conclusions of Bosma et al. (2004) and others, so the second hypothesis is:

Hypothesis 2: Human resources cost positively influences SMEs' success.

2.3 Debt

Nichter and Goldmark (2009) stated that - from the lack of guarantees to their own limitations and a higher risk level - small businesses tend to face greater credit difficulties than large companies. Indeed, because of these financing difficulties, small business owners often start up with their own savings (Lahm and Little, 2005; Nichter and Goldmark, 2009; Ou and Haynes, 2006; Swinnen, 2005). Thus, this lack of credit hinders the growth of small businesses in the early years, to the extent that there is a reduction in investment and maintenance of technological improvements (Nichter and Goldmark, 2009, Schiffer and Weder, 2001). Small businesses do not have the same access to finance in capital markets as larger ones, and even when they obtain this, they are rarely allowed extended deadlines to settle the debt or even fairness in traditional markets (Walker, 1989).

According to the theories related to information asymmetry and certification, the fact that business owners use their own resources to finance the company might become positive, in that it can be a sign of quality for outside investors, which may contribute, in the medium / long term, to increased availability of external capital. This will contribute to the reduction of existing information asymmetry. Diamond (1989) and La Rocca et al. (2009) claim that this situation, analyzed in terms of reputation, can mitigate the problem of asymmetric information and thus improve access to external sources of funding.

Several studies examined the relationship between banks and SMEs and concluded on a positive correlation between the cost and amount available for lending and the length of the relationship between bank and firm (Bornheim and Herbeck, 1998 and Petersen and Rajan, 1994). Ma and Lin (2010) argue that SMEs need to control cash flow and maintain an open dialogue with their banks and investors. Nevertheless, Sharpe (1990) refutes the use of length of relationship as a possible proxy for loyal customers, because bad debtors tend to remain with the same bank as long as possible. More recent studies, such as Ghosh (2007), state that banks have a comparative advantage in financing companies because they can mitigate the existing information asymmetry. With the third hypothesis, the study intends to verify how debt influence company growth, because in most studies on SMEs, financing is the factor determining companies' success / failure. For Ferligoj et al. (1997), SMEs are often forced to rely on internal sources due to severe restrictions in access to loans and relatively high interest rates. This statement was corroborated by Yusuf (1995), who found that the level of early stage funding and type of funding influence SME growth. Also, Barringer and Jones (2004), Becchetti and Trovato (2002) and Carpenter and Peterson (2002) found this kind of result.

Hypothesis 3: Debt positively influences SME's success.

This assumption is crucial for hypotheses 2 and 5, because it is not possible to maintain skilled and capable human resources or invest in new innovation projects without the necessary financial resources.

2.4 Venture capital funding

Venture capitalists are considered by many authors as important partners in supporting SME growth. For Yazdipour (1990), venture capitalists exist to help business growth, not only to invest financially but also help in management. Cumming et al. (2008) also argue that the role of venture capitalists is different from banks, because they not only finance but also help in management. Venture capital financing is one way for small and medium-sized businesses to achieve their financial and strategic goals (Cumming et al. (2008), Hsu (2008) and Wright (2007). Venture capitalists are not passive investors but try to intervene constructively in the company. Siegel et al. (1988) and Sapienza (1992) claim that venture capitalists try to influence the results of portfolio companies in favour of their investment. Davila et al. (2003) state that companies financed by venture capital grow more. The staged venture capital financing process

is beneficial for both the portfolio company and the venture capitalists. Shane and Venkataraman (2000) also reported that venture capital is an important factor for business growth in the early stages of activity, the existence of venture capital funding serving to explain the differences between companies. Several authors report that venture capital makes young firms grow faster, create more value and generate more employment opportunities (Gompers and Lerner, 1998, 2001; Hellmann and Puri, 2000, 2002; Keuschnigg, 2004; Kortum and Lerner, 2000; Pradhan et al, 2017; Puri and Zarutskie, 2012). Davila et al. (2003) show that companies financed by venture capital grow more, because when a company is financed by venture capital this sends a positive signal, both internally and to the market, about its ability to work. When venture capitalists become involved in a portfolio company, they can bring network contacts, infrastructure, suppliers, potential clients and experienced management teams (Kaplan and Stromberg, 2003). For Gompers and Lerner (2001), venture capitalists can mitigate the information asymmetries of markets, and thus allow firms to receive external funding they cannot obtain from other sources. Venture capitalists have inside information about the market and companies and so adjust their funding in accordance with that information.

With hypothesis 4 the study intends to demonstrate that companies that receive venture capital funding are more likely to grow and succeed, due to the specificity of this type of financing. Davila et al. (2003) show that SMEs obtaining venture capital funding increase the number of employees and the business in general. The credibility associated with the venture capital firm acts as a positive sign for the market about the investees.

Hypothesis 4: Venture capital funding positively influences SME's success.

2.5 Investment in Innovation

The first work on innovation in SMEs was carried out by Schumpeter[5] (1934). According to this author, small innovative companies will eventually grow. Audretsch (2002), Comanor (1967) and Freel (2007) confirmed the existence of a positive relationship between innovation and company growth. Lampadarios et al (2017) tell us, quoting Worthington and Britton (2009) and Wetherly and Otter (2014), that investment in technology and innovation is a key to firm's success and it can be used to explain differences in the relative competitiveness of different countries.

Empirical research generally shows a very satisfactory impact on companies' sales growth when they invest in innovation (Kothari et al, 2002), both in terms of creating new products and increased work efficiency. Durand and Coeurderoy (2001) stated that investing in innovative projects is critical for SME growth. This conclusion was corroborated by Rammer et al. (2009), who argue that the ability to generate new knowledge through R&D is generally regarded as a key to innovation and business success. For them, investing in R&D can result in the creation of higher quality products, or significantly increase business efficiency. However, investing in R&D is a costly and risky activity, which requires a minimum amount of resources and time to achieve results. Rammer et al. (2009) argue that funding for innovation is particularly difficult for SMEs due to exposure to relatively high risks and lack of guarantees, as well as the high costs of managing the lender's side in monitoring these investments.

However, Cohen et al. (1987) stated that the relationship between innovation and growth is positive but insignificant in most companies, despite being very important in technologically advanced companies. Dewaelheyns and Van Hulle (2008) mention that SMEs tend to invest less in R&D due to a lack of knowledge about where to obtain the skills needed for these investments. Studying age as one characteristic of the relationships between determinants and growth, Nunes et al (2013) find a positive and statistically significant relationship between

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[5] He defined five types of innovation: introduction of a new product or a qualitative change in an existing one; process innovation new to an industry; the opening of a new market; development of new sources of supply for raw materials or other inputs; and, changes in industrial organization.

R&D intensity and growth in young and old SMEs. Nevertheless, their results contribute to the clarification of the issue presented above since they conclude that the magnitude of the positive effect of R&D on growth is greater in old SMEs than in young SMEs.

It is observed that there is no consensus on how to measure innovation. Rogers (1998) refers us that a form of access innovation is doing the distinction between the outputs and the inputs of the innovation activity. Indeed, the level of R&D expenditure[6] has been the most used proxy for the level of innovative effort (Matolcsy and Wyatt, 2008; Pandit et al, 2011; Rogers, 1998), presenting the advantage of being simple understood and to be in monetary units which facilitates its use in empirical studies (Rogers, 1998). Even so, Pandit et al (2011) call attention to the fact that firms are likely to vary in their ability to transform R&D inputs into future benefits. With the 5th hypothesis the study intends to verify how investment in innovation (measured by R&D expenditures) influences SME growth.

Hypothesis 5: Investment in innovation projects positively influences SME's success.

2.6 Productivity

Alvarez and Görg (2009) claim that any model intending to study company growth must consider productivity as an independent variable. Independently of the type of company, productivity is a major factor in the success. Nevertheless, adding one or more units of capital or work does not always result in immediate increases in productivity (Nichter and Goldmark, 2005). It is possible to observe irregular changes in productivity throughout the firm's life-cycle. Nunes et al (2013) concluded that when small and medium-sized firms are more established in their markets, greater labour productivity can be expected to lead to diversification strategies. Then, these strategies can contribute to increased growth and so to the firm success. This leads to the next hypothesis:

Hypothesis 6: Productivity positively influences SME's success.

3. Methodology
3.1 Data

The sample was collected from the AMADEUS database from Bureau van Dijks. This database has financial accounting information (balance sheets, income statements, ratios, information on funding sources and other information) about European companies for several successive periods, thus containing the necessary information for our proxy variables. The target population of this study are Portuguese SMEs, active in 2006, aged 5 years or more, and having at least one employee, listed in the AMADEUS database and with financial records (balance sheets, ratios and income statements). The sample includes companies belonging to all sectors of activity (excluding the financial sector), according to the Portuguese classification of economic activities. The European definition of SME was considered, in order to be possible, the comparison of the findings with the ones from other studies on this subject.

Since the objective of the study is to empirically analyses the success factors for SMEs, it was chosen to study companies that managed to survive the first five years of activity (regardless of the results obtained in those years), during which most SMEs find themselves forced to close their business. Several authors mention this, for example, Dickinson (1981) and Lauzen (1985) claimed that about two thirds of SMEs close in the first five years of activity. However, Barsley and Kleiner (1990) reported that the closure rate is much higher, about 80%. Cochran (1981) also reported an SME mortality rate of about 66%, but up to the first four years of activity. However, closure rates vary significantly from study to study, depending on the country. A common thread is found in the values referred to in almost all studies: mortality

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[6] The author refers that intellectual property measures; acquisition of technology from others; expenditure on tooling-up, industrial engineering and manufacturing start-up associated with new products/processes; intangible assets; marketing expenditures for new products; training expenditures relating to new/changed products/processes; and managerial and organizational changes, are also used.

rates are always very high in the first years of business. In a more recent study, Ahmad e Seet (2009) reinforce these results, however the authors report us that in Australia, the SME failure rate is 23% (Watson, 2003) and in Malaysia was 60% (Portal Komuniti KTAK, 2006).

Our final sample is composed of 200 Portuguese SMEs, for the period 2006 to 2014, giving a total number of observations of 1800. However, it should me mention that the panel is not balanced, due to missing information in some data.

3.2 Variables

There is no consensus on which proxy use to measure success, observing studies that consider measures of profitability, others of performance and even of improvements in productivity. Rogers (1998) say that firms' success can be proxied by profits, revenue growth, share performance, market capitalization, or productivity, among others. In this study, we follow Roger (1998), Simpson et al (2012) and Lampadarios (2016) and considered it two ways of measure success: sales annual growth and ROA. Considering the study's objective and to validate the hypotheses, it was also necessary construct the variables shown in Table 1.

Table 1: Description and measurement of the variables.

Variables	Measurement
Dependent Variables:	
Success1 ($Succ1_{it}$)	Sales annual growth
Success2 ($Succ2_{it}$)	ROA
Independent Variables:	
Age (Age_{it})	Logarithm of age
Personnel costs ($PersC_{it}$)	Personnel costs annual growth
Debt ($Debt_{it}$)	Ratio between total debt and total assets
Venture Capital (VC_{it})	Dummy variable that assumes the value of 1 if venture capital funding occurred and 0 if no
Innovation ($Innov_{it}$)	Ratio between R&D investment and total assets
Productivity ($Prod_{it}$)	Ratio between Gross Value Added and the number of employees

3.3 Estimation Method

Given the nature of the collected data, it was decided to use static and dynamic panel data methods. The static panel data models allow us to explore simultaneously the sectional and time relationships. The basic structure of a panel data model with *k* explanatory variables and unobserved effects is as follows:

$$y_{it} = \beta_0 + \beta_1 x_{it1} + \beta_2 x_{it2} + \cdots + \beta_k x_{itk} + a_i + u_{it} \tag{1}$$

where $i = 1, \cdots, N$ refers to the company and $t = 1, \cdots, T$ refers to the time period (year). The term $v_{it} = a_i + u_{it}$ is the composite error for company *i* and period *t*. The component a_i is called the country fixed effect and captures all unobserved time constant factors that affect y_{it}.

The most adequate estimation method depends on whether the term a_i is correlated or not with the explanatory variables. When a_i is not correlated with the explanatory variables the random effects estimator is the most adequate one since it is consistent and more efficient than the fixed effects estimator. However, if the unobserved effect is correlated with the explanatory variables the random effects estimators are biased and inconsistent and consequently the fixed effects estimator is more adequate. The random effects estimator is the feasible GLS estimator[7] of equation (1) whereas the fixed effects estimator is the OLS estimator of the regression using time-demeaned data:

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[7] The GLS estimator is used because the error terms $v_{it} = a_i + u_{it}$ are correlated.

$$y_{it} - \bar{y}_i = \beta_1(x_{it1} - \bar{x}_{i1}) + \beta_2(x_{it2} - \bar{x}_{i2}) + \cdots + \beta_k(x_{itk} - \bar{x}_{ik}) + u_{it} - \bar{u}_i \qquad (2)$$

Where $\bar{y}_i = \frac{\sum_{i=1}^{T} y_{it}}{T}$, and so on.

Since the fixed effect component is eliminated when the differences in relation to the mean are considered, the fixed effects estimator is unbiased and consistent even when the unobserved effects are correlated with the explanatory variables. In order to choose between the two estimators, we tested if the unobserved factors are correlated with the explanatory variables using the Hausman test.

Given the potential persistence and dynamic nature of the dependent variable, and also the need to control for: endogeneity; time-invariant characteristics; possible collinearity between independent variables; effects from possible omission of independent variables; elimination of non-observable individual effects; and, the correct estimation of the relationship between the dependent variable in the previous and current periods, we will also use dynamic panel data models in particular the GMM system (1998) estimator and the correction proposed by Roodman (2006).

The validity of the estimated parameters obtained using system GMM (1998), depends on: i) the restrictions being valid, a result of using the instruments; and ii) absence of second-order autocorrelation. We run the Sargan-Hansen test to test for identifying restrictions, so under the null hypothesis, the instruments are valid. The Arellano-Bond test for AR(1) and for AR(2) allows us to test the second condition.

According to Roodman (2006), the system GMM (1998) general model consists of:
$$y_{it} = \alpha y_{i,t-1} + x'_{it}\beta + \varepsilon_{it} \qquad (3)$$

$$\varepsilon_{it} = \mu_i + v_{it}$$

$$E[\mu_i] = E[v_{it}] = E[\mu_i v_{it}] = 0$$

Equation (3) can be written as follows:

$$\Delta y_{it} = (\alpha - 1)y_{i,t-1} + x'_{it}\beta + \varepsilon_{it} \qquad (4)$$

The general model to study will be as follows:

$$Succ_{it} = \beta_0 + \beta_1 Age_{it} + \beta_2 PersC_{it} + \beta_3 Debt_{it} + \beta_4 VC_{it} + \beta_5 Innov_{it}$$
$$+\beta_6 Prod_{it} + a_i + u_{it} \qquad (5)$$

4. Results

The results of the descriptive statistics (Table 2) and correlation matrix (Table 3) are presented below. In our sample, the sales average variation was 69.33%, the average ROA is 52,43%, it is observed that the average growth of personnel costs was 53.82%, the variation for the innovation ratio was 58.64% and the average value for productivity was of 68,31%. The value of the ratio between total debt and total assets shows the average value of 60,67% and only 2.3% of the companies received venture capital funds. Average firm age in our sample was 20 years.

Table 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.
Succ1	1725	69.330	54.451
Succ2	1800	52.432	22.234
Age	1800	3.000	0.910
PersC	1726	53.818	41.402
Debt	1800	60.671	34.450
VC	1800	0.023	0.150
Innov	1726	58.644	56.850
Prod	1800	68.313	96.423

Analyzing the correlation matrix, it is possible to see that all values are below 0.50, showing there will be no collinearity problems between the independent variables.

Table 3: Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Succ1	1							
(2) Succ2	0.11	1						
(3) Age	-0.08	-0.10	1					
(4) PersC	0.35	0.17	-0.10	1				
(5) Debt	-0.04	-0.13	-0.18	-0.03	1			
(6) VC	0.00	-0.02	0.09	0.02	0.01	1		
(7) Innov	0.12	0.06	-0.03	0.15	0.02	0.06	1	
(8) Prod	0.05	0.09	0.08	0.03	-0.13	-0.02	0.03	1

To find out the factors that contribute to success in SMEs, it was estimated two regressions with different dependent variables: sales annual growth (*Succ1*); and, ROA (*Succ2*). All the regressions were estimated using both fixed effects and random effects estimators, for static panel data models, and for the dynamic panel data models for GMM system (1998) and the corrected GMM model proposed by Roodman (2006). The results are presented in Table 4.

Although the values obtained for the R-squared are quite low for the regressions[8,] all estimated models present strong overall significance. The F and Wald tests for joint significance of all covariates allow us to clearly reject the null hypothesis that all coefficients are equal to zero. The results of the Hausman test lead us to reject the null hypothesis that the fixed effects and random effects estimators are equal. This suggests that the country fixed unobserved effects are correlated with the explanatory variables, which implies that the fixed effects estimators are consistent and more efficient. Our discussion will concentrate on the results for fixed effect estimators, system GMM and corrected system GMM. Observing table 4 it is possible to see that:

Table 4: Empirical Results for firm success

Potential Determinants		Succ1		Succ2		Succ1		Succ2	
		FE	RE	FE	RE	System GMM	GMM (2006)	System GMM	GMM (2006)
Age	-	0,748	-2.443*	0,177	-0,597	2,571	-3.036*	2.722***	-1.843***
		(0.37)	(-1.62)	(0.24)	(-0.92)	(0,94)	(-1.80)	(3.21)	(-4.01)
PersC	+	0.361***	0.418***	0.041***	0.045***	0.233***	0.288***	0.021**	0.026**
		(9,39)	(11.86)	(3.19)	(3.58)	(5.25)	(7.20)	(2.03)	(2.38)
Debt	+	0,093	-0.013	-0.155***	-0.103***	0,143	-0,044	-0,035	-0.065***
		(1.26)	(-0.29)	(-3.70)	(-4.78)	(1.11)	(-1.06)	(-1.01)	(-5.53)
VC	+		-2.566		-8,436	201.533*	-3.263	-21,209	-2,298
			(-0.46)		(-1.10)	(1.78)	(-0.36)	(-0.41)	(-0.91)
Innov	+	0.072***	0.064***	0.013*	0.014**	0.078***	0.063**	0.019***	0.016**
		-2,86	(2.86)	(1.73)	(1.93)	(2.61)	(2.26)	(2.84)	(2.16)
Prod	+	0,004	0.006*	0.007***	0.005***	0,004	0.007**	0,008	0.005***
		(1.00)	(1.80)	(4.28)	(3.82)	(0.69)	(2.15)	(5.91)	(6.10)
l.CrescVendas	+					-0,0052	0,0049		
						(-0.16)	(0.12)		
l.ROA	+							0.139***	0.186***
								(4.52)	(4.82)
R-squared		0,09	0,32	0,08	0,02				
HausmanTest			20.51***		20.36***				
F Test for Fixed Effects		1.41***		6.35***					
F Test		22.52***		10.08***					
Wald Test			169.04***		78.03***	66.00***	80.42***	137.32***	156.94***
aic		15965,64		12268,74					
bic		15992,29		12295,40					
chi2			169,04		78,03	66,00		137,32	
RESET			452.34***		828.84***				
Sargan						35.34*	13,8*	56.72***	45.87***
m(1)						-9.88***		-6.62***	
m(2)						-1.41		1,31	
AB AR(1)							-10.61***		-10.88***
AB AR(2)							-1.54		1.56

In parentheses we present the values of the t-statistics for each variable. Test statistics are significant at the following levels: *** 1 percent; ** 5 percent; * 10 percent.

- Firm age has a negative and statistically significant impact, except for the ROA (*Succ2*) dependent variable on system GMM;
- Personnel costs has a positive and statistically significant impact for all models;
- The ratio between total debt and total assets presents a negative and statistical significant

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[8] Quite low values for R-squared may be due to the limited number of explanatory variables. Nevertheless, most growth orientated studies present similar result.

impact;

- The venture capital financing, it presents a positive and statistically significant coefficient in one model (for the *Succ1* dependent variable on the system GMM model);
- For the impact of innovation, the result is positive and statistically significant for all the models;
- The labour productivity has a positive and statistically significant impact on five models; and,
- Having success (as measured by *ROA*) in the past has a positive and statistically significant impact on the company's present success.

5. Discussion of the results

Let us analyze the impact of each explanatory variable. Firm age (*Age*) has a negative and statistically significant impact, at the 1% level, on SMEs' success, except for the ROA dependent variable (*Succ2*) in the system GMM case. This result allows us to confirm our first hypothesis and shows that companies lose their ability to grow over time. This evidence agrees with the argument of La Rocca et al (2011). Lussier (1995) and Lussier and Corman (1996) also found statistical evidence that company age helps distinguish successful companies from unsuccessful ones, with younger companies having higher growth rates. Honjo and Harada (2006) found that younger companies tend to present higher growth than older ones, due to their ability to invest in innovation. For the Portuguese case Nunes et al (2013) also found these impacts, that companies lose their ability to grow as they become older.

Personnel costs (*PersC*) have a positive and statistically significant impact, at 1% level, on SME success, except for the Turnover variable (*Succ2*). This result confirms hypothesis 2 and is consistent with the conclusions obtained by Freel (2000), Pfeifer (2000), De Kok and Uhlaner (2001), Lussier and Pfeifer (2001) and Bosma et al (2004). According to the literature, investment in human resources positively influences the growth of SMEs (Acar, 1993; Ferligoj et al, 1997; Ichniowski et al, 1997; Pena, 2002; Barringer and Jones, 2004). Our results contribute to the evidence that human resources are critical resources for business growth and so for their success. On the other hand, they indicate that when human resources are well paid and motivated this will contribute to an increase in productivity and thus to business growth (Kok and Uhlaner, 2001; Bosma et al., 2004). This is an important result for entrepreneurs since it demonstrates that maintaining qualified human resources, so well paid, will contribute to the growth of companies, which meets what Lampadarios et al (2017) also argue.

Concerning the ratio between total debt and total assets (*Debt*), it presents a negative and statistical significance at the 1% level and so no possible confirmation of hypothesis 3. It was expected that the more sources of funding become available for most SMEs the greater their probability of growth (Wiklund and Shepherd, 2005). As it is known from the theories relating to the companies' capital structure, increased debt levels could lead to both positive and negative impacts in the firms' profitability. If in debt raising situations, managers make better management of the resources in order to fulfil the obligations associated with the financing contract (Jensen, 1976), an increase in debt will lead to better levels of profitability. However, the effort required to pay the interest, associated with debt, reduces the possibility of taking advantage of growth opportunities, causing managers to invest in profitable projects with high levels of risk (Jensen and Meckling, 1976) and so an increase in debt can lead to lower levels of profitability. Thus, it is possible to see studies that have had negative and positive impacts for this variable. In fact, it is known that a lack of financial resources will not allow for the maintenance of skilled and capable human resources or invest in new innovation projects.

Regarding the participation of a venture capitalist (*VC*) in the company via venture capital financing, hypothesis number 4 was partially prove because it only presents a positive and

statistically significant coefficient in one system GMM regression[9] (for the *Succ1* dependent variable, annual sales growth). It was expected that companies funded by venture capital present higher growth rates than those without this type of funding, given that access to finance for SMEs and any other type of company is essential to allow innovation and growth. Venture capital companies have visible advantages over other external funders, as they are not limited only to finance but also help in planning, management and strategic decision-making, making the manager feel more confident in the decisions on company growth, that is, those companies actively working with company managers (Davila et al, 2003). For instance, Von Burg and Kenney (2000) stated that venture capitalists are very different from traditional investors because they are not passive, always trying to intervene constructively in the company. That is, they try to shape the future in order to improve the outcome of their investments. To do this they offer advice, engage in critical analysis of company decisions, help in the recruitment of staff and sometimes even reassure an important client or help in attracting a potential supplier. The existence of venture capitalists in a company also send positive signals to the market, certifying the growth potential of the firm, allowing for the reduction of the degree of informational asymmetry (Félix et al, 2009).

As for the impact of innovation (*Innov*), the result is positive and statistically significant for the *Succ1* and *Succ2* regressions. These results allow us to accept our 5th hypothesis and are in accordance with the results of Freel (2000), Hall et al (2009), Rammer et al (2009) and Pandit et al (2011). For the Portuguese case, Nunes et al (2013) also find a positive and statistically significant relationship between R&D intensity and growth in young and old SMEs. Also, for the Portuguese case, Nunes and Serrasqueiro (2015) found that the R&D expenditures contribute to greater profitability to the knowledge-intensive business services. For cultural reasons, in some countries investment in innovation is visible through their companies, these countries having innovation as a competitive advantage over their counterparts.

The productivity (*Prod*) variable has a positive and statistically significant impact, so the expected relationship was found, validating Hypothesis 6. The result is consistent to Alverez and Görg (2009), productivity is a firm success factor and the impact take us to conclude that the bigger the productivity the bigger the firm success.

Finally, the results allow us to conclude that there seems to be persistence on success, since the results show a positive and statistically significant relationship between success in the previous period and success in the current period.

6. Conclusions

This study empirically analyzes if the enterprise factors: firm age, human resource costs, debt, venture capital funding, investment in innovation and productivity, are success factors for SMEs. It was also analysed the changing and dynamic behaviour of the used factors and the persistence of the success. It was used static and dynamic panel data models (GMM system (1998) and Roodman (2006) corrections) on a data set of 200 non-financial Portuguese SMEs, for the period 2006 to 2014. As measures of success it were used the sales annual growth and ROA.

The results reveal a positive impact on success of: human resource costs; investments in innovation; productivity; and, venture capital funding. It was confirmed the negative impact of firm age and debt. Also, the results show evidence of persistence in success for the case of one of the success proxies (ROA).

It was found evidence that personnel costs, investments in innovation, higher levels of productivity and access to venture capital funds have a positive impact on firm success, showing that firms that develop good human resource management practices gain competitive

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[9] Nevertheless, this fact can be justified because the way VC variable was constructed, since a dummy variable is used.

advantages and that investments in innovation and access to venture capital funding will contribute to improved success.

It was found strong evidence that firm age has a negative impact on firm success, confirming that younger firms tend to present higher growth than older ones, also showing younger companies' ability to invest in innovation. This result is in line with hypothesis 1 and with the existing literature showing that younger, small and innovative firms tend to grow faster and more than others. Finally, the persistence found in terms of success suggests that SME managers should be concerned with measuring the success levels of their companies and pursuing management policies that maintain and improve those indicators.

It seems to us that SME owners/managers should consider human resources as critical resources for the success of their companies and thus use human resource management practices to increase their motivation, for example with productivity-based bonus payments. Empirical evidence has shown that well-paid and motivated workers lead to business growth. Another recommendation for these owners/managers is the implementation of innovation strategies and, finally, to consider the use of venture capital as a source of funding. To the extent that the possibility of being financed by venture capitalists allows it not only to access capital, but also to a whole network of contacts and knowledge that would otherwise be difficult to obtain. The presence of a venture capitalist in a company certifies to the market the quality and growth potential of that company, reducing possible asymmetries of information.

From our conclusions, it seems possible to suggest the implementation of policy measures at various levels to improve the SMEs success. Namely, through incentives for firms to make more R&D investments, possibly through the streamlining of patent registration procedures for the Portuguese case; and, through the promotion of a venture capital market to improve the access to finance of SMEs and allow for their funding sources diversification.

About this study, it should be mentioned some limitations and possible future developments. One improvement could be introduced in the proxy for the venture capital funding variable. Instead of using a dummy if the company had received venture capital funding in the period under analysis, it should be used as proxy the amount received from such type of funding. It seems to us that this way of measuring the impact of venture capital funding will facilitate the use of other econometric models and thus present stronger evidence of the results now achieved.

With respect to the debt variable, it will be important to analyze the impact of the short-term debt and the medium and long-term debt, as well as using leverage ratios that are weighted by the equity instead of the total assets. This division will allow to analyze the impacts of the debt contracts duration, as well as the effects of the financial leverages on the companies' success. On the other hand, it will allow the use of other econometric models, such as those used by Ramalho and da Silva (2009), analyzing the differences of having or not use debt or the impact of different proportions of debt.

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