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Drivers to firm innovation and their effects on performance: an international comparison

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Abstract This research aims to analyse the drivers to company innovation and their effects on the financial performance. This study is based upon a sample of companies, located in two neighbouring countries (Portugal and Spain). Linear regression was the methodology deployed to analyse the importance of innovation types (differences between Portugal and Spain). To analyse the extent to which the innovation capacity variables influence financial performance (turnover), we made recourse to Probit Regression models. Our results show significant differences in terms of both the drivers and inhibitors to innovation in these two countries. The introduction of products into new markets only proved significant at Spanish companies whilst innovations in both products and processes are significant in both sets of Iberian companies.

Keywords Innovation firm · Innovation capacities · Financial performance · Iberian countries

Introduction

Innovation is a process involving the transformation of opportunities into practical utility (Tidd et al. 1997). The effective implementation of innovation has gained an increasing level of recognition as synonymous with constructing sustained competitive advantage thereby boosting organisational performance (Koc and Ceylan 2007). Within an ever more competitive environment, innovation proves a critical factor

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both for companies attempting to retain dominant positions and for raising profit levels (Hu and Hsu 2008; Kaminski et al. 2008). Various authors point to innovation as the only route to companies adapting to increasingly dynamic surrounding environments (Roberts and Amit 2003; Hua and Wemmerlov 2006; Doloreux and Melancon 2008). Through analysis of the introduction of new processes, products or ideas at the organisational level, we may measure firm innovation capacities (Hurley and Hult 1998).

Innovation derives from the flexibility of companies able to make recourse to different options for meeting the demands of their consumers (Banbury and Mitchell 1995), through a sustained strategy focused upon the resources and capacities in place at companies, which are not only able to satisfy those desires in the present but also into the future (Wernerfelt 1984; Barney 1991; Drazin and Schoonhoven 1996; Tushman and O'Reilly 1997; Souitaris 2002; Hwang 2004; Lemon and Sahota 2004). However, despite this growing awareness of how innovation extends beyond technical processes and products, some recent research has tended to take technical innovation exclusively into consideration and especially in the transformation industrial sector (Becker and Dietz 2004; Huergo and Jaumendreu 2004; Lynskey 2004; Nieto and Santamaria 2005).

There is also a range of different research findings on the performance of companies in relation to their innovation based activities (Klette and Griliches 2000; Klette and Kortum 2001, 2004; Thompson 2001; Lentz and Mortensen 2005). Many of these studies concentrate on interpreting the endogenous growth models, for example, the works by Gossman and Helpman (1991) and Aghion and Howitt (1992) based on the perspective that companies operate at the macro level and thereby assuming heterogeneous firm behaviour and the influence of these activities on innovation and consequently on their investment in research and development (R&D). Other studies directly approach the relationship between R&D expenditure and firm innovation activities and demonstrating that there is a positive relationship between these two variables (Phillips 1971; Dasgupta 1985; Hopenhayn 1992).

According to Sundbo (1998), innovation in the service sector is measurable by: new products and services; new processes; new forms of organisation or management; new marketing techniques; changes to the physical appearance of objects; changes in intellectual terms (consultancy services); new means of transporting products; and the introduction of new strategies. According to Camacho and Rodríguez (2005), we should adopt a combination of theories, ranging from the most recent to the oldest original outputs, for the study of innovation in the service sector. Indeed, approaching innovation in this type of sector inherently requires a perspective reaching beyond the introduction of new products or processes. Furthermore, the literature has duly recognised the growing importance of firm based innovation to competitiveness (Cooke 2001; Malecki et al. 2004; Wood 2005; Muller and Doloreux 2009; Gómez-Haro et al. 2011; Hotho and Champion 2011; Yang and Li 2011). The definition of innovative capacity adopted in this research is the Sundbo (1998) perspective.

This article aims to analyse the drivers to company innovation and their effects on the financial performance of companies located in two neighbouring countries (Portugal and Spain).

After this brief introduction, the article is structured as follows: section two provides a review of the literature on innovation capacities and the influence of innovation on firm financial performance. In section three, we set out our methodology and describe the sample and the statistical methods applied. Section four discusses our results and the final considerations are presented in section five.

Literature review

Innovation and innovation capacities

With the theme of innovation under academic study ever since around the 1940s, we opted, and taking the literature review into consideration, to classify studies of innovation and innovation capacities, into four distinct and chronologically evolving phases (Fig. 1): origin, integration, distinction, and systematisation.

In the first phase, the origin phase (1940–1960) researchers detected the important need for change. They concluded that change involved innovation and within the framework of which they also approached invention. Schumpeter (1942) drew attention to the need for companies to open up to new markets, terming this a process of creative destruction and attributing this process as the primary concept driving capitalism. Schmookler (1957) went still further and referred to "invention" as the route towards creating new knowledge that thereby consequently enabled the creation and launch of new products.

Following in wake of the studies of these authors there then came a second phase—integration (1960–1985), in this phase, innovation is associated with material technology and equipment. The most commonly adopted indicators for measuring innovation were statistics on R&D and patents (Hoops 1963; Jervis 1972; Ferrari 1973; Brewer 1973; Ray 1980; Kennedy 1982; Smith 1982; von Hippel 1982; Pavitt 1984; Walsh 1984).

This correspondingly led onto a third phase, that of distinction (1985–2000). Now, research made recourse to resource and capacity theory to explain firm innovation capacities with new products, processes and patents the main indicators studied to portray the innovation capacities existing. Researchers conceived of innovation as a

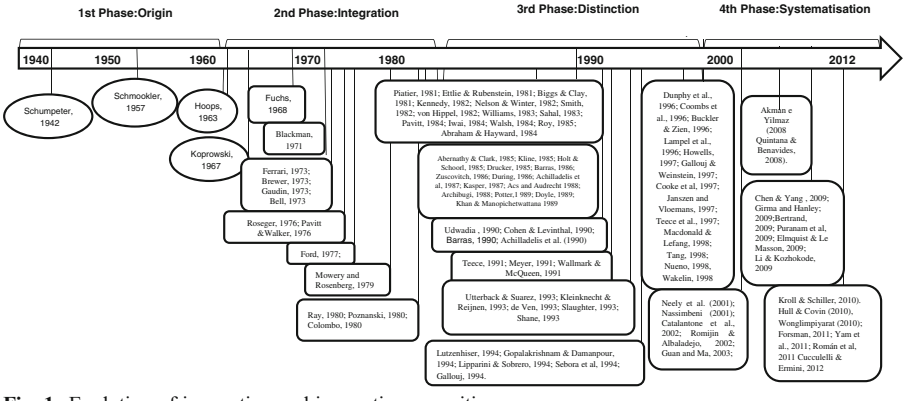

Fig. 1 Evolution of innovation and innovation capacities

process involving the entire organisation while simultaneously conditioning organisational behaviour (Kline 1985; Roy 1985; Abernathy and Clark 1985; Holt and Schoorl 1985; Barras 1986; Zuscovitch 1986; During 1986; Acs and Audretsch 1988; Nelson and Winter 1982; Achilladelis et al. 1990; Teece 1991; Wakelin 1998). Studying the organisational variables conditioning innovation opens up a very important insight into understanding firm innovation capacities (Archibugi 1988; Roman et al. 2011). Udwadia (1990) defends creativity as the pathway to attaining innovation.

The innovative behaviours of companies are in the majority evaluated according to their innovation capacities (Cohen and Levinthal 1990; Teece et al. 1997). The firm has to adapt itself to whatever the needs deriving from the innovation process in terms of generating and leveraging the desired innovation capacities (Nonaka and Takeuchi 1995). Capacity is thus a factor fundamental to the study of innovation. However, what are these innovation capacities? Potter (1989) and Doyle (1989) recognise innovation capacities in terms of timely responses to market needs. Nueno (1998) come out in favour of innovation capacities as displaying three fundamental dimensions: knowledge, organisational culture, and human capital. From the perspective of Kasper (1987), innovation capacities refer simply to the capacity to innovate products and processes.

In the fourth phase, systematisation (as from 2000), researchers understand how the application of any single approach will prove insufficient for any meaningful explanation of innovation capacities. Thus, we have witnessed an eclectic and integrative application of these theories. Innovation capacities are, however, increasingly associated with firm financial performance records.

Neely et al. (2001) find innovation capacities include innovation in the prevailing organisational culture, the capacity to innovate internal processes and the capacity to understand the surrounding environment. Calantone et al. (2002) define innovation capacities simply as the level to which companies attain innovation. Romijn and Albaladejo (2002) propose innovation capacities as the ability and knowledge necessary to innovate effectively while simultaneously boosting the levels of existing technologies necessary to ensuring the creation of new resources. Meanwhile, Guan and Ma (2003) stress that all the steps taken by a firm with the objective of implementing and attaining their strategic and competitive goals in the surrounding environment are reflections of the innovation capacities in effect.

Zhao et al. (2005) conclude that innovation capacities consist of the ability to manage knowledge in the form of intellectual property through the registering of patents. They also back how the capacity to respond to market needs and successfully implement creative ideas in an organisation is also bound up with any definition of innovation capacities. However, Sher and Yang (2005) turn to the resource and capacity theory to define innovation capacities as those factors fundamental to the firm boosting its competitive strategy while simultaneously attaining sustainable competitive advantage and improving their performance in whatever the respective surrounding environment. Subramaniam and Youndt (2005) argue that innovation capacities are measured through incremental innovations (the capacity for redefining and strengthening already existing products and services) and radical innovations (the capacity to significantly transform already existing products and services). The authors furthermore highlight that the difference between these two types of capacity, incremental and radical, lies in the type of knowledge incorporated.

According to Assink (2006), the ability to manage and explore new ideas and concepts and generate solutions for potential opportunities that meet needs in the markets and turn them into viable solutions represents the scope of innovation capacities (Hult et al. 2004). Akman and Yilmaz (2008) maintain that all the factors facilitating the existence of an innovative organisational culture and the capacity to respond appropriately to the surrounding environment are synonymous with capacities.

Technological diversity positively impacts on firm competences to the extent such is able to drive innovation capacities (Quintana and Benavides 2008). Xu et al. (2008) propose that the relationship between the structural characteristics of firm cooperation and the innovation activities ongoing at each of the partners represents innovation capacities. Furthermore, Chen and Yang (2009) identify technological positioning as the means by which companies may demonstrate the greater or lesser extent of their innovation capacities. Meanwhile Girma and Hanley (2009) opt in favour of export levels to reflect the capacity to innovate with the greater the weighting of exports in firm sales turnover, the greater the extent of its innovation capacities.

According to Yam et al. (2011) and Puranam et al. (2009), innovation capacities are susceptible to measurement through the patents registered and the intensity of knowledge present in the firm, such as expenditure on R&D. Bertrand (2009) defends how innovation capacities depend on its level of R&D investment and hence correspondingly dependent on the depth and intensity of knowledge in effect at the firm.

This position has also been supported by other research findings (Nassimbeni 2001; Elmquist and Le Masson 2009; Li and Kozhikode 2009; Kroll and Schiller 2010; Chang et al. 2011; Jafari et al. 2011; Chaston, and Scott 2012). However, Wonglimpiyarat (2010) suggests innovation capacities are measurable through organisation innovations, in processes, in services, in products and in marketing. In accordance with Hull and Covin (2010), the greater the learning capacities present, the swifter the firm responds and meets needs arising in the marketplace through designing and launching new products.

Thus, the greater the intensity of knowledge, the greater the innovation capacities. According to Forsman (2011) innovation capacities are a composite phenomenon incorporating variables including internal resources and capacities and cooperative network participation rates.

Innovation capacities and financial performance

Many theoretical articles have investigated the presence of links between firm performance (economic, productivity and firm size growth) and product innovation (Klette and Griliches 2000; Klette and Kortum 2001; Thompson 2001; Lentz and Mortensen 2005; Welbourne et al. 2012). Currently, there is agreement that in addition to differences in innovation performances between regions, innovation capacities and company innovation strategies also depend on the region of location (Cooke et al. 2004). Furthermore, beyond these innovative capacities in themselves, government innovation support policies are fundamental alongside technological changes in the regions, especially in more rural locations (Doloreux and Dionne 2008). Indeed, according to the OECD (2007), the motivation underpinning studies about differences in regional innovation should be that of enabling the design of policies ensuring less advantaged regions return better innovation performances.

On analysing firm growth, two characteristics are always underlying, the age and the scale of the firm under study (Cucculelli and Ermini 2012). These variables are posited by Jovanovic (1982) in his model of passive learning. This model fundamentally reflects the idea that small and young companies innovate more than their older and larger scale counterparts. The same conclusions were reached by other authors (Evans 1987a, b; Hall 1987; Dunne and Hughes 1994; Lotti et al. 2003; Audretsch et al. 2004; Cormier et al. 2011). More recently, some empirical evidence does report a positive correlation between firm growth, its age and the ongoing level of innovation activities (Das 1995; Heshmati 2001; Ermini 2008; Teruel-Carrizosa 2010; Goktan and Miles 2011; Huarng and Yu 2011; Naranjo-Valencia et al. 2011). Cucculelli and Ermini (2012) go so far as to identify innovation as the key factor to firm growth.

Other researchers have analysed the impact of technological innovation on firm productivity (OECD 1986; Crepon et al. 1998; Bönte 2003; Hall et al. 2008; Ortega-Argilés et al. 2009). Through the adoption of R&D or innovation capacity based indicators (innovations in products, processes, or patent numbers), various research conclude in favour of the positive impact of innovation on firm performance levels (Nolan et al. 1980; Hall 1987; Amirkhalkhali and Mukhopadhyay 1993; Singh 1994; Lefebvre et al. 1998; Del Monte and Papagni 2003; Nurmi 2004; Yang and Huang 2005; Coad and Rao 2008; Curado et al. 2011; Reed et al. 2012). Some researchers find that only the innovation capacity variables impact on the firm performance of Indian firms and not those related to R&D and concluding that indices of R&D expenditure do not contribute towards evaluating firm growth and performance (Geroski 1995; Geroski et al. 1997; Coad and Rao 2008; Hölzl 2009; Cavalcante et al. 2011). Other researchers hold, however, that these results stem from companies being unable to separate R&D expenditure from other operational costs with the knowledge driving innovation activities taking place in the informal node (Dosi et al. 1995; Michie 1998; Flor and Oltra 2004; Cegarra-Navarro et al. 2011; Renko, et al. 2012).

This means that despite R&D expenditure representing an indicator demonstrating a greater or lesser propensity towards innovation, its adoption may nevertheless cause bias in the results for the aforementioned reasons (Arundel and Kabla 1998; Becheikh et al. 2006; Bhasin 2012; Battistella et al. 2012; Lee et al. 2012a; Sandulli et al. 2012).

Thus, for Kirner et al. (2009), innovation capacities are very much associated with R&D activities, with innovations in terms of new products the output of these activities. In this way, new products require new capacities or, alternatively expressed, a new combination of already existing competences (Koch and Strotmann 2008; Van Riel et al. 2011; Siegel and Renko 2012). New competences as a pre-condition for generating new products or services may be seen as the result of the acquisition, assimilation and dissemination of new knowledge (Cohen and Levinthal 1989, 1990) and thus susceptible to reference as innovation capacities. Innovation capacities stem from individually held competences, pre-acquired knowledge and the specific competences of the companies as well as through recourse to diverse means of knowledge production (Cohen and Levinthal 1990; Malerba and Torrisi 1992; Becker and Peters 2000; Schmidt 2005; Lee et al. 2012b).

Thus, innovative companies tend to record better economic-financial performances than their non-innovative competitors (Ferreira 2010; Kostopoulos et al.

2011; Forsman 2011; Cucculelli and Ermini 2012). In this sense, this research considers the turnover to measure financial performance (Kostopoulos et al. 2011).

Innovation is, in every sector of the economy, fundamental to surviving and to prevailing in an increasingly globalised world. Innovation aids companies seeking to respond to diversified patterns of demand undergoing constant change and enables improvements to the different fields and activities taking place in society (Cooke 1998). Therefore, innovation is perceived as the motor of progress, of competitiveness and economic development (Romer 1994; Johansson et al. 2001; Gallego-Álvarez et al. 2011).

Methodology

Sample

The present research is supported by the ACTION project. The ACTION project is an international project designed to promote cooperation among cross border regions, among firms in different industries and also among scientific and technological entities to enhance the productivity of regional innovation. This project is co-financed by the POCTEP—Program of Cooperation in Border Regions, Axis I (Joint Cooperation and Management for Fostering Competitiveness and the Labour Market). The geographical scope of the Project is the NUT II, which includes the *Castilla y León* region (Spain) and Portugal's *Centro* region. The questionnaire was structured to inquire about innovation activities and their respective influence on financial performance across a sample of 61 companies in two neighbouring countries (Portugal and Spain). Table 1 details the main sample characteristics.

Defining and measuring the variables

The variables in study are defining and measuring according to the set of indicators detailed in next Table 2.

Table 1 Survey data collection

Temporal basis	Cross-sectional
Geographic area	Portugal and Spain
Sectors	Manufacturing and service industries
Analysis unit	Iberian SME (25 Portuguese and 36 Spanish)
Sample	Intentional/convenience: 61 valid questionnaires
Questionnaire date	October–December, 2011
Data gathering	Postal questionnaire
Key informant	Owner/managers or CEO
Data analysis	Univariate and Linear Regression

Table 2 Variables measuring

Model	Means of measurement	Based on
Innovative capacities	Number of innovations	Muller (2001)
Product innovations		Rutten (2003)
Process innovations		
Organisational innovations		
Introduction of already existing products in new markets		
Factors of innovation	Level of importance of different company innovation factors	Muller (2001)
Risk capital		Rutten (2003)
Qualified human resources		
R&D		
Consultants		
State support for economic and technological development	Likert's scale: 1="not at all important" to 5="very important"	
Innovation friendly climate		
Clients		
Suppliers		
Specialist publications		
Study offices		
Universities		
Inhibitors to innovation	Difficulties regarding innovation Likert's scale: 1="not at all important" to 5="very important"	Muller (2001)
Lack of equity capital		Rutten (2003)
Lack of external financing		
Very high wage costs		
Demand difficult to forecast		
Innovations difficult to organise		
Lack of employees qualified in R&D		
Lack of employees qualified in Production		
Lack of employees qualified in marketing and sales		
Company characteristics	1: < 5 years	
Company age	2: [2 to 15]	
	3: [16 to 35]	
	4: [36 to 70]	
Number of Employees	1: < 10 employees	
	2: [10 to 49]	
	3: [50 to 249]	
Core business sector	What is your core business sector?	
Production		
Production & distribution		
Transporter		
Logistics operator		

Analysis of the numerical variables produced their averages, medians, minimum, maximum, and standard deviation while qualitative variables were analysed according to their absolute and relative frequencies. In the comparative bivariate analysis of Portuguese and Spanish companies, we applied the Mann–Whitney test and the t-test for continuous variables and the chi-squared test for the categorical variables. In multivariate terms, linear regression was the methodology deployed to analyse the importance of innovation types (differences between Portugal and Spain). To analyse the extent to which the innovation capacity variables influence financial performance (turnover), we made recourse to Probit Regression models.

We classify associations as statistically significant when returning p-values of less than 0.10. We furthermore applied the Nagelkerke calculated determinant coefficient (Pseudo R^2). In the bivariate analysis, we rank as significant p-value differences lower than 0.05 with this level set at 0.10 in the multivariate analysis. We applied the latter value in recognition of the sample containing only 61 companies.

Company profile

Firm characteristics, such as age, sector of activity or scale in terms of number of employees have been broadly defended as crucial to innovation based processes (Mills and Marguiles 1980; Acs and Audretsch 1988; Gallouj and Weinstein 1997; Tether 2003; Drejer 2004; Dinur 2011; Criscuolo et al. 2012; Anderson et al. 2012; Audretsch 2012; Mousa and Wales 2012).

Regarding company profile by location (Table 3), there were statistically significant differences ($p<0.05$) between Portuguese and (PT) and Spanish (SP) companies in terms of their core business activity. In Portuguese companies, the most common activity is Transporter (46.2 %) while the main activity among Spanish firms is Production and Distribution (54.3 %). There are also statistically significant differences ($p<0.05$) in terms of levels of firm employment. The majority of Spanish companies employ less than ten employees (60 %) and the largest category of Portuguese companies was that classifying firms employing from 10 to 49 employees (61.5 %). According to the European Commission (1996) criteria, these companies are classified as micro and small companies respectively.

Inhibitors to innovation

Different authors defend how factors such as financing issues, difficulties in predicting potential demand, the lack of qualified employees and the difficulties inherent to organising innovation are perceived as some of the inhibitors to innovation (Banbury and Mitchell 1995; Wheelwright and Clark 1995; Amabile et al. 1996; Slappendel 1996; Damanpour and Gopalakrishnan 1998; Hwang 2004; Lemon and Sahota 2004; Koc and Ceylan 2007). As regards the level of difficulties regarding innovation, Spanish companies, in comparison with their Portuguese peers, consider the difficulties are significantly greater ($p<0.05$) due to insufficient firm equity and externally sourced financing, very high wage costs, the difficulty to predict demand, the difficulty in organising innovations

Table 3 Company profile

	Country						*p*
	PT		SP		Total		
	N	%	N	%	N	%	
	Core business sector						
Production	2	7.7 %	8	22.9 %	10	16.4 %	0.001***
Production and Distribution	8	30.8 %	19	54.3 %	27	44.3 %	
Transporter	12	46.2 %	3	8.6 %	15	24.6 %	
Logistics Operator	0	0.0 %	4	11.4 %	4	6.6 %	
Other	4	15.4 %	1	2.9 %	5	8.2 %	
Total	26	100.0%	35	100.0%	61	100.0%	
	Number of employees						
Less than 10 employees	9	34.6 %	21	60.0 %	30	49.2 %	0.033**
From 10 to 49 employees	16	61.5 %	10	28.6 %	26	42.6 %	
From 50 to 249 employees	1	3.8 %	4	11.4 %	5	8.2 %	
Total	26	100.0%	35	100.0%	61	100.0%	

**$p<0.05$, ***$p<0.01$

as well as an overall lack of qualified employees in the fields of R&D, Production and Marketing/Sales.

Drivers of innovation and innovation capacities

The literature demonstrates that firm innovation activities directly derive from certain specific factors, such as cooperation with suppliers, with clients, with universities, the existence of risk capital investors and business angels, an innovation friendly climate in addition to infrastructures (Roberts and Berry 1985; Cooper 1990; Wheelwright and Clark 1995; Slappendel 1996; Dussage et al. 1992; Lemon and Sahota 2004; Koc and Ceylan; 2007; Tidd and Bessant; 2009; Idris, and Tey 2011; Lindic and Marques da Silva 2011; Bourne 2011; BarNir 2012; Garcés-Ayerbe et al. 2012; Mainardes et al. 2011). In terms of regional factors and their level of importance as regards firm innovation capacities, Spanish companies attribute significantly higher importance ($p<0.05$) than their Portuguese peers (Table 4) to the following factors: risk capital, research laboratories and centres, universities, study offices and specialist publications.

Wonglimpiyarat (2010) proposes measuring innovation capacities through organisational innovations across the dimensions of processes, services, products and marketing.

In Table 5, we provide the descriptive results for the level of importance attributed to the innovation capacity variables. Despite the averages showing how greater importance is attributed to product innovations, the results are not statistically significant.

Table 4 Inhibitors to innovation

	Country	N	Av.	DP	*p*
Lack of equity capital	PT	14	2.4	1.4	0.006***
	SP	31	3.7	1.5	
Lack of external financing	PT	14	1.7	1.1	0.000***
	SP	31	3.7	1.4	
Very high wage costs	PT	14	1.6	0.9	0.017**
	SP	32	2.5	1.2	
Demand difficult to forecast	PT	14	2.4	1.2	0.035**
	SP	29	3.3	1.3	
Innovations difficult to organise	PT	13	1.8	0.8	0.041**
	SP	30	2.5	1.4	
Lack of employees qualified in RandD	PT	14	2.1	1.2	0.035**
	SP	30	3.0	1.4	
Lack of employees qualified in Production	PT	13	1.2	0.4	0.005***
	SP	28	2.4	1.3	
Lack of employees qualified in Marketing and Sales	PT	14	1.9	1.3	0.013**
	SP	31	3.0	1.4	

**$p<0.05$, ***$p<0.01$

Results

Multiple regression estimates for innovation capacities

With the objective of analysing the importance of innovation types to companies (and the respective differences between Portugal and Spain), we applied multiple linear regression by country to ascertain the factors determinant to the level of importance attributed to innovation across the following areas: processes, products, organisation, and introduction of already existing products into new markets.

In relation to process innovations, no variable returns a statistical level of significance ($p>0.05$) in terms of the importance attributed at either Portuguese or Spanish companies. The level of importance attributed by Portuguese companies to product innovations (Table 6) is significantly associated with the importance attributed to the following factors of innovation: i) Public support ($B=-1.81$, $p<0.01$); ii) Suppliers ($B=1.31$, $p<0.01$), iii) Clients ($B=1.40$, $p<0.01$) and iv) Innovation friendly climate ($B=-1.25$, $p<0.05$). The greater the importance attributed to suppliers and clients, the greater the importance attributed to product innovation with the inverse holding for the factors of public support and innovation friendly climates, thus, the greater the importance attributed to these factors, the lower that attributed to product innovations and thus potentially perceivable as inhibitors to this type of innovation.

In Spanish companies, the descriptor "company age" bears influence on rates of product innovation ($B=-2.34$, $p<0.01$) as do the levels of importance attributed to the following factors of innovation: i) Innovation friendly climate

Table 5 Factors of innovation and innovative capacity

		Country	N	Average	DP	*p*
Factors of innovation	Risk capital	PT	15	1.7	1.2	0.000***
		SP	32	3.6	1.2	
	Qualified human resources	PT	15	4.0	1.2	0.053*
		SP	27	3.1	1.5	
	RandD	PT	15	3.2	1.4	0.544
		SP	30	3.5	1.4	
	Consultants	PT	15	3.9	1.6	0.262
		SP	32	3.4	1.1	
	State support for economic and technological development	PT	15	3.5	1.5	0.966
		SP	29	3.6	1.3	
	Innovation friendly climate	PT	15	3.3	1.3	0.879
		SP	30	3.2	1.4	
	Clients	PT	15	3.6	1.5	0.280
		SP	32	3.2	1.2	
	Suppliers	PT	15	3.3	1.6	0.297
		SP	31	2.8	1.4	
	Specialist publications	PT	17	1.9	0.9	0.024**
		SP	21	2.7	1.2	
	Study offices	PT	17	1.4	0.9	0.003***
		SP	20	2.5	1.3	
	Universities	PT	17	1.4	0.9	0.013**
		SP	21	2.5	1.5	
Innovative capacities	Product innovations	PT	13	3.2	1.6	0.968
		SP	23	3.1	1.7	
	Process innovations	PT	12	2.5	1.8	0.187
		SP	20	3.3	1.2	
	Organisational innovations	PT	10	2.4	1.6	0.909
		SP	21	2.3	1.4	
	Introduction of already existing products in new markets	PT	10	2.1	1.8	0.924
		SP	19	2.2	1.4	

*$p<0.1$, **$p<0.05$, ***$p<0.01$

($B=-0.69$, $p<0.05$) and ii) Local labour supply ($B=0.73$, $p<0.05$)**.** They all significantly influence the importance levels attributed to product innovations. Therefore, companies in business for up to 15 years of age (young companies) and which endow greater importance to the innovation friendly climate factor attribute significantly less importance to production innovations, which may be approached as obstacles to innovation. Hence, when Spanish companies are young in age, then this implies lower levels of product innovation. In the case of the local labour supply factor, the greater the importance attributed to this factor, the greater the importance attributed to product innovations.

Table 6 Linear regression—product innovations

		B	Std. error	Beta	*t*	*p*	R^2
PT	(Constant)	5.37	0.49		10.99	0.000***	0.962
	State support for economic and technological development	−1.81	0.21	−1.49	−8.52	0.001***	
	Suppliers	1.31	0.23	1.09	5.76	0.005***	
	Clients	1.40	0.26	1.15	5.30	0.006***	
	Innovation friendly climate	−1.25	0.32	−1.05	−3.96	0.017**	
SP	(Constant)	4.12	0.89		4.65	0.001***	0.716
	Innovation friendly climate	−0.69	0.23	−0.55	−3.01	0.013**	
	Firm in business up to 15 years	−2.34	0.61	−0.66	−3.85	0.003***	
	Local labour supply	0.73	0.24	0.56	3.06	0.012**	

**$p<0.05$, ***$p<0.01$

The level of importance attributed by Portuguese companies to organisational innovation (Table 7) is significantly associated with the importance attributed to the factors of innovation: i) Clients ($B=1.20$, $p<0.05$); ii) State support ($B=-1.25$, $p<0.05$); and iii) Research ($B=-0.61$, $p<0.1$). The greater the importance attributed to clients and to research, the greater the importance awarded to organisational innovations with the inverse holding in the case of the state support factor where the greater the importance attributed to this factor, the lesser the importance attributed to organisational innovation with this factor perceived as an obstacle to innovation.

Meanwhile, the level of importance attributed by Spanish companies to organisational innovation is associated with the following factors: i) Research ($B=0.31$, $p<0.1$); ii) Consultants ($B=0.84$, $p<0.05$); and iii) Innovation friendly climate ($B=-0.53$, $p<0.05$) as well as the firm descriptive variable "number of employees" ($B=3.36$, $p<0.01$). Companies currently employing between 50 and 249 employees

Table 7 Linear regression—organisational innovation

Dependent		B	Std. error	Beta	t	*p*	R^2
PT	(Constant)	1.43	0.99		1.45	0.207	0.799
	Clients	1.20	0.32	1.01	3.71	0.014**	
	State support for economic and technological development	−1.25	0.37	−1.04	−3.33	0.021**	
	Research	0.61	0.28	0.57	2.13	0.086*	
SP	(Constant)	−0.31	0.79		−0.39	0.707	0.803
	Research	0.31	0.18	0.30	1.71	0.099*	
	Between 50 and 249 employees	3.36	0.70	0.75	4.78	0.001***	
	Consultants	0.84	0.26	0.66	3.26	0.010***	
	Innovation friendly climate	−0.53	0.21	−0.46	−2.47	0.036**	

*$p<0.1$, **$p<0.05$, ***$p<0.01$

(annual firm average) are those endowing organisational innovations with greater levels of importance with the higher the level of importance attributed to the consultants and research factors, the greater the important attributed to organisational innovation. However, the inverse is observed for the innovation friendly climate factor where the greater the importance, the lesser that attributed to organisational innovations and thus ranked as an inhibitor to innovation.

The importance granted by Portuguese companies to the introduction of already existing products in new markets is not linked to any variable.

In Spanish companies, the level of importance attached to the introduction of already existing products in new markets (Table 8) is significantly associated with the importance attributed to the factors of innovation: i) Clients ($B=-0.73$, $p<0.01$); ii) Qualified human resources ($B=1.43$, $p<0.001$): iii) Local labour supplies ($B=-1.85$, $p<0.001$); iv) Transport infrastructures ($B=0.81$, $p<0.01$); v) Research ($B=-0.55$, $p<0.01$); and vi) Risk capital ($B=0.51$, $p<0.05$), as well as the firm description variables: i) firm age ($B=2.40$, $P<0.001$); and ii) number of employees ($B=0.69$, $p<0.1$). Companies in business for less than 15 years (young) and employing between 50 and 249 employees (firm average) award significantly greater importance to the introduction of already existing products in new markets and the greater the importance of qualified human resources, transport infrastructures and risk capital, the greater the importance attributed to the introduction of already existing products in new markets. This returns an inverse relationship in the case of the factors of clients, local labour supplies and research, which may thus be perceived as obstacles to this innovation type.

Innovation effects on financial performance

Many theoretical studies have undertaken research on the influence between innovation and financial performance (Chakrabarti 1990; Klette and Griliches 2000; Klette and Kortum 2001, 2004; Thompson 2001; Lentz and Mortensen 2005; Cucculelli and Ermini 2012).

Table 8 Linear regression—existing products in new markets (Spain)

	B	Std. error	Beta	t	*p*	R^2
(Constant)	2.19	0.42		5.24	0.003***	0.988
Clients	−0.73	0.13	−0.59	−5.46	0.003***	
Qualified human resources	1.43	0.09	1.62	16.15	0.000***	
Local labour	−1.85	0.17	−1.67	−10.90	0.000***	
Firm in business up to 15 years	2.40	0.29	0.79	8.35	0.000***	
Transport infrastructures	0.81	0.14	0.85	5.68	0.002***	
RandD	−0.55	0.12	−0.57	−4.47	0.007***	
Capital	0.51	0.14	0.49	3.62	0.015**	
Between 50 and 249 employees	0.69	0.33	0.17	2.11	0.089*	

*$p<0.1$, **$p<0.05$, ***$p<0.01$

With the objective of analysing the influence of the respective innovation types on financial performance, we calculated Probit Regression models, for each country in order to determine which innovation related factors, whether innovating products, processes, organisations or introducing already existing products into new markets, influence financial performance as measured through turnover (Table 9). At Portuguese companies, we find there is no statistically significant association ($p>0.10$) between the importance attributed to the different factors of innovation and financial performance (turnover).

As regards Spanish companies, the level of importance attributed to product innovations is significantly associated with turnover ($B=0.38$, $p<0.10$), with the greater the importance attributed to this innovation type associated with a greater probability of the level of sales breaking the €2 million mark (average level of turnover).

Final considerations

To the extent by which globalisation has advanced and deepened the level and consequences of interdependence between national economies, the business world has become ever more complex and exponentially more competitive. This scenario has driven companies to adopt proactive strategies designed to seek out sustainable competitive advantage. Innovation has thereby now emerged as one of the core strategic priorities for companies seeking success in their business dealings. Innovation is strongly dependent on the capacities of companies to acquire, generate and apply knowledge.

Many business leaders already perceive business success as depending on the capacity to bring new products, services or processes to the market and before their competitors manage to do so. Innovation requires timely decision making about the investments going into knowledge, assets, brands and reputation from the perspective of developing capacities beyond those already wielded and deployed by the respective firm. The competitive pressures and the desire for greater returns further boost the incentives acting to drive innovation.

Table 9 Probit regression—innovation effects on financial performance

		B	Std. error	Wald	*p*	R^2
PT	Constant	−0.81	1.00	0.65	0.421	0.297
	Product innovations	0.42	0.41	1.07	0.301	
	Process innovations	0.75	1.05	0.50	0.478	
	Organisational innovations	−0.60	0.71	0.71	0.398	
	Existing products in new markets	−0.63	1.29	0.24	0.625	
SP	Constant	−1.76	1.50	1.38	0.240	0.381
	Product innovations	0.38	0.23	2.81	0.094*	
	Process innovations	0.42	0.40	1.13	0.288	
	Organisational innovations	−0.14	0.26	0.31	0.579	
	Existing products in new markets	−0.47	0.33	2.03	0.154	

*$p<0.1$

This paper sets out the findings of research undertaken to study the drivers and inhibitors verified within the framework of the innovation capacities and their effects on financial performance.

The empirical results return significant differences between the companies in the two countries under study in terms of the innovation capacities across products, organisational innovation and the introduction of existing products into new markets. In the case of Portuguese companies, the leading regional factors of innovation were the relationships with suppliers, with clients and the level of commitment to R&D. However, in the case of Spanish companies, the most significant regional factors of innovation were the existence of local labour supplies, R&D expenditure, firm size, consultants, qualified human resources, transport infrastructures and the capital available for investment.

In terms of innovation inhibitors, Portuguese companies reported that the lack of state support and weak innovation friendly climates were the main obstacles. On the Spanish side, companies identified firm age (young companies), weak innovation friendly climates, local labour supplies, client relationships and the lack of investment in R&D as the primary innovation inhibitors.

The relationship between innovation and financial performance was statistically validated in the case of Spanish companies that confirmed the introduction of greater numbers of product innovations did drive higher overall turnover.

The identification of regional factors enabling and hindering innovation generates worthwhile indicators for public innovation support policies as they may now be tailored to take into account the specific properties of companies actually located in the border regions under study.

The greatest contribution that this research makes to the literature is the best knowledge about the factors influencing the innovative capacity in companies located in border regions. Portugal and Spain are the south countries of Europe, face the same challenges and the same economic difficulties, because the economic crisis that hit across Europe affected more peripheral countries (as is the case of the Iberian Peninsula). In this sense it is essential to understand the behaviour of the enterprise located in such economies. Besides the study of innovation factors will be important also important to study the factors of cooperation and the existence of cooperative activities that promote innovation activities, between Portuguese and Spanish companies.

Given this study contained a sample of only 61 companies, this limits the generalisations that may be drawn from its findings. Nevertheless, it did prove possible to compare the innovation capacities in effect in two countries and would therefore correspondingly suggest a future research engaging with not only a larger study sample to ensure the conclusions are more robust and more generally applicable but also expanding the research approach to other countries.

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