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YOUNG INNOVATIVE COMPANIES (YICs).
The Role of Entrepreneurship and Innovation Policies

TESIS DOCTORAL

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Sin vosotros, estas páginas estarían en blanco.

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Resumen

La investigación llevada a cabo en esta Tesis tiene como objetivo analizar la relación existente entre un subgrupo de empresas innovadoras, las *Young Innovative Companies* (YICs) y las políticas públicas de fomento al emprendimiento y la innovación. Las YICs han sido identificadas como aquellas empresas de menos de 8 años de actividad que en los últimos tres años han introducido productos o procesos innovadores o han comenzado proyectos innovadores. Las empresas innovadoras de nueva creación y menor tamaño –como las YICs- han de hacer frente a diversas barreras como las dificultades de financiación, la información imperfecta, la limitación de recursos internos o el acceso a servicios tecnológicos.

En esta investigación se analizan qué características estructurales (grado de innovación, el tamaño de la empresa, el sector en el que actúa, el grado de competencia del sector y la edad y el género del emprendedor) de las empresas innovadoras en general, y de las YICs en particular, están relacionadas con el acceso a políticas públicas. Para ello, se distingue entre políticas públicas de apoyo financiero (subvenciones, subsidios, etc.) y acciones públicas dirigidas a facilitar la utilización de servicios intensivos en conocimiento como la consultoría avanzada o el asesoramiento profesionalizado.

Entre las conclusiones que se han obtenido cabe destacar las siguientes. En primer lugar, prácticamente todos los atributos de las empresas innovadoras que se han analizado tienen una relación significativa con el

acceso a políticas públicas de promoción del emprendimiento y la innovación. En segundo lugar, al comparar estos resultados con los obtenidos con una muestra formada exclusivamente por un grupo de YICs, se detecta que existen pocas relaciones significativas. Es decir, estas mismas políticas no tienen en cuenta las especificidades de determinados subgrupos de empresas innovadoras.

A partir de las conclusiones, se derivan determinadas implicaciones de política. Así, los esfuerzos de los gobiernos regionales y nacionales para promover el emprendimiento podrían ganar en eficiencia si tales acciones estuvieran dotadas de mayor especificidad. Es decir, que dicho programas se implementen con un mayor grado de selectividad y segmentación, adaptados a las necesidades concretas de los proyectos empresariales, en función de sus características específicas.

Abstract

The aim of this thesis was to analyze the relationship between a subgroup of innovative firms – young innovative companies (YICs) – and public innovation and entrepreneurship policies. YICs have been defined as companies with less than eight years of activity, which in the last three years have developed innovative products or processes, or have embarked on innovative projects. Small, newly created innovative firms, such as YICs, must overcome various hurdles such as attracting investment, imperfect information, limited internal resources and accessing technological services.

This investigation attempts to determine which structural features (degree of innovation, size of the firm, sector, degree of competition within the sector, and the age and gender of the entrepreneur) of innovative companies in general, and in particular YICs, are related with access to public policies. To do this, the study differentiates between policies of financial assistance (e.g., subsidies, grants) and programs targeting the use of knowledge-intensive business services such as advanced consultancy or professional advisory services.

The following conclusions of the study stand out as being of particular relevance and interest. First, practically all the features of innovative companies that were included in the analysis have significant relationships with access to innovation and entrepreneurship policies. Second, upon comparing these results with those from samples consisting solely of YICs, very few statistically significant relationships are found. In other words, the

findings show that the aforementioned policies do not take into account the specific characteristics of certain subgroups of innovative companies.

The conclusions of the study have potential implications for innovation and entrepreneurship policies. Thus, regional and national governments could enhance the efficiency of their efforts to stimulate entrepreneurship if such programs and policies were designed and implemented more specifically. In other words, governments could achieve this goal by pursuing policies with a higher degree of selectivity and segmentation, and which are adapted to the precise needs of each project, depending on its specific features.

Resum

La investigació duta a terme en aquesta tesi té com a objectiu analitzar la relació existent entre un subgrup d'empreses innovadores, les Young Innovative Companies (YICs) i les polítiques públiques de foment a l'emprendiment i la innovació. Les YICs han sigut identificades com aquelles empreses de menys de 8 anys d'activitat que en els últims tres anys han introduït productes o processos innovadors o han començat projectes innovadors. Les empreses innovadores de nova creació i menor grandària -com les YICs- han de fer front a diverses barreres com les dificultats de finançament, la informació imperfecta, la limitació de recursos interns o l'accés a serveis tecnològics.

En aquesta investigació es determinen quines característiques estructurals (grau d'innovació, la grandària de l'empresa, el sector en què actua, el grau de competència del sector i l'edat i el gènere de l'emprenedor) de les empreses innovadores en general, i de les YICs en particular, estan relacionades amb l'accés a polítiques públiques. Per a això, es distingix entre polítiques públiques de suport financer (subvencions, subsidis, etc.) i accions públiques dirigides a facilitar la utilització de serveis intensius en coneixement com la consultoria avançada o l'assessorament professionalitzat.

Entre les conclusions que s'han obtingut, cal destacar les següents. En primer lloc, pràcticament totes les característiques de les empreses innovadores que s'han analitzat tenen una relació significativa amb l'accés a

polítiques públiques de promoció de l'emprenedoria i la innovació. En segon lloc, al comparar aquests resultats amb els obtinguts amb una mostra formada exclusivament per un grup de YICs, existixen poques relacions significatives. És a dir, aquestes mateixes polítiques no tenen en compte les especificitats de determinats subgrups d'empreses innovadores.

D'acord amb les conclusions, es deriven algunes possibles implicacions de política. Així, els esforços dels governs regionals i nacionals per a promoure l´emprenedoria podrien guanyar en eficiència si tals accions estigueren dotades de major especificitat. És a dir, per mitjà de polítiques amb un major grau de selectivitat i segmentació adaptades a les necessitats concretes dels projectes, en funció de les seues característiques específiques.

Capítulo I

INTRODUCCIÓN

CAPÍTULO I

Introducción

El concepto de jóvenes empresas innovadoras o *Young Innovative Companies* (YICs) ha sido introducido en los últimos años y hace referencia a empresas de reciente creación que implementan innovaciones de gran valor comercial y aplicación industrial. Diversos estudios, a los que a lo largo de la Tesis se hará referencia, muestran que este tipo de empresas tienen especial importancia por su papel como regeneradoras de la estructura industrial.

En efecto, de acuerdo con la literatura más reciente (Schneider y Veugelers, 2010; Azagra-Caro et al., 2012), las YICs pueden cumplir un rol fundamental no sólo para hacer frente a la coyuntura económica actual, sino también por su potencial de renovación del tejido empresarial. Por ello, esta Tesis centra su atención en el papel que pueden jugar las instituciones públicas para la promoción de las YICs a través de políticas de impulso del emprendimiento y de la innovación.

Uno de los mayores problemas a los que se enfrentan los emprendedores es la falta de financiación, sobre todo en el momento del lanzamiento de la empresa. Por ello, se analizan las políticas públicas de subvenciones o subsidios para el fomento del emprendimiento innovador. Un diseño adecuado de este tipo de políticas públicas puede ser una vía de mejora de

los instrumentos para el fomento de empresas (Kirzner, 2011). Además, junto a la falta de financiación, las empresas innovadoras y, en particular, las YICs, también hacen frente a otro tipo de barreras como la limitación de recursos internos o la información imperfecta. Por ello, las acciones públicas de tipo financiero han de complementarse con otro tipo de apoyos como el asesoramiento o la consultoría para fomentar los servicios de conexión y transferencia del conocimiento (Lundvall et al., 2000; Furman et al., 2002).

El objetivo general de la Tesis es profundizar en el conocimiento de las YICs en un doble frente. En primer lugar, se trata de determinar qué papel juegan las políticas públicas en el impulso de este tipo de empresas innovadoras, tomando como referencia el conjunto de empresas innovadoras en general. Para ello, se analizan tanto las políticas públicas de subvenciones como las acciones públicas centradas en facilitar el acceso de estas empresas a servicios intensivos en conocimiento. En segundo lugar, se pretende extraer recomendaciones que permitan diseñar acciones ajustadas a los diversos tipos de empresas innovadoras mediante un mayor grado de especificidad en la implementación de las políticas.

Estructura

La Tesis se estructura en tres artículos. Cada uno de ellos aborda un aspecto específico con el fin de cumplir el objetivo general que se acaba de señalar. Estos tres artículos son los siguientes.

El primer artículo se titula ***Young Innovative Companies (YICs) and Entrepreneurship Policy*** y ha sido aceptado para su publicación en la revista

científica *Management Decision*, indexada en el Social Science Citation Index**.** En él se analizan qué características tienen las YICs que acceden a ayudas públicas en forma de subvenciones. De esta forma, se determina el perfil de las YICs que obtienen ayudas para la promoción del emprendimiento y, subsecuentemente, establecer si estas políticas públicas tienen un carácter selectivo y adaptado a las especificidades de este tipo de empresas. El artículo examina de qué forma las características del emprendedor, de las propias YICs o del sector en el que compiten están relacionadas con las políticas públicas de promoción al emprendimiento. La investigación también analiza si estas variables, aún en el caso de que no tengan una relación directa con la obtención de subvenciones, pueden actuar como variables moderadoras. Así, mediante un análisis de regresión logística binaria, se establece que tanto el tamaño de la YIC como el género del emprendedor influyen significativamente en el acceso a las subvenciones otorgadas por las instituciones públicas. Estos resultados permiten extraer recomendaciones dirigidas a proponer que los esfuerzos de los gobiernos regionales y nacionales para promover el emprendimiento estén dotados de mayor especificidad, con políticas selectivas, segmentadas y adaptadas a las necesidades concretas de los proyectos en función de las particularidades específicas de los mismos (Kirzner, 2011).

Junto a las barreras de financiación, las YICs también se enfrentan a otro tipo de dificultades como la información imperfecta, la limitación de recursos internos o el acceso a servicios intensivos en conocimiento. Así, las acciones de apoyo financiero de las políticas de innovación han de complementarse con otro tipo de iniciativas como el asesoramiento técnico o la consultoría. Por ello, el segundo artículo, ***The level of innovation***

among Young Innovative Companies: the impacts of knowledge-intensive services use, firm characteristics and the entrepreneur attributes (aceptado en la revista científica *Service Business. An International Journal*, indexada en el Social Science Citation Index) tiene como objetivo determinar qué características de las YICs potencian su grado de innovación, y en particular, si la utilización de *Knowledge Intensive Business Services* (KIBS) impulsa la intensidad innovadora de este tipo de empresas que son, por definición, innovadoras. A través del análisis empírico se detecta que la utilización de KIBS promueve la innovación de las YICs. Siendo una de las funciones primordiales de los KIBS la de actuar como facilitadores y fuente de innovación para empresas de otros sectores, el hecho de que se confirme que estos servicios potencian la intensidad innovadora de las YICs, constituye un resultado de interés de cara a la definición de políticas de promoción de la innovación (Audretsch, 2012).

Finalmente, el tercer artículo se titula ***Different innovation policies for different types of innovative companies?*** y ha sido aceptado para su publicación en la revista científica indexada en el Social Science Citation Index *European Journal of International Management*. Dentro del colectivo de empresas innovadoras la literatura hace referencia a diversos tipos -New Technology Based Firms (NTBF), YICs, spin-off, etc.- que, en muchas ocasiones, tienen definiciones ambiguas. Con este punto de partida, el tercer artículo plantea dos objetivos. En primer lugar, llevar a cabo una delimitación de los diferentes conceptos y tipos existentes dentro del conjunto de empresas innovadoras, haciendo especial hincapié en las jóvenes empresas innovadoras (YICs) y considerando las diferentes políticas de promoción de empresas innovadoras que han surgido a lo largo de los

años (Audretsch y Link, 2011). En segundo lugar, analizar y contrastar las diferencias existentes entre las YICs y el conjunto de empresas innovadoras en relación con la aplicación de estas políticas. Para ello se examinan los atributos que aumentan las probabilidades de acceder a ayudas públicas de promoción de la innovación por parte del conjunto de empresas innovadoras localizadas en una región europea. Finalmente, este análisis se contrasta con los resultados obtenidos en una investigación similar pero con una muestra específica de YICs (Mas-Tur y Simón-Moya, 2013). A partir de los resultados obtenidos se concluye que, al ampliar la muestra de jóvenes empresas innovadoras (YICs) al conjunto de todas las empresas innovadoras, las políticas públicas de promoción del emprendimiento y la innovación resultan ser más selectivas, es decir, están más adaptadas a las necesidades específicas de cada tipo de empresas. Esto permite concluir la necesidad de que las políticas públicas tengan en cuenta las particularidades de los diferentes tipos de empresas innovadoras, lo que exige un diseño y aplicación más matizado de las mismas.

Metodología

El análisis empírico de los dos primeros artículos se ha realizado sobre un grupo de 189 *Young Innovative Companies* de la Comunidad Valenciana. La muestra se ha elegido tomando como base las definiciones utilizadas por la literatura sobre YICs (Schneider y Veugelers, 2010; Pellegrino et al., 2009): empresas creadas a partir del 2005 (menos de 8 años de antigüedad) y que en los últimos tres años han introducido productos o procesos innovadores o han comenzado proyectos innovadores. Las empresas encuestadas corresponden, de acuerdo con el Instituto de la Pequeña y Mediana

Industria Valenciana (IMPIVA), con la práctica totalidad de las YICs de la región.

En el tercer artículo se realiza una contrastación de los resultados extraídos en los dos primeros artículos con una muestra más amplia del conjunto de empresas innovadoras de la misma región. Por ello, este análisis se realiza sobre un grupo más amplio de 521 empresas innovadoras.

Los datos utilizados han sido recogidos mediante una encuesta llevada a cabo en 2009/2010. La encuesta fue realizada por el IMPIVA, organismo creado para la promoción de las pequeñas y medianas empresas valencianas. Antes de enviar los cuestionarios se realizó un estudio piloto o pre-test para comprobar que las preguntas formuladas eran comprensibles y no daban lugar a sesgos. La información de los cuestionarios ha sido suministrada por los propios promotores o fundadores de las empresas y está relacionada con las características del sector en el que opera su empresa, con los aspectos clave de su propia organización y con las particularidades de sí mismos como emprendedores.

Con estos datos, se analiza la influencia de las diferentes variables -la edad y el género del empresario, el sector de actividad, el tamaño y el grado de innovación de la empresa, la competencia del sector- sobre la probabilidad de acceder a políticas públicas de promoción al emprendimiento y la innovación.

En cada uno de los artículos, las hipótesis o supuestos establecidos se contrastan mediante análisis de regresión logística binaria. En las diferentes pruebas estadísticas llevadas a cabo se estudia, en primer lugar, la

influencia directa de las siguientes variables, sugeridas por la literatura: edad y género del empresario, sector de actividad, tamaño, grado de innovación de la empresa y competencia del sector sobre la variable dependiente. En segundo lugar, se introducen en los modelos diferentes variables moderadoras para detectar interacciones. Así, puede suceder que una variable independiente no influya directamente en la dependiente pero afecte de manera indirecta en la relación existente entre la variable dependiente y alguna de las independientes. Las variables moderadoras creadas recogen la relación existente entre las variables independientes y la dependiente. Estas variables moderadoras se incorporan en el modelo estadístico como producto de las variables independientes: competencia x sector, competencia x innovación, competencia x género, tamaño x sector, tamaño x innovación, etc.

Capítulo II

JÓVENES EMPRESAS INNOVADORAS Y POLÍTICAS DE PROMOCIÓN DEL EMPRENDIMIENTO

CAPÍTULO II

Jóvenes Empresas Innovadoras y Políticas de Promoción del Emprendimiento

Artículo

YOUNG INNOVATIVE COMPANIES AND ENTREPRENEURSHIP POLICY

Autores: Alicia Mas-Tur y Virginia Simón-Moya

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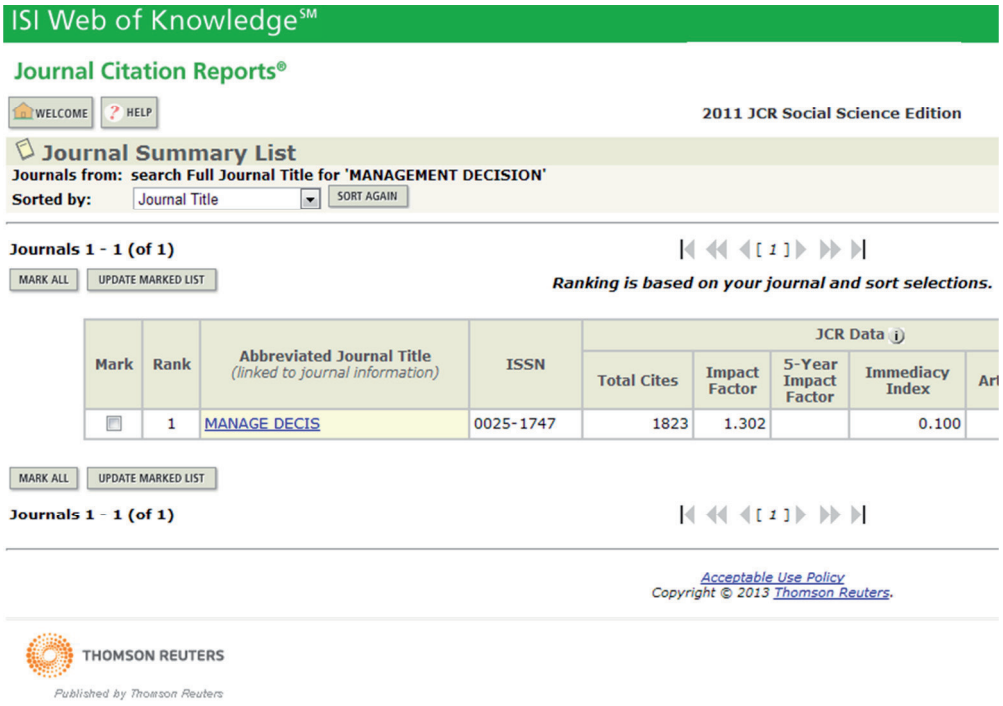

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YOUNG INNOVATIVE COMPANIES AND ENTREPRENEURSHIP POLICY

Abstract

This paper studies the features of young innovative companies (YICs) that enable their access to public policies in the form of subsidies. Through this analysis, we aim to determine the profile of YICs that have been granted public innovation aid and thus establish whether these innovation policies are being tailored to fit the specific nature of this type of company. To achieve this objective, we analyzed a sample of 189 YICs from the Valencian Region. We used this data to study the way in which the features of the entrepreneurs, the YICs themselves and their sector are related with public innovation policies. The study also looks at whether these variables, including those which do not have direct relationships with access to subsidies, act as moderating variables. Thus, using binary logistic regression, we have been able to establish that both the size of the YIC and the gender of the entrepreneur have a significant influence on access to subsidies. Furthermore, the fact that a YIC is created by a female entrepreneur is shown to be a moderating factor in the positive relationship between size and access to subsidies.

Keywords: young innovative companies (YICs), entrepreneurship, public policy, subsidies

2.1. Introduction

Young innovative companies (YICs) are becoming an increasing focus in the debate on business policies due to the capacity of these companies to reactivate and reinvigorate the industrial fabric. Numerous studies have shown that this type of company is fundamental for revolutionizing the industrial framework, driving economic growth and spreading innovation across a territory or region (Schneider & Veugelers, 2010; Azagra-Caro, Mas-Verdú & Martinez-Gomez, 2011). Thus, both the academic community and the political parties are devoting an increasing amount of attention to YICs (BEPA 2008, Schneider & Veugelers, 2010).

YICs are a relatively novel concept and therefore there is no universally accepted definition in the literature as to what exactly characterizes a YIC. Schneider and Veugelers (2010) define YICs as small, young enterprises with great potential to develop innovations for commercial applications and create value for society. Pellegrino, Piva and Vivarelli (2009) characterize YICs as companies with less than eight years of activity, and which in the last three years have brought out innovative products or processes, or have embarked on innovation-based projects.

Establishing innovation policies which foster and promote new business initiatives is important to governments. The measures that they are putting in place to achieve this range from reductions in tax obligations and the protection of intellectual property rights (Díaz, Urbano & Hernández, 2005; Reynolds et al. 2001; Stephen, Urbano & Van Hemmen, 2005) to programs of subsidies for new companies (Van Stel et al., 2007; Mas-Verdú, Baviera-

Puig & Martínez-Gómez, 2009; Aghion, 2011). Other such policies also include measures aimed at improving the status of entrepreneurs, so as to acknowledge their role as drivers of economic growth and the innovative capacity of an economy (Van Praag, 2011).

Attracting investment is one of the critical issues faced by small, startup firms (Kerr & Nanda, 2011). Hall (2008) showed that funding is one of the main barriers to growth and innovation. Thus, within the broad range of reasoning behind entrepreneurship policy, the study of such measures could also go some way to rectifying the lack of consensus regarding their effectiveness.

Minniti (2008) has highlighted the fact that the relationship between public policy and entrepreneurship or business creation has not been studied in sufficient depth. Although there is a rich literature on public policy, there are very few studies that focus on YICs (Schneider & Veugelers, 2010) and practically none, as far as we are aware, that address the relationship between these two elements. To contribute to filling this gap in the literature, this paper expounds the features of young innovative companies that have gained access to public policies in the form of subsidies. The analysis explores the way in which characteristics of entrepreneurs, YICs and the sectors where they compete are related with public entrepreneurship policies.

The paper is structured as follows. The following section presents the theoretical framework and sets out the hypotheses relating public policies with a range of factors that affect company performance. The third and

fourth sections describe the empirical analysis and state the results of the study. Finally, the conclusions, limitations and future lines of investigation are presented.

2.2. Theoretical Framework: Key Factors of Public Entrepreneurship Policy in the field of YICS

The aim of this paper is to determine which variables related to the entrepreneur and the setting up of YICs enable access to public policies designed to promote innovation. More specifically, we look at public aid in the form of subsidies because, as shown above, one of the biggest problems facing entrepreneurs is a lack of funding, especially when launching a new business venture.

Subsidies, as tools that help to promote entrepreneurship and business creation, began to be implemented at the end of the Second World War. Following the devastation of various countries' economies as a result of the conflict, public bodies decided to look for ways to quickly reactivate the economy (Krueger & Tuncer, 1982). This goal remains the aim of subsidy policies for startup businesses: economic growth through the value created by entrepreneurship. The argument used to justify the use of these policies as an aid to starting up new ventures is that one of the main barriers to entrepreneurial development is the lack of capital markets for business funding (Kerr & Nanda, 2011; EC-DG Enterprise, 2010).

Despite the above reasoning, there is considerable controversy regarding the functionality, effectiveness and impact of public policies for business creation (Mas-Verdú et al., 2009). The validity of this type of measure has been questioned by certain authors, who have stated that such actions may encourage projects with low degrees of efficiency (Pellegrino, Piva & Vivarelli, 2009). Furthermore, some authors (Aghion, 2011) have revealed their doubts about entrepreneurship policies, taking the view that they contradict the idea of free competition.

Aside from the authors who question the implementation of subsidies, some studies defend policies of public aid for newly created firms, claiming that they help to boost entrepreneurship. Authors such as Greenwald and Stiglitz (2006) base their views on the theory of the *infant industry* and state that recently established businesses are not in a position of equal competition with firms that are already integrated in the market. This viewpoint is justified by the fact that new enterprises face: high costs to set up a business, liquidity issues during the initial stages of their development and low operating profit (Krueger & Tuncer, 1982). Furthermore, these authors express the view that offering subsidies to enterprises does not necessarily go against free competition because the entry of new companies in a sector increases the degree of competition and therefore may trigger a process of innovation stimulation. An increase in the number of companies within a sector encourages competition and raises the innovative potential of the sector through communication between firms and knowledge transfer (Hamel & Prahalad, 2006).

Without doubt, the existence of barriers to external and internal funding, along with barriers to innovation in the field of YICs, clearly demonstrates the need for public policy analysis to take on a specific nature from a territorial viewpoint. More specifically, public policymaking must take into consideration the specific features of this type of enterprise. Thus, suitable design of public policies for subsidies may attenuate some of the problems related to the promotion of businesses (Kirzner, 2011).

The following variables will be analyzed: *degree of innovation*, *age of the entrepreneur*, *gender of the entrepreneur*, *size of the company*, *sector where the YIC competes* and *degree of competition faced by the YIC*. Studies have also considered other variables that may influence YICs' access to public aid such as the ownership structure of the firm (Heijs & Herrera, 2007; Hewitt-Dundas & Roper, 2009) or its age (Heijs & Herrera, 2004; Czarnitzki & Fier, 2002). However, because of the type of companies studied here, these variables are not suitable for consideration.

Business innovation

Innovation is, according to the literature, one of the key factors of entrepreneurship (Wennekers & Thurik, 1999; Eckhardt & Shane, 2003; Sternberg & Wennekers, 2005; Cuervo, Ribeiro & Roig, 2007; Braunerhjelm, 2011; García-Quevedo et al., 2013).

The Global Entrepreneurship Monitor (GEM) differentiates between two types of entrepreneurship: opportunity and necessity. The term *opportunity*

entrepreneur refers to an individual who creates a business because they feel that they have found an opportunity in the market that they can capitalize on (Reynolds et al., 2001). Therefore, these entrepreneurs are characterized by their innovative capacity (Headd, 2003; Ho & Wong, 2007; Kelley et al., 2010; Zortea-Johnston et al. 2012). On the other hand, *necessity entrepreneurs* are individuals who set up their businesses to avoid unemployment (Reynolds et al. 2001; El Harbi & Anderson, 2010), and so these ventures are not based on the innovative potential of the activity being carried out (Sternberg & Wennekers, 2005).

Numerous studies conducted on the matter have shown that companies created through opportunity entrepreneurship have a greater chance of success than companies created as an alternative to unemployment. Thus the majority of authors conclude that opportunity entrepreneurship holds a positive relation with performance (Reynolds et al. 2001; Headd, 2003; Van Praag, 2003). Moreover, this positive relation is linked to there being an element of innovation during the process of business startup by an opportunity entrepreneur (Ho & Wong, 2007).

In this sense and in keeping with Schneider and Veugelers (2010), YICs, which are essentially innovative companies, achieve greater innovative performance than other enterprises, introducing new products or services to the marketplace. This type of company plays a fundamental role in the transformation of industry because, as a result of a combination of their age, size and degree of innovation, YICs do not so much tweak the innovations of the sector where they operate, but instead create new products, technologies or markets and, in turn, drive economic growth and

innovation in their region (Azagra-Caro et al., 2011). Given that innovation is a key factor in the success of businesses, this should be one of the variables that public entrepreneurship policies take into account.

Numerous studies make it clear that firms with R&D departments, those that are technology intensive, those that have high levels of R&D spending per employee, and other such enterprises have greater chances of gaining access to subsidies (Czarnitzki & Fier, 2002; Almus & Czarnitzki, 2003; Görg & Strobl, 2007). Thus, we will test whether these results are corroborated in the case of YICs.

H1: The degree of innovation of YICs positively affects their chances of receiving entrepreneurship subsidies.

Features of the entrepreneur

In addition to the role played by innovation in business performance, other factors linked to the figure of the business owner should be considered. The most commonly studied variables of the entrepreneur are age and gender (Sapienza & Grimm, 1997; Bosma, Van Praag & de Wit, 2000; Ribeiro Soriano, 2003).

In terms of the age of the entrepreneur, several studies have shown that people over 40 years old are more entrepreneurial (Shane & Khurana, 2003; Mas-Verdú et al., 2009). Furthermore, Bosma et al. (2000) showed that this variable may be linked to performance. These authors used age as a proxy for *knowledge of the world*, in other words, to represent experience. Thus,

it can be observed that younger entrepreneurs exhibit a higher rate of venture abandonment.

The survival of enterprises is also often used as a measure of entrepreneurial success (Van de Ven et al., 1984; Cooper et al., 1994; Haber & Reichel, 2005; Nielsen & Lassen, 2012). With this in mind, there seems to be a positive relationship between an entrepreneur's age and business survival.

H2: The older the entrepreneur, the greater the chance of accessing subsidies to set up a YIC.

The ease with which a newly founded company gains access to funding seems to be related to whether the business is set up and run by a female entrepreneur. Thus, Pellegrino and Reece (1982) provide evidence that, as a general rule, women entrepreneurs achieve financial backing in less favorable conditions than their male counterparts. Some authors (Hisrich & Brush, 1984; Verheul & Thurik, 2001; Akehurst, Simarro & Mas-Tur, 2012) have claimed that it is more difficult for women to attract the investment necessary to start up their entrepreneurial ventures and that, in addition, they face problems of credibility when dealing with financial institutions.

In any case, these differences in operating capital do not appear to affect performance, according to the studies carried out by Kalleberg and Leicht (1991), who did not find significant differences in business success between men and women.

For the above reasons, it would be of interest to examine whether public policies take special note of gender (i.e., positive discrimination). However, it is important to bear in mind that, although businesses created by women entrepreneurs are characterized by smaller size (Carter & Rosa, 1998; Cowling & Taylor, 2001), lower growth rate, and lesser chances of attracting investment (Pellegrino & Reece, 1982), among other factors, their performance is not inferior to that of businesses founded by their male counterparts (Kalleberg & Leicht, 1991).

H3: YICs created by women find it easier to access subsidies from public entrepreneurship policies.

Features of the company and its competitive environment

In terms of factors linked to the structural characteristics of the enterprise, various authors have primarily focused on the analysis of the size of the business and its sector (Agarwal & Audretsch, 2001; Fritsch, Brixy & Falck, 2006). In terms of the factors related to the competitive environment, the literature is often based on examining the relation between the degree of competition of the sector where the business operates and the probability of success of the business (Porter, 1979).

As for the size of the business, several authors have analyzed whether this attribute of startup businesses has some effect on their performance (Sutton, 1996; Caves, 1998; Ashworth, 2012). Businesses that are larger to begin with have a greater probability of growing than businesses with a

smaller initial size due to the fact that there is a minimum size of efficiency below which firms are, in most cases, destined to fail (Wagner, 1994; Fritsch, Brixy & Falck, 2006).

A range of authors have concluded that larger businesses have greater chances of obtaining public aid and subsidies (Almus & Czarnitzki, 2003; Görg & Strobl, 2007; Heijs & Herrera, 2007). Thus, we will test if these results are confirmed for the case of YICs.

H4: The size of the YIC has a positive relation with its receiving subsidies.

In terms of sector, Fritsch, Brixy and Falck (2006) showed that the probability of success of a business depends on this factor. Several studies have established the existence of a relationship between sector and the probability that a business will receive public aid. Hewitt-Dundas and Roper (2009) state that companies that compete in traditional sectors have less chance of receiving subsidies. Other authors claim that the manufacturing sector is one of the principal targets for public funding (Almus & Czarnitzki, 2003; González, Jaumandreu & Pazó, 2005). Heijs and Herrera (2004) state that companies that operate in expanding markets or sectors have a greater probability of accessing subsidies. Finally, Czarnitzki and Fier (2002) conclude that the services sector is one of the main beneficiaries of subsidies from public bodies.

There seems to be a relationship between sector and a company's chance of receiving public financial support. However, there is no consensus of opinion in the literature regarding the sectors that should be singled out by entrepreneurship policymakers. Therefore, we may conclude that there

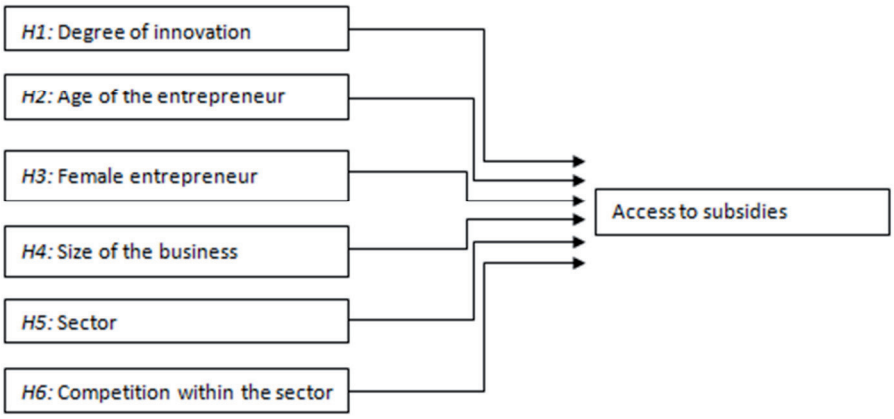
does exist a relation between a company's sector and its receiving subsidies, although it is not possible to determine *a priori* how this relationship works.

H5: The sector where the YIC competes is related with its access to subsidies.

According to Aghion (2011), competition within a sector enhances the need to innovate and, as a result, increases the efforts of companies within the sector to do so. Moreover, a higher degree of competition also increases communication between companies of the same sector, as well as knowledge transfer (Hamel & Prahalad, 2006). Therefore, if competition within the industry where a young company is operating boosts knowledge transfer between competitors, as well as the performance of the companies within that sector, then the degree of competition faced by a YIC could prove to be one of the variables scrutinized by public bodies when devising entrepreneurship policies. In addition, competition in the marketplace is one of the relevant variables in the study conducted by Almus and Czarnitzki (2003), who concluded that when there is greater competition within an industry, there is greater probability of obtaining subsidies.

H6: The degree of competition within a sector is positively related with the probability that a YIC within that sector receives subsidies from public bodies.

Figure 1. Relationships to be tested following the literary review



2.3. Empirical Analysis

Method

The empirical analysis was carried out on a group of YICs from the Valencian Region, located in the southeast of Spain. This region is classified as a European region with low innovation absorption capacity (Azagra-Caro et al., 2011). The enterprises that make up the sample were chosen based on the definitions of YICs employed in the literature (Schneider & Veugelers, 2010; Pellegrino et al., 2009). Thus, these firms were created after 2005 and were therefore less than 8 years old at the time of the study. Furthermore, the business activity of all the companies is based on innovation. All of the 189 firms were started up between 2005 and 2008. According to the IMPIVA (Valencian Institute for Small and Medium-Sized Enterprises), the surveyed companies comprise nearly the entire population of YICs in the region.

The data used in this analysis were collected via a survey conducted in 2009. The survey was administered by the IMPIVA, which was created to foster small and medium-sized enterprises in the Valencian Region. The responses to the questionnaire were gathered from the founders of the YICs being analyzed. The items on the questionnaire covered the YIC's sector, key aspects of the organization and information about the respondent as an entrepreneur.

We used this data to analyze the influence of the variables discussed above—age and sex of the entrepreneur; sector, size and degree of innovation of the YIC; and competition within the sector—on the probability of obtaining public aid.

Definition of variables

The variable *age of the entrepreneur* was defined using a binary variable (young/not young) with the cut-off point at 40. This age was established by considering the mean age of the entrepreneurs in the Valencian Region, in accordance with the *Global Entrepreneurship Monitor*. In addition, following authors such as Klofsten and Jones-Evans (2000), the majority of entrepreneurs are over 40 when they start their own businesses.

The variable *gender* was also defined using a binary variable to establish whether the business is run by a male or a female entrepreneur.

The companies in the sample were split into two groups depending on the sector where they carry out their business activity. The first group

incorporates enterprises from the manufacturing sector, thus defined if their main activity is the production of goods. The second group is made up of the tertiary or services sector, which consists of enterprises whose main activities are related with IT, R&D, consultancy, and engineering services, among others.

The variable *size of the firm* was measured according to the number of employees. The questionnaire offered seven options for this variable: fewer than 5 employees, 5 to 10, 11 to 24, 25 to 49, 50 to 99, 100 to 249, or more than 250 employees.

For the variable *degree of innovation of the company*, we started with the assumption that all YICs are, by definition, innovative and, hence, we attempted to differentiate between these companies based on their degree of innovation. It is worth mentioning here that, according to the sample design, the companies are classified into three levels of innovation. The entrepreneurs elected the category that best corresponded to the degree of innovation in their firms[1]. Thus, in this study the categories are: 1) technology-based firms (TBFs), which are firms whose activity is based on technology and specialized knowledge; 2) highly innovative firms, which are companies that develop more than one new product, service or process per

[1] This classification is based on a self-evaluation completed by each entrepreneur and therefore does not refer to any absolute figures of R&D investment. The majority of studies based on the *Community Innovation Survey* (CIS) also use self-evaluations, given that it has been shown that the results yielded from this type of survey are reliable and offer a narrow range of possibilities. Furthermore, to confirm that this is the case, the categories based on the self-evaluation were compared with other evaluations from the literature (Hyytinen & Toivanen, 2005; Takalo & Tanayama, 2010).

year; and 3) innovative enterprises, which are organizations that frequently improve their products, services or processes.

To measure competition within the sector, the questionnaire allowed respondents to choose from the following three groups: 1) companies in sectors where there are few competitors and these are totally identifiable; 2) companies in sectors where there is a limited number of competitors, provided there are no fewer than 10 competitors; and 3) companies in sectors where the competition is vast, and there are a large number of competitors that cannot be identified.

Finally, the dependent variable was taken to be whether or not the YICs have received subsidies. To measure this, we created a binary variable that takes the value 1 when the YIC has had access to subsidies from the Valencian Government or from other public institutions, and 0 when the YIC has not obtained any type of public aid in the form of subsidies.

Data analysis

The aim of this study is to verify, using the variables described above, whether there exist significant differences in a YIC's probability of benefiting from public policies depending on characteristics of the entrepreneur (age and sex of the founder of the company), features of the company itself (sector and size) and other factors to do with the YIC's business activity (degree of innovation and the competition within its sector).

The hypotheses set out above were tested using binary logistic regression analysis. Following this analysis, moderating variables were included in the model to detect interactions between variables. Thus, an independent variable may have no direct effect on the dependent variable, while at the same time producing an effect on the relationship between the dependent variable and other independent variables. The moderating variables pick up on the relations existing between the independent variables (degree of innovation, age and gender of the entrepreneur, size and sector of the company, and competition within that sector) and the dependent variable (access to subsidies).

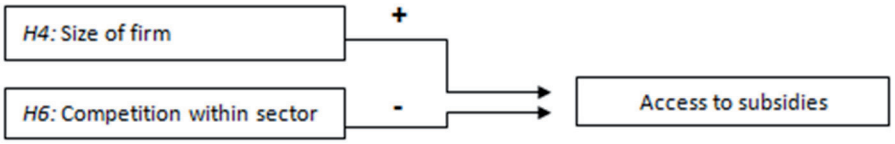
2.4. Results

We first generated a binary logistic regression (Table 1), which yielded the following model, with a significance level of 95% (Chi-squared = 9.833, p-value = 0.007).

Table 1. Results of the binary logistic regression

	B	S.E.	Wald	Df	Sig.	Exp(B)
Sector	.208	.152	1.878	1	.171	1.232
Competition	-.440	.218	4.091	1	**.043**	.644
Innovation	-.151	.199	.577	1	.448	.860
Size	.240	.103	5.470	1	**.019**	1.271
Gender (Female)	-.502	.386	1.692	1	.193	.605
Age	.056	.329	.029	1	.864	1.058
Constant	.919	.555	2.738	1	.098	2.506

Figure 2. Significant relationships from the regression shown in Table 1



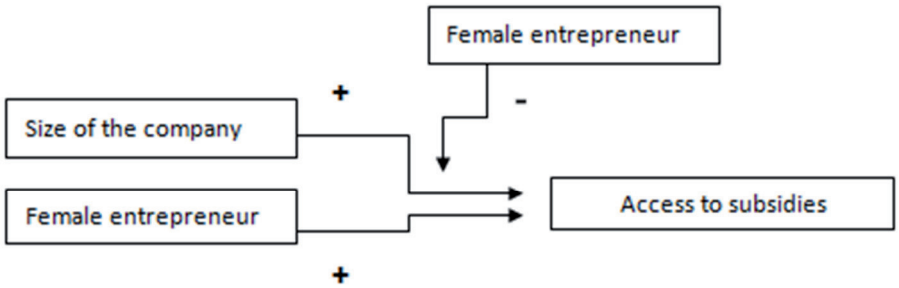
The size of the YICs and the competition within their sector of activity show significant relations with receiving subsidies from public institutions. The relationship between size and receiving subsidies is positive: larger YICs have a greater chance of receiving aid from public bodies. On the other hand, the relationship between competition and access to subsidies is negative, contradicting what we earlier inferred from the literature. However, given the level of significance, this relation could be subject to variations upon introducing moderating variables in the model.

Following this initial analysis, we analyzed the existence of interactions by creating the following variables: competition x sector, competition x innovation, competition x age, competition x gender, size x sector, size x innovation, size x age, size x gender, size x competition, gender x innovation, gender x age, gender x sector. Table 2 displays only the variables that provide significant results in this new model, at the 95% significance level (Chi-squared = 28.303, p-value = 0.001).

Table 2. Results of the binary logistic regression incorporating moderating variables

	B	S.E.	Wald	df	Sig.	Exp(B)
Size	1.185	.333	12.645	1	**.000**	3.271
Female entrepreneur	1.875	.882	4.520	1	**.033**	6.518
Size x female entrepreneur	-.727	.236	9.478	1	**.002**	.483
Constant	-2.380	1.138	4.372	1	**.037**	.093

Figure 3. Significant relationships from the regression in Table 2



When we introduced these moderating variables in the model, competition ceased to be a significant influence on whether YICs receive subsidies. A possible explanation for this result is that, because its p-value in the first model is very close to 0.05 (0.043), it may be very sensitive to changes in the model.

Size, as posited in Hypothesis 4, is positively linked to the probability of achieving greater access to subsidies. In other words, larger YICs are more likely to obtain funding from subsidies. However, this conclusion should be refined to allow for the fact that 59% of the YICs in the sample have fewer than five employees and only 5% have a staff of more than 25. Therefore,

public policies in this field should take into account this factor in their design and implementation.

The YICs run by female entrepreneurs have a greater chance of receiving subsidies than their male counterparts. This result supports Hypothesis 3 and corroborates the findings of other studies (Reynolds et al., 2001), in the sense that it implies that growth and prosperity in the long term occur as consequences of an increase in participation of women in business activity.

Of all the moderating variables, only the gender of the entrepreneur is shown to be significant in the model. When a YIC is large and was set up by a female entrepreneur, the probability of receiving subsidies is lower than for large companies or those run by women in general. Similarly, women always have a greater probability of receiving subsidies than men, and this probability is even higher in the case of small enterprises. This is an example of the effect of interaction that cannot be picked up on just by considering the two variables independently. This may be interpreted as a consequence of the general rule that, in most cases, women are owners of small businesses.

It is also of note that the variables related to the age of the entrepreneur, degree of innovation, sector, and competition within the sector do not affect a company's chances of receiving a subsidy. A greater degree of innovation does not raise the probability of obtaining subsidies. The target companies of these subsidies are, by definition, innovative and, in light of the above results, it seems that public policies do not consider nor discriminate according to the innovative intensity of the firm. It is worth

noting, however, that 50.8% of the YICs in the sample can be considered technology-based firms.

In our model, the variable *age* did not have a significant influence either. As in the case of degree of innovation, it is worth pointing out that the literature calls for the design of public policies to be honed. Bosma et al. (2000) highlighted the fact that the youngest entrepreneurs usually show a higher rate of abandonment of their business projects. These authors go on to conclude that this group of entrepreneurs should not be the target of public aid. In our analysis, public policies are shown to be unaffected by the age of the entrepreneur.

2.5. Discussion and Conclusions

This paper analyzes the profile of young innovative companies (YICs) with respect to their chance of receiving public aid in the form of subsidies. The aim of the study was to examine the features of YICs that increase this probability. Thus, we sought to establish whether public policies are a good fit with the specific characteristics of this type of company. We used data from a sample of 189 YICs from the Valencian Region, which constitutes nearly the entire population of YICs in the region. The majority of these enterprises (84%) have fewer than 10 employees (i.e., they are microenterprises), operate in the services sector (59%) and are defined as technology-based firms (51%).

The conclusions of the study can be summarized as follows. First, the results yielded from the model that includes all variables show that YICs created and run by women have a greater probability of obtaining

subsidies. Thus, we can conclude that public policies seem to take note of the gender of the entrepreneur. Several authors (Hisrich & Brush, 1984; Verheul & Thurik, 2001; Akehurst, Simarro & Mas-Tur, 2012) state that it is more difficult for women entrepreneurs to attract the investment necessary to start a business. With this in mind, it appears that the policymakers of the type of policies addressed by this study have raised their awareness of this barrier and are implementing positive discrimination towards female entrepreneurs who run YICs.

Second, although the results show that larger YICs find it easier to access subsidies, this conclusion should be refined; on the one hand, because 60% of the sample was made up of businesses with five employees or less; and on the other, because large businesses started by women were shown to have a lower probability of obtaining subsidies than when these two factors were considered independently. This may be a consequence of the fact that women are, for the most part, owners of small businesses (Carter & Rosa, 1998; Cowling & Taylor, 2001).

Third, and despite the implications of the literature (Almus & Czarnitzki, 2003; Czarnitzki & Fier, 2002; Görg & Strobl, 2007), a YIC's degree of innovation was not shown to have a significant relationship with its receiving subsidies. This may be because in the criteria used to gauge the concession of subsidies, public bodies do not allow for differing intensities of innovation, and simply look at whether or not the company innovates. However, in agreement with the literature analyzed above, many authors call for the degree of innovation to form part of the decision process when granting public aid. Given that YICs are, by definition, innovative companies,

the difference in degree of innovation between these firms ought to be one of the determinants of public policymaking.

Finally, the remaining variables that were originally cited in the literature on companies in general as potential factors in access to subsidies—age of the entrepreneur, sector and degree of competition within the sector—do not exhibit significant relationships with the dependent variable in our model.

These conclusions yield some important implications for the definition of public policies for YICs. We have observed that relatively few features of YICs exert a significant influence on whether they receive subsidies. It is of particular note that the degree of innovation is not among the variables that influences whether a YIC receives a subsidy. In light of this observation, regional and national governments could boost the efficiency of their efforts to promote entrepreneurship if such policies were made more specific. This goal could be achieved through selective policies that are separated out into programs that fit the needs of each project, depending on its specific characteristics. Furthermore, as a more general point that takes its lead from models established on the international stage (Lerner, 2009), it would be advisable to place a greater emphasis on complementing financial support (subsidies and tax breaks) with indirect actions (consultancy and advisory services, etc.).

This study is not without limitations. First, the number of YICs in the sample is relatively small (fewer than 200 observations). However, due to the survey design, the sample size can be considered sufficiently representative of the total population of this type of company in the region in question.

Second, the dependent variable is binary, corresponding to the response to the question, 'Have you ever received subsidies from a public body?' This variable does not allow for frequency, size of the subsidy or the outcome of the public financial support. Also, information relating to when the subsidy was granted was not collected, therefore preventing temporal comparisons between companies. The third limitation has to do with the study of only one form of entrepreneurship policy (subsidies) when, in practice, there exist a whole host of actions for stimulating entrepreneurship. These actions cover not only a range of different areas and stages in a business venture, but are also implemented via a range of different programs (technical advisory services and training, guarantees and endorsements, etc.).

From the results of the analysis and the limitations highlighted above, two possible future lines of research should be pursued. On the one hand, it would be of interest to adapt the dependent variable to incorporate other entrepreneurship policy instruments such as the supply of technology and organizational resources that seek to enable the growth of new ventures through connection and transfer services (Lundvall et al., 2000; Furman, Porter & Stern, 2002) in addition to public support in the form of financial aids. On the other hand, it would be equally instructive to conduct comparative analysis between YICs and other enterprises, in relation to public entrepreneurship policies. Such a study may detect differences in the characteristics of the two groups when accessing different forms of public policy support.

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Capítulo III

EL GRADO DE INNOVACIÓN DE LAS JÓVENES EMPRESAS INNOVADORAS: LA INFLUENCIA DE LOS SERVICIOS INTENSIVOS EN CONOCIMIENTO Y DE LAS CARACTERÍSTICAS DE LA EMPRESA Y DEL EMPRENDEDOR

CAPÍTULO III

El grado de innovación de las Jóvenes Empresas innovadoras: La influencia de los servicios intensivos en conocimiento y las características de la empresa y del emprendedor

Artículo

THE LEVEL OF INNOVATION AMONG YOUNG INNOVATIVE COMPANIES: THE IMPACTS OF KNOWLEDGE-INTENSIVE SERVICES USE, FIRM CHARACTERISTICS AND THE ENTREPRENEUR ATTRIBUTES

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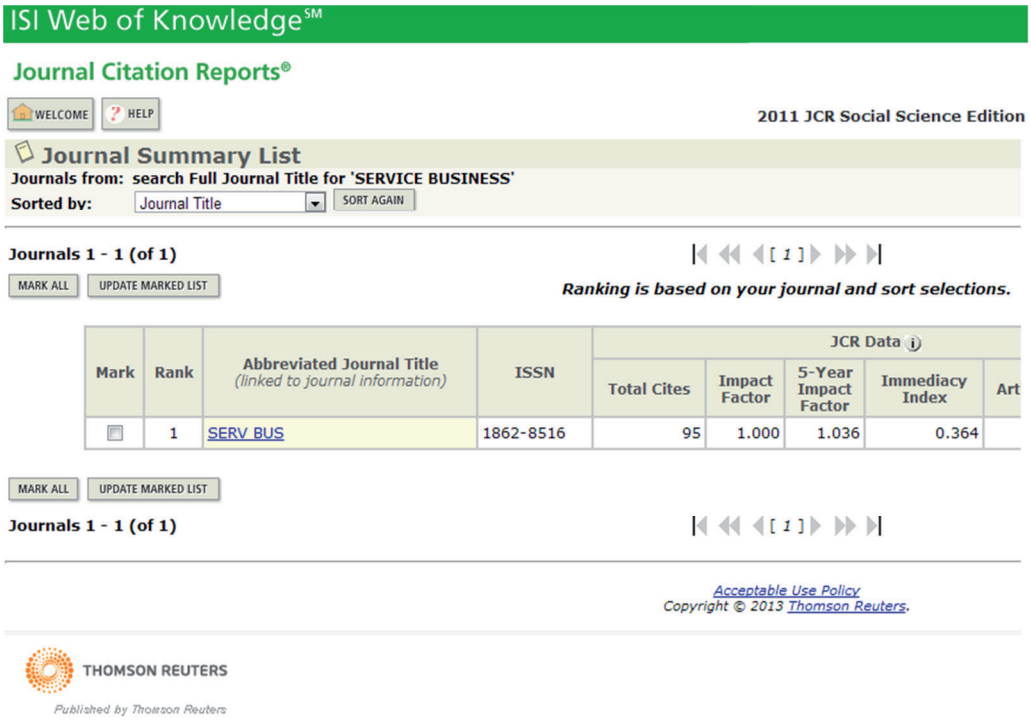

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THE LEVEL OF INNOVATION AMONG YOUNG INNOVATIVE COMPANIES: THE IMPACTS OF KNOWLEDGE-INTENSIVE SERVICES USE, FIRM CHARACTERISTICS AND THE ENTREPRENEUR ATTRIBUTES.

Abstract

The link between difficulties in obtaining funding and young innovative companies (YICs) has been investigated in numerous studies. YICs also face other barriers such as limited internal resources, access to technology services, etc. Thus, any public policy on innovation for providing financial support to YICs must be accompanied by offering technical assistance and consulting services. The purpose of this study is to determine the characteristics of YICs that enhance their innovation and, specifically, if the use of knowledge-intensive business services (KIBS) helps drive innovation. This study also investigates the level of innovation among YICs in relation to the firms' characteristics (size, sector, competition) and the entrepreneurs' attributes (age, gender). This study found that the use of KIBS stimulates innovation in YICs.

Keywords: Young innovative companies, knowledge-intensive business services, public policies.

3.1. Introduction

The attention paid to the creation of businesses is growing all the time as it is the engine for economic growth (Chaston and Scott, 2012; Ashworth, 2012; Urbano, 2006). In particular, smaller businesses are important because of their flexibility and capacity to adapt to change. Among SMEs, there lies a special type of business: the so-called young innovative companies (YICs). YICs are small, young businesses with a great potential to develop innovations for commercial applications (Schneider and Veugelers, 2010). More specifically, these businesses can be characterized by: introducing new, highly innovative products or processes to the market; being less than six years old; comprising fewer than 250 employees; and allocating at least 15% of their spending to R&D (Veugelers, 2009).

YICs, therefore, form a special group of innovation-intensive SMEs. This defining characteristic of YICs produces social benefits. For this reason, a large portion of the literature on YICs advocates a greater and more intensive involvement of the government in this area (Veugelers, 2009).

As a general rule, public involvement in the field of entrepreneurship is natural due to a high degree of failure, which makes it difficult for newly created firms to attract investment (Hall, 2008; Lee, Hwang and Choi, 2012). The barriers to attract funding to YICs have been investigated by many researchers such as Schneider and Veugelers (2010) and Mas-Tur and Simón Moya (2013). YICs also face other difficulties such as limited internal resources, access to technology services, etc. Thus, public funding activities for YICs must include other indirect types of support such as the provision

of advisory or consultancy services to foster the development of services based on connections and knowledge transfer (Lundvall et al., 2000; Furman et al., 2002).

Knowledge-intensive business services (KIBS) act as an important source of external knowledge that contributes to innovation. Miles (2005) has defined KIBS as services directed towards private businesses and public institutions that perform complex, problem-solving operations where the role of human capital is key. KIBS carry out various tasks that are essential for innovation, incorporating knowledge-intensive activities in the production processes of other businesses (García-Quevedo et al., 2013; Parker, 2012).

Public policy aimed at fostering entrepreneurship, specifically the creation of innovative businesses, has yet to receive attention for a detailed study (Minniti, 2008). There remains much to investigate to determine which characteristics constitute effective policies. In the case of innovation policies to stimulate the use of advanced services, although there is a rich literature on KIBS, there are very few studies focusing on YICs (Schneider and Veugelers, 2010). As a matter of fact, there is hardly any study that aims to link the use of KIBS to business innovation (Simmie and Strambach, 2006). In order to contribute to bridging this gap, the current study analyzes if the use of KIBS, as well as other characteristics such as business size, business sector and the entrepreneur's gender, influence the degree of innovation in YICs.

This study is organized as follows. The next section provides a review of the most recent literature on KIBS and then examines the way in which the use of these services boosts innovation in YICs. The third and fourth sections present the empirical analysis and the results. Finally, the main conclusions of the study are brought together in the fifth section, along with the work's limitations and possible future lines of investigation.

3.2. Theoretical Framework

Policies for promoting innovation have been studied by numerous authors. However, empirical studies on the topic have shown ambiguous or contradicting results. The studies by Baumol (1990), Stevenson and Lundström (2001), Audretsch (2003), Santarelli and Vivarelli (2007), Mas-Verdú et al. (2009) and Veugelers (2009) found that there was a positive relationship between public policy and innovative entrepreneurship, whereas those conducted by Duckett (2001), Djankov et al. (2002) and Pages et al. (2003) are the most critical studies on the effectiveness of innovation policies. Despite the obvious discrepancy of results, this paper builds on the first of these two schools of thought because, among other reasons, the innovations brought about by YICs justify government involvement in this field (Veugelers, 2009).

Stevenson and Lundström (2001) suggested a classification scheme for innovation policies that foster the creation of innovative businesses (*E-Policy* or *Entrepreneurship Policy*), in *SME Policy Add-on, Niche Entrepreneurship Policy* and *Generic Entrepreneurship Policy*. *SME Policy*

Add-on consists of activities focused on the creation of new firms, along with the promotion of entrepreneurship in the already existing programs available to SMEs. *Niche Entrepreneurship Policy* comprises those policies where the government establishes assistance for a certain group or type of entrepreneurs or entrepreneurial ventures. These policies may be aimed at a specific sector of the population of entrepreneurs that is underrepresented (female entrepreneurs, young firms, etc.), or may also be directed at generating high business potential via investment in R&D. The third and final type of public policy, *Generic Entrepreneurship Policy,* consists of actions that are more generic in nature that focus on creating an approach which is congruent with a set of policies promoting innovative entrepreneurship.

Thus, public policies that promote YICs fit into the second of the three approaches, the topic of this study, the *Niche Entrepreneurship Policy* category. These policies comply with the two principal objectives of the paper: they are directed at a specific group (in this case young firms), and those with great business potential (in this case due to their innovation intensity).

The need for public institutions to step in can be justified because of a high degree of failure of YICs (Schneider and Veugelers, 2010; Baba and HakemZadeh, 2012). A sizeable portion of the failures is related to the difficulty that YICs face in securing financial resources (Hall, 2008; Veugelers, 2009). In addition, there are other barriers that YICs face, as discussed already. These barriers involve intangible difficulties that could be

mitigated through advisory or consultancy services (Lundvall et al., 2000; Furman et al., 2002; Lin and Liu, 2012).

The programs designed to stimulate YICs should include two components. The first involves financial issues inherent in risk-taking decisions for creating an innovative firm (Veugelers, 2009). Second, it is advisable for the program offering financial support to be accompanied by programs that enable YICs to access advanced services such as consultancy or advisory services, namely knowledge-intensive business services (KIBS). KIBS cover professional services such as strategic advisory services for design, engineering, consulting, etc., as well as technical services for advertising and marketing, etc. (Simmie and Strambach, 2006; Goktan and Miles, 2011; Nielsen and Lassen, 2012). Thus, KIBS generate and disseminate knowledge, which is crucial in the innovation process.

Innovation has a fundamental role within the context of public policies due to the key function that innovation plays in the success of businesses and regions. YICs are, by definition, innovative businesses (Schneider and Veugelers, 2010), and therefore serve a vital purpose in transforming the economy and contributing to the growth and innovation of a region (Azagra-Caro et al., 2011; Hotho and Champion, 2011; Reed, Storrud-Barnes and Jessup, 2012). Thus, the main aim of this study is to investigate how the degree of innovation of YICs is enhanced by the use of KIBS. The study also investigates the features of YICs that generate the greatest innovation among these businesses. In doing so, this focus enhances not only young companies, but also highly innovative firms.

Knowledge-intensive business services (KIBS)

There are various ways to define KIBS without reaching a consensus (Den Hertog, 2000, García-Quevedo et al., 2013; Audretsch, 2012). Miles (2005) defined KIBS as being based on the knowledge of people: professional knowledge. On the other hand, Mas-Verdú et al. (2011) define KIBS as including a variety of services, ranging from advertising to legal services, and suggesting that these services be provided via consultancy, advisory services, engineering, technical analysis, and the like. Bettencourt et al. (2002) propose that companies offering KIBS are those whose main function is the accumulation, creation and diffusion of knowledge, with the objective of developing services or products to meet the needs of the client. Finally, Muller and Zenker (2001) highlighted KIBS as services with a high intellectual value added.

The functions of KIBS include the following two elements: 1) acting as enablers and sources of innovation for firms from other sectors; and 2) developing innovation through knowledge-transfer activities (Audretsch, 2012; García-Quevedo et al., 2013; Mas-Verdú et al., 2011; Muller and Zenker, 2001). In short, KIBS form a fundamental link in the transfer of knowledge, exchange of information and the innovation process (Mas-Verdú et al., 2009; Rezaeenour, Mazdeh and Hooshmandi, 2011; Tuan, 2012). Hence, studying these services in relation to YICs is of importance, given that YICs play a vital role in the process of technological implementation, which contributes to the regeneration of the economy (Pellegrino et al., 2009). An appropriate design of the public policy that

enables access for YICs to KIBS would be valuable for the innovative processes of these businesses (Kirzner, 2009).

Because of their specific characteristics, smaller businesses, including YICs, have a special facility to innovate through collaboration with other companies. This allows small firms to converge their internal knowledge resources more efficiently and combine these resources with their collaboration partners (Muller and Zenker, 2001). KIBS act as an external knowledge resource and contribute to the innovation process of their clients. In this sense, KIBS may be viewed as co-innovators (García-Quevedo et al., 2013; Lee, Olson and Trimi, 2012) with their YICs clients. However, this relationship goes one step further as KIBS themselves could benefit from their interactions with other firms, in terms of access to skills and capabilities to innovate. This creates a virtuous circle in which all of the agents that form the innovation value chain are beneficiaries (Muller and Zenker, 2001). The following hypothesis is proposed.

H1: The use of KIBS by YICs is a driver of innovation.

Characteristics of YICs and their surroundings

Adapting the methodology expounded by Almus and Nerlinger (1999), two groups of independent variables can be distinguished: (1) the specific characteristics of the YIC and its surroundings, and (2) the characteristics of the actual founder of the YIC. The study also considers as an independent variable the use of KIBS as a potential enhancer of innovation in YICs.

As regard to the size of the company, there is a certain degree of controversy in the literature surrounding the relationship between the size of a business and its innovative capacity. However, this disparity is often due to different ways of measuring the variables being investigated. Recent literature has affirmed that there is a positive relationship between business size and innovation (Rogers, 2004; Boronat et al., 2002; Idris and Tey, 2011). Thus, larger firms have a greater capacity for innovation and allocate more funding to R&D (Cohen and Levinthal, 1990). We investigate whether this relationship can be extrapolated to YICs by suggesting the following hypothesis.

H2: Larger YICs have a higher degree of innovation.

Numerous works clearly demonstrate that a relationship exists between the business sector and the innovative potential. Some studies have established that this relationship is stronger in traditional sectors (Hewitt-Dundas and Roper, 2009; Dinur, 2011). Other works have highlighted the fact that the manufacturing sector makes better use of innovation policies than other sectors (Almus and Czarnitzki, 2003; González, Jaumandreu and Pazó, 2005; Madichie, 2011). A third group of authors have concluded that businesses in the services sector are the heaviest users of innovation policy (Czarnitzki and Fier, 2002; Magala, 2012; Renko, Shrader and Simon, 2012). Thus, in this study, the relationship between the sector in which the YIC operates and its degree of innovation is investigated, in light of the majority of results present in the literature. The following hypothesis is developed.

H3: The innovative potential of YICs is stronger in the service sector than others.

Finally, in regard to the degree of competition present in the YIC's sector, Aghion et al. (2005) produced the first model to show the existence of a non-linear relationship between a sector's degree of competition and innovation. The relationship between these two variables took the form of an inverted *U*. According to the model, in sectors where the technology gap between companies is small, the relationship between innovation and competition would be positive, whereas in sectors businesses have very different levels of technology, the relationship between these variables would be negative. This negative relationship is a consequence of the Schumpeterian effect, which states that innovation reduces the competition. Since YICs are, by definition, innovative companies, we understand that the technology gap between YICs is small. The following hypothesis is proposed.

H4: The greater the competition in the YIC's sector, the greater the YIC's innovative capacity.

Characteristics specific to the entrepreneur

Bosma et al. (2000) showed that the entrepreneur's age is related to various measures of performance (profit, job creation, etc.). More specifically, one of the most widely used variables to measure the success of a business is the rate of survival (Brüderl and Schussler, 1990; Cuervo,

Ribeiro and Roig, 2007; Haber and Reichel, 2005; Hackling and Wallnöfer, 2012). In this sense, and in keeping with the investigations carried out by Haber and Reichel (2005), there seems to be a positive relationship between age and performance of newly created firms; that is to say, the older the entrepreneur, the greater chance the business has of lasting. However, Stam, Suddle, Hessels and van Stel (2006) suggested that an entrepreneurial, ambitious spirit on the part of young entrepreneurs has a greater contribution to economic growth than innovative activity in general. These results are relevant in light of the debate about the suitability of the public policies oriented at promoting high-growth businesses created by young entrepreneurs. In this study, we investigate whether these results also apply to YICs by suggesting the following hypothesis.

H5: The age of the entrepreneur is positively related to the degree of innovation of the YIC.

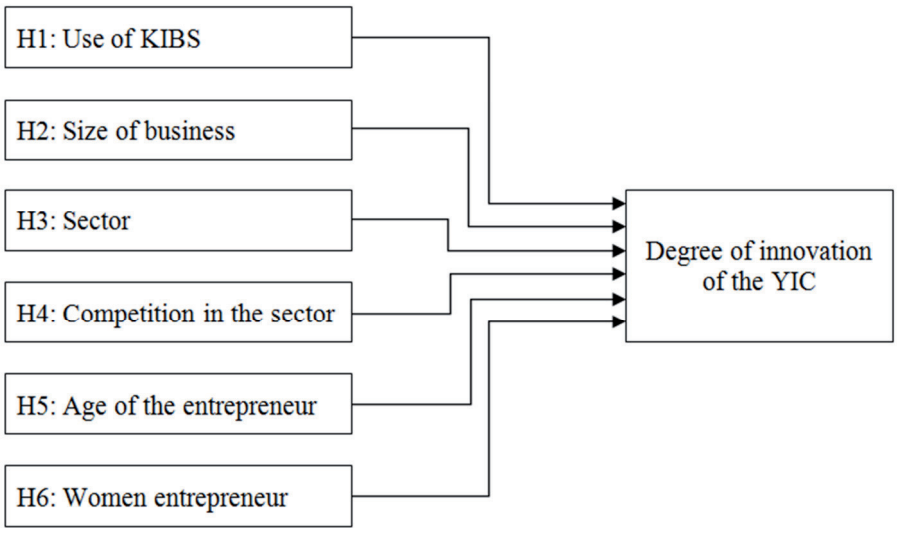
With respect to the gender of the entrepreneur, an important factor to bear in mind is that businesses created by female entrepreneurs are characterized by a smaller size (Carter and Rosa, 1998; Cowling and Taylor, 2001; Lin, 2011), lower growth rate, lesser chances of receiving funding (Pellegrino and Reece, 1982, Huarng et al., 2012), less access to advisory services, etc. However, their performance is not inferior to that of businesses created by men (Kalleberg and Leicht, 1991; BarNir, 2012). This means that, despite the differences that exist between genders when obtaining access to capital and in running a business, no significant difference exists in the success of businesses run by women from those run by men. In the specific case of YICs, those YICs run by women have a

greater degree of innovation than those created by their male counterparts (Mas-Tur et al., 2013). These results agree with those of Reynolds et al. (2001), who pointed out that the growth and prosperity of society in the long term rely on an increase in the role of women in business activities. The following hypothesis is developed.

H6: YICs created and run by women have a greater innovative capacitythan those by men.

The research model with associated hypothesis is presented in Figure 1.

Figure 1. Research model and hypotheses



3.3. Methodology

Process and definition of variables

The analysis of data was carried out for a group of 189 young innovative companies (YICs) in the Valencian Region (Comunidad Valenciana), a European region situated in the southeast of Spain. The data was collected via a survey administered in 2009 and 2010 and was chosen based on the suggestions taken from the literature on YICs (Veugelers, 2009; Schneider and Veugelers, 2010; Pellegrino et al., 2009). The survey targeted companies that were less than eight years old at the time of carrying out the survey and had business models based on innovation. This sample of YICs corresponds to almost the entire population of this type of business in the region being investigated, according to the Valencian Institute for Small and Medium Size Enterprise (Instituto de la Pequeña y Mediana Industria Valenciana, IMPIVA).

The survey questionnaire utilized items that were validated by previous studies. To develop the questionnaire, the double translation protocol was used. The questionnaire was first prepared in English and it was translated into Spanish by the researchers. Then, the Spanish version was translated back into English by a bilingual faculty specializing in entrepreneurship. The two English versions had no significant differences.

Basing the study on this sample, analysis was carried out to determine whether the use of KIBS by YICs increased their innovative capacity. The analysis also investigated if the specific characteristics of YICs – the size of the company, business sector and the degree of competition the company

faces – and the attributes of the company's founder – age and sex – are related to the innovation potential of the YICs.

For the dependent variable, degree of innovation, the responders to the questionnaire classified their YICs according to the following three options: technology-based company (high R&D intensity), highly innovative company (medium R&D intensity), and innovative company (low R&D intensity). This classification is the one used by the Valencian public institutions in their decisions on access for companies to innovation policies, hence its use in this study. The majority of studies based on the Community Innovation Survey (CIS) also use self-evaluations, given that it has been shown that the results from this type of survey are reliable and offer a narrow range of possibilities (Hyytinen and Toivanen, 2005; Takalo and Tanayama, 2010). Table 1 shows the definitions of the variables used in the study.

Table 1. Variables used in the statistical analysis

VARIABLE	DEFINITION
Use of KIBS	Whether or not the YIC has had access to consultancy and advisory services via innovation policy.
Size of the YIC	A seven-point scale was used for this variable, depending on the number of employees of the business. The groups are as follows: fewer than 5, between 5 and 10, between 11 and 24, between 25 and 49, between 50 and 99, between 100 and 249, and over 250 employees.
Sector in which the YIC operates	The industrial sector (the principal activity of the YIC is manufacturing products) and the services sector (the principal activity of the YIC is related to IT services, R&D, cultural services, engineering services, etc.).

Degree of competition in the sector	The following three categories were used: 1) companies operating in a sector where there are few other companies offering competing products or services, and, in addition, these companies are completely identifiable; 2) companies that compete in a sector where there are a limited number of competitors, provided this number does not exceed 10; and 3) companies that do business in sectors where the competition is prevalent (i.e., there are a large number of competitors, and this number cannot be identified).
Age of the entrepreneur	Binary variable (young/not young) to determine whether the entrepreneur is older than 40 or not. (This figure was determined by taking into account the mean age of the entrepreneurs in the Valencia Region.)
Gender of the entrepreneur	Binary variable that determines whether the major entrepreneurial activity is performed by a male or a female entrepreneur.

The developed hypotheses based on the literature review were tested using binary logistical regression analysis. The model introduces, in addition to the already defined variables, new moderating variables to detect possible interactions. These moderating variables bring together the relationships that already exist between the independent variables (use of KIBS, age and sex of the entrepreneur, size of the company, sector, and degree of competition faced in the sector) and the dependent variable, degree of innovation. These moderating variables were calculated as a product of the independent variables, for example competition*sector, competition*use of KIBS, competition*gender, size*sector, etc.

3.4. Results

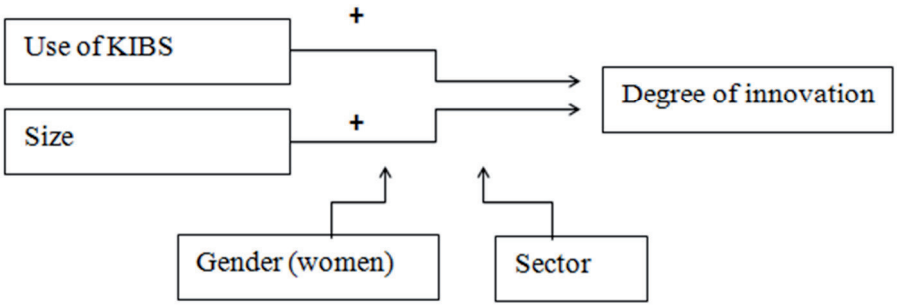
Table 2 presents the results of the binary logistical regression analysis according to the steps carried out. This model had a significance level of 99%.

Table 2. Results of the binary logistic regression analysis.

	B	S.E.	Wald	d.f.	Sig.	Exp(B)
Use of KIBS	.845	.350	5.843	1	**.016**	2.329
Size of YIC	2.524	1.256	4.038	1	**.044**	12.481
Size*sector	-.671	.299	5.052	1	**.025**	.511
Size*gender	-1.111	.540	4.223	1	**.040**	.329
Constant	-1.458	1.073	1.846	1	.174	.233

As can be observed Table 2, both the use of KIBS and the size of the company have direct, positive significant relationships with the degree of innovation of the YIC. Furthermore, the YIC's sector and the fact that the YIC is run by a woman entrepreneur have negative influences on the relationship between size and the degree of innovation of the company.

Figure 2. Relationships between the factors of the model.



As can be inferred from the literature, the variable *use of KIBS* is positively related to the company's degree of innovation. Thus, companies that have access innovation policies and, in particular, use KIBS, are found to be more innovative. This result is consistent with the studies of Almus and Czarnitzki (2003) and Görg and Strobl (2007).

The size of the YIC also has a positive relationship with the degree of innovation. This result is in line with the findings from the literature review, which asserted that the larger the company, the greater the chances of the company increasing its R&D spending. However, it must be noted that 59% of the YICs in the sample have fewer than five employees and only 5% have a staff of more than 25 people.

The fact that the company is run by a woman entrepreneur negatively moderates the positive relationship between size and innovation. Thus, when the company is large and the founder is female, the probability that the YIC is highly innovative or technology-based decreases. This finding may be a consequence of the fact that women are generally owners of small

businesses. Sector also has a moderating relationship, which may be explained by the nature of the study, given that 80% of the companies investigated operate in the services sector. Finally, the variables corresponding to sector competition and the entrepreneur's age do not have a relationship with the degree of innovation of the YIC.

3.5. Conclusions

The purpose of this study was to explore the analysis of YICs because of their potential as engines for the economic growth of a region or country. More specifically, the analysis looked into the role of KIBS as drivers of innovation in YICs. In addition, the study investigated which of the characteristics of YICs increase their innovative capacity.

First, the use of KIBS by YICs, through innovation policies, was found to increase the innovative capacity of YICs. This result is particularly relevant since YICs are essentially innovative businesses as they play a key role in the transformation of industries (Schneider and Veugelers, 2010). Therefore, it would be revealing to verify whether governments consider this type of company to be a target for their innovation policies. These policies support innovation on several levels, through the use of subsidies, the promotion of infrastructure and knowledge transfer. One of the principal functions of KIBS is to act as enablers and sources of innovation for companies from other sectors. Therefore, it is interesting to observe that KIBS also enhance innovation in companies that are, by definition, innovative (Audretsch, 2012; Mas-Verdú et al., 2011).

Second, size was observed to positively affect the YIC's degree of innovation. This finding is consistent with results from other studies showing that the probability of companies performing innovative business activity is related to the size of the company (Buesa et al., 1998). Thus, business size is clearly linked to the investment model of innovative companies and, therefore, larger businesses have greater investment capacities to drive innovation. YICs tend to be small companies but, despite this, the larger YICs achieve higher levels of innovation.

Third, it is shown that the remaining variables – sector, sector competition, age and sex of the entrepreneur – do not have a direct relationship with the degree of innovation of YICs. In this case, it seems that innovation policy is being applied based on standard criteria, without taking into account some specific groups of innovative firms (Schneider and Veugelers, 2010). As highlighted by Bridge et al. (2003) and Stam et al. (2006), it appears to be necessary to establish specific objectives and select target groups to increase the efficiency of the support measures being offered. For this reason, when designing innovation policy strategies, it would be advisable to consider certain groups of businesses that may have high growth potential, such as YICs.

As a final remark to highlight some of the limitations of this work, it should be noted that the dependent variable is binary and only differentiates between innovative YICs and highly innovative or technology-based YICs. This could constitute a future line of investigation, which could try to evaluate the innovative intensity of YICs by comparing R&D spending with turnover. On the other hand, information on the point in time when the

YICs had access to KIBS is not available, which prevents the study from taking this temporal factor into account. Once again, a longitudinal analysis could prove to be a fruitful line of investigation. Finally, this study could provide the basis for a posterior qualitative analysis. Along these lines, it would be useful to investigate how to promote not only young innovative companies but also highly innovative YICs by fostering specific features of YICs and, in particular, through the use of KIBS.

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Capítulo IV

¿DIFERENTES POLÍTICAS DE INNOVACIÓN PARA DIFERENTES TIPOS DE EMPRESAS INNOVADORAS?

CAPÍTULO IV

¿Diferentes Políticas de innovación para diferentes tipos de empresas innovadoras?

Artículo

DIFFERENT INNOVATION POLICIES FOR DIFFERENT TYPES OF INNOVATIVE COMPANIES?

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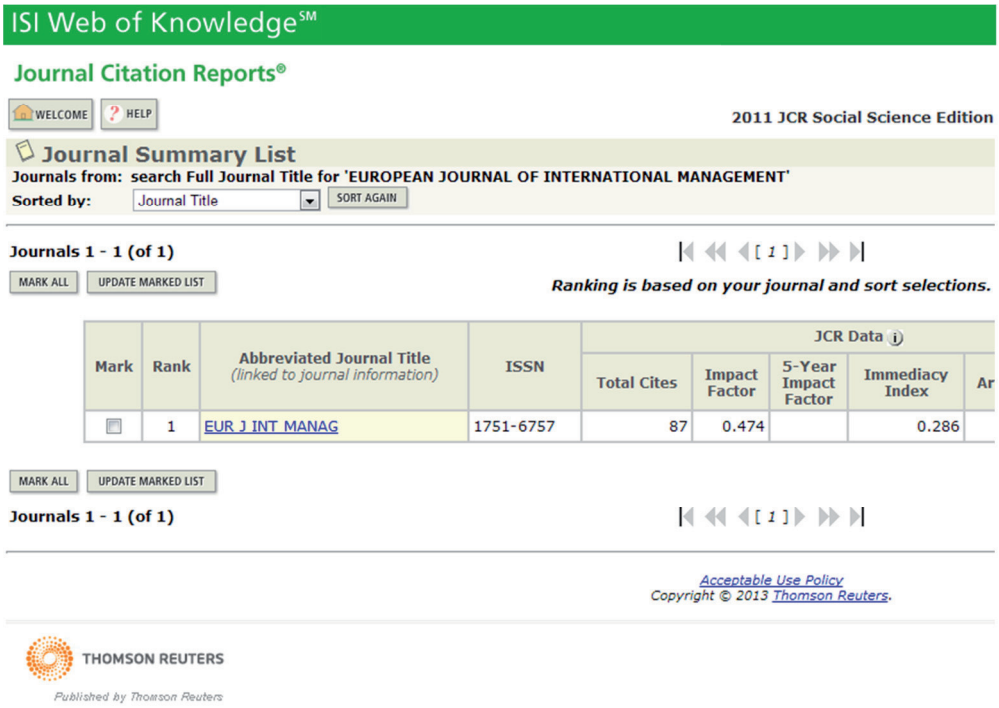

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[1]

DIFFERENT INNOVATION POLICIES FOR DIFFERENT TYPES OF INNOVATIVE COMPANIES?

Abstract

The literature on innovation and entrepreneurship policy has yet to deepen its analysis of young innovative companies (YICs). To fill this gap in the literature, the aim of this study was to provide empirical evidence of the special features of YICs versus the full scope of innovative firms, within the context of innovation policy. We carried out an initial diagnosis of the features that enable access to public innovation programs in the field of innovative companies. This study of innovative firms was then contrasted with analysis of samples comprising YICs. The results of this comparison show that YICs access innovation policies by virtue of their status as innovative firms and not because of their own, specific features.

Keywords**:** Young Innovative Companies (YICs), innovation policy, innovative firms.

4.1. Introduction

Establishing innovation policies to stimulate innovative business initiatives is becoming an important topic for governments within the scope of economic policy (Tsai and Kuo, 2011). Small, recently created businesses face different financial, economic and technological issues from those faced by large, mature businesses. Thus, the study of innovation policies for this type of business must differ from the approach taken for other types of businesses (Acs and Audretsch, 1990; Acs et al., 1994). Public stakeholders are no strangers to the market failures faced by innovative companies in general, particularly by companies that have recently been created. This awareness has led to a wide range of programs and actions focused on organizational, financial and commercial aspects of different types of firms (Tödtling and Trippl, 2005; March-Chordà and Yagüe-Perales, 2008). The similarities between the fields of action and the tools used to improve the business and innovation climate has resulted in something of a convergence of innovation and entrepreneurship policies. These similarities should not come as a great surprise, given the well-known Schumpeterian rationale regarding innovative firms, along with the growing visibility of both innovation policy and entrepreneurship policy in the current landscape of economic policy (Tsai and Kuo, 2011).

According to the literature, innovation policies have two basic components. First, they aim to resolve the financial issues inherent in risk-taking decisions for creating innovative companies (Veugelers, 2009; Mas-Tur and Ribeiro, 2013). Second, this financial support is accompanied by programs that enable companies to access advanced services such as consultancy or

advisory services (Lundvall et al., 2000; Furman et al., 2002; Felício, Gonçalves and Gonçalves, 2012; Lin and Liu, 2012).

Among innovative firms there are subgroups of companies with their own, specific characteristics. Despite these separate subgroups, authors have yet to carry out an exhaustive study detailing the different types of firms that have appeared over the last few years. Thus, appropriate innovation policies in each case have yet to be identified. For this reason, the aim of this study was to bring to the forefront the issue of differentiating between subgroups of innovative firms – young innovative companies (YICs), new technology-based firms (NTBFs), spin-offs – focusing, in this case, on YICs.

Interest is growing in the role YICs play in implementing technology, which contributes to revitalizing the industrial structure (Pellegrino, Piva and Vivarelli, 2009). Schneider and Veugelers (2010) have defined YICs as small, young companies with great potential to develop innovations for commercial applications and that create value for society. Pellegrino et al. (2009) furthered this definition by characterizing YICs as companies with less than eight years of activity, which in the last three years have developed innovative products or processes, or have embarked on innovative projects.

The first aim of this study was to analyze the profile of innovation policies for innovative firms. Following this analysis, the results were contrasted with the results from other studies on YICs. Thus, we were able to observe whether innovation policies, within the overall framework of innovative

companies, take account of the specific features of a subgroup of these innovative firms: YICs.

This study is organized as follows. The next section presents the conceptual framework, which focuses on the different types of innovative companies and the current range of innovation policies. This section also defines the hypotheses that are tested in the section on methodology. The third and fourth sections present the empirical analysis and the results. Finally, the main conclusions are brought together in the fifth section, along with the work's limitations and possible future lines of investigation.

4.2. Conceptual Framework: Innovation Policy and YICs

Public innovation policy

Although public intervention in the field of entrepreneurship is natural due to market failures, recent analysis has highlighted that systemic failures (i.e., failures in the functioning of innovation systems) also limit the innovative capacity of a country or region (Callejón and García-Quevedo, 2011). These systemic failures are related to limitations in achieving the necessary information and knowledge flows between different players in the innovative processes. They are also due to the general features of the innovation landscape. Therefore, innovation policies should not only act as a direct driver of innovation (i.e., through financial support). These policies must also promote the smooth and efficient functioning of all the components of the innovation system.

Decision makers for entrepreneurship and innovation policy tend to opt for traditional means of aid like subsidies or loans. However, there are other tools available such as the provision of highly qualified and highly professionalized technical support, which, in general, only large business can afford to incorporate into their business structure (Belso-Martínez, 2004).

Public innovation policies are relatively new in terms of economic policy and can prove to be a source of inspiration and incentives for potential entrepreneurs. Thus, it is necessary to promote both assistance services and resources that are necessary to foster innovative business activities (Tsai and Kuo, 2011, March-Chorda, 2004).

On the other hand, it is fundamental for the government not only to enable the creation of new businesses, but also to support their growth. Entrepreneurship and innovation are two of the key components in driving economic growth both in the short and the long term (Acs and Szerb, 2007). However, the public policies that governments have been putting into action in a range of countries have had mixed results (Molina-Morales, 2001; Mas-Verdú et al., 2009). It seems difficult to establish a general rule as to which public policies achieve the best results. To do this, it would be necessary to conduct a study on public policies, taking into account the specific characteristics of each area or region (Acs and Szerb, 2007). Many authors have stated that for an entrepreneurship policy to be more efficient, the government closest to the actual issues of the region in question should be the implementers of these policies, with the central

government merely acting as a coordinator (Molina-Morales and Martínez-Fernández, 2009; Belso-Martínez, 2004; González, 1993).

Furthering the discussion on proximity and targeting, certain authors have affirmed that by establishing specific objectives and selecting target groups it is possible to increase the effectiveness of the measures for supporting innovation (Molina-Morales and Martínez-Fernández, 2009; Bridge et al., 2003, Stam et al., 2006).

Schneider and Veugelers (2010) take a different view, concluding that innovation policies are not directed specifically at YICs and that YICs are simply benefitting from innovation policies due to their inclusion in the broader definition of innovative companies. In the following sections we observe that these conclusions also apply to the case investigated in this study.

In summary, when implementing innovation policies, two demands must be kept in mind. First, it is advisable to work geographically closely to the region where the target firms are located. In other words, innovation policies should be regionalized. Second, these policies should adapt to the specific features of each group of businesses. In other words, innovation policies should be tailored according to the needs of different target groups of innovative companies.

Young innovative companies (YICs)

The companies termed as innovative firms form a heterogeneous group. Thus, bearing in mind the characteristics of the so-called *young innovative companies* (i.e., young businesses, innovative potential and small size) it is useful to define and separate the types of companies that fulfill these characteristics. We distinguish between new technology-based firms (NTBFs), spin-offs and young innovative companies (YICs).

NTBFs were first defined by Cooper and Bruno (1977), who stressed some of their more specific features such as: small size, independent ownership, a technological base, sustained efforts in R&D, novelty in their outputs and use of emerging technologies. This definition has since been honed, with Rothwell (1986) defining NTBFs as a specific category of small businesses that operate in emerging, highly technological sectors. Storey and Tether (1998) classified NTBFs as new companies working in high-tech sectors, while also specifying that, strictly speaking, the term should only be applied to businesses at the cutting edge of knowledge.

A spin-off is a company created by a group of researchers, with the goal of commercializing the results of their scientific work carried out in some university or research center (Trenado y Huergo, 2007). Thus, the differentiating factor lies in the background of the founders and the source of the innovative idea.

Finally, YICs can be distinguished from NTBFs by the fact that, in a context where the traditional sectors represent the majority of the economy, YICs need external know-how to carry out their own innovative activities

(Pellegrino et al., 2009). Therefore, since they are not constrained by a need to safeguard their existing skills and market position, YICs produce more radical innovations (Veugelers, 2009). More specifically, Veugelers (2009) defined YICs as a group of small, young and highly innovation-intensive firms, which are characterized by: introducing new, highly innovative products or processes to the market; being less than six years old; comprising fewer than 250 employees; and allocating at least 15% of their spending to R&D (Veugelers, 2009). Thus, the very nature of YICs makes them key drivers of economic growth, hence the importance of carrying out a specific study of these firms (Schneider y Veugelers, 2010).

4.3. Methodology

The aim of this study was to determine which characteristics of so-called *innovative companies* are being considered when implementing innovation policies. This aim covers both economic/financial and consulting/advisory components of these policies. These results were then contrasted with those found in other studies with a specific focus on one kind of innovative firm: YICs.

Definition of variables

Following previous studies (Almus and Nerlinger, 1999; Mas-Tur et al., 2013), the features of innovative companies that must be considered in the analysis are as follows. The dependent variables are: *degree of innovation*,

age and *gender of the entrepreneur*, *size of the company*, *sector*, and *competition within this sector*. The independent variables are: 1) in the first stage of analysis, *access to subsidies to support innovation*; 2) In the second stage of analysis, *the use of knowledge-intensive business services*. A definition of each of the independent variables in the questionnaire and an explanation providing the reason for its selection is given below.

- *Degree of innovation*. Companies with R&D departments, and those with an emphasis on technology or with a high R&D spending per employee have greater chances of receiving the benefits of innovation policies (Almus and Czarnitzki, 2003; Görg and Strobl, 2007; March-Chordà and Yagüe-Perales, 2002). The questionnaire classifies three types of companies: technology-based firms (companies based on technology and specialized knowledge); highly innovative companies (those which develop more than one new product, service or process per year); and innovative companies (firms that frequently improve their products, services and/or processes).

- *Size of the firm*. Studies have identified a positive relation between business size and chances of gaining access to assistance from public policies (González Jaumandreu and Pazó, 2005; Görg and Strobl, 2007; Heijs and Herrera, 2007). A seven-point scale was used for this variable, depending on the firm's number of employees. The groups are as follows: fewer than 5, between 5 and 10, between 11 and 24, between 25 and 49, between 50 and 99, between 100 and 249, and over 250 employees.

- *Sector*. Several authors have established a link between sector and probability of receiving the benefits of innovation policies (Czarnitzki and Fier, 2002, Almus and Czarnitzki, 2003; González, Jaumandreu and Pazó, 2005, Hewitt-Dundas and Roper, 2009). The different sectors in the questionnaire are: the industrial sector (the principal activity of the YIC is manufacturing products); and the services sector (the principal activity of the YIC is related to IT services, R&D, cultural services, engineering services, etc.).

- *Degree of competition in the sector*. Almus and Czarnitzki (2003) concluded that the greater the competition in a firm's sector, the greater its probability of receiving support from innovation policies. The following three categories were used: 1) companies operating in a sector where there are few other companies offering competing products or services, and, in addition, these companies are completely identifiable; 2) companies that compete in a sector where there are a limited number of competitors (no fewer than 10); and 3) companies that do business in sectors where competition is high (i.e., there are a large number of competitors).

- *Age of the entrepreneur*. There exists a certain degree of controversy in the literature on this matter. While some authors suggest that an ambitious, entrepreneurial spirit on the part of young entrepreneurs has a greater contribution to innovative activities, other authors claim that the *knowledge of the world* possessed by entrepreneurs with more experience increases

innovative potential (Bosma et al., 2000). *Age of the entrepreneur* is a binary variable (*young/not young*) depending simply on whether the entrepreneur is under 40 or not. This cutoff point was established by considering the mean age of entrepreneurs in the Valencian region.

- *Gender of the entrepreneur*. YICs run by female entrepreneurs have greater probabilities of accessing innovation policies than their male counterparts (Mas-Tur et al., 2013). *Gender of the entrepreneur* is measured using a binary variable, depending on whether the entrepreneurial activity is performed by a male or a female entrepreneur.

For the dependent variables the following items were considered.

- *Access to subsidies*. Funding is one of the crucial issues that small, newly created firms must face (Kerr and Nanda, 2011). Hall (2008) cited funding as one of the main barriers to innovation and growth. In the questionnaire, *access to subsidies* is a binary variable, depending on whether the company has had access to subsidies from the regional government or has not received any such support.

- *Use of public knowledge-intensive business services*. The use of these services stimulates innovation in innovative companies (Kirzner, 2009). *Use of public knowledge-intensive business services* is a binary variable according to whether or not the company has

received consultancy or advisory services as a result of public innovation policies.

Procedure and data analysis

The data were collected using a survey carried out in 2009. The survey was administered by a public body created to promote SMEs in the Valencian region in the southeast of Spain. The sample consists of 521 companies whose business is innovation based. The Valencian region is characterized by its low absorptive capacity in terms of innovation (Azagra-Caro et al., 2011). As observed in the literature, innovation policies implemented at the regional level can increase efficiency because they are better suited to the needs of businesses in that region. Therefore, it seems advisable to base the study on a specific area with its own, particular features.

The hypotheses set out in the previous section were tested using binary logistic regression analysis over two successive stages to avoid collinearity. The first stage allowed us to identify which characteristics have significant relationships with obtaining subsidies. The second stage then tested which characteristics of the same companies increase their chances of receiving knowledge-intensive business services (e.g., advanced consultancy services). Both models included moderating variables in addition to the variables described above. These moderating variables were included to detect interactions. Thus, it is possible for the model to contain an independent variable that does not directly affect the dependent variable but that acts as a moderator in the relation between the dependent variable and another of the independent variables. The moderator variables

bring together the relationships that already exist between the independent variables (*degree of innovation*, *age* and *gender of the entrepreneur*, *size of the company*, *sector*, and *competition within the sector*) and the dependent variables. Finally these results were compared with those from other studies whose data were related to YICs. This comparison allowed us to observe whether innovation policies differ between the different subgroups of innovative firms.

4.4. Results

The dependent variable for the first logistic binary regression was access to innovation subsidies. The independent variables were degree of innovation, size of the company, sector, degree of competition within the sector, and the age and gender of the entrepreneur. Table 1 shows that four of the six independent variables have significant relationships, either direct or indirect, with access to subsidies. The variables with direct relationships are size of the business, gender of the entrepreneur and the degree of innovation of the business. Thus, larger innovative companies have greater chances of obtaining subsidies or financial aid. This result agrees with the findings of other studies (Görg and Strobl, 2007; Heijs and Herrera, 2007). Our results show that innovative companies created and run by women have higher probabilities of accessing public financial support. Several studies (Hisrich and Brush, 1984; Verheul and Thurik, 2001; Akehurst et al., 2012) have concluded that female entrepreneurs find it more difficult to attract the investment necessary to launch their business activities. It

seems that public policies have recognized this barrier and have implemented a system of positive discrimination towards women who run innovative firms. Finally, degree of innovation also increases the probability of receiving subsidies for creating innovative firms. Thus, public policies are attempting to promote business innovation as a central component of an innovation system (Guzmán-Cuevas and Martínez-Román, 2008).

Table 1. Results of the first binary logistic regression. Dependent variable: *access to innovation subsidies*. Model significant at the 99% level.

	B	SE	Wald	d.f.	Sig.	Exp(B)
Constant	-3.108	.834	13.879	1	**.000**	.045
Size	1.237	.256	23.338	1	**.000**	3.446
Size x *Gender*	-.721	.185	15.153	1	**.000**	.486
Competition x *Deg. innov.*	-.267	.088	9.136	1	**.003**	.766
Degree of innovation	.608	.202	9.044	1	**.003**	1.836
Gender	1.848	.592	9.753	1	**.002**	6.349

Following this first step, we performed a binary logistic regression to shed light on the characteristics of innovative companies that have significant relationships with the use of knowledge-intensive business services (e.g., professional consultancy or advisory services). Table 2 shows that practically all the variables included in the study are related with access to this type of services. The strong positive relationship between *degree of innovation* and *access to advanced consultancy services* stands out in particular. It is of interest to note that governments are taking into account the degree of innovation of the companies being targeted by their public

policies. This means that public policies are boosting not only the existence of innovative companies, but also the creation of highly innovative firms. This finding is in line with Almus and Czarnitzki (2003) and Görg and Strobl (2007), who found that companies with R&D departments, and those with an emphasis on technology or with a substantial R&D spending per employee, have greater chances of receiving the benefits of innovation policies. As in the case of the first regression, companies run by women entrepreneurs also have greater probabilities of accessing public programs of professional consultancy and advisory services.

Table 2. Results of the second binary logistic regression. Dependent variable: *access to knowledge-intensive business services*. Model significant at the 99% level.

	B	SE	Wald	d.f.	Sig.	Exp(B)
Constant	5.141	2.453	4.392	1	**.036**	170.898
Degree of innovation	3.197	.987	10.492	1	**.001**	.041
Gender	7.250	2.719	7.109	1	**.008**	.001
Gender x *Size*	-1.220	.434	7.916	1	**.005**	3.387
Deg. innovation x *Age*	-.348	.099	12.270	1	**.000**	1.416
Deg. innovation x *Gender*	-1.830	.838	4.769	1	**.029**	6.234
Gender x *Sector*	-.866	.391	4.904	1	**.027**	2.376

The results of this analysis indicate which specific features of innovative companies increase their chances of accessing innovation policies. To meet the aims of this study, the characteristics found here for innovative companies in general were contrasted with the features of YICs that increase their probabilities of receiving the benefits of innovation policies (Mas-Tur and Simón-Moya, 2013; Mas-Tur and Ribeiro, 2013). Table 3

presents a summary of the statistically significant variables in terms of accessing innovation policies, both on the part of innovative companies in general and on the part of YICs. Thus, we can differentiate between the variables related to innovative firms in general and those specifically related to YICs that are being considered by policymakers when implementing innovation policies.

Table 3. Comparison between YICs and innovative companies in general.

	Young innovative companies	Innovative companies in general
	Statistically significant variables	
Access to subsidies	▪ *Size* ▪ *Gender*	▪ *Size* ▪ *Gender* ▪ *Degree of innovation* ▪ *Competition within the sector*
Access to KIBS	▪ *Degree of innovation*	▪ *Size* ▪ *Gender* ▪ *Degree of innovation* ▪ *Sector* ▪ *Age of the entrepreneur*

Table 3 reveals that almost all the variables analyzed are statistically significant with regard to access to innovation policies for innovative companies in general. However, when the sample is reduced to only companies classed as YICs, the number of statistically significant variables decreases considerably. This does not agree with the conclusions reached by Schneider and Veugelers (2010), who stated that YICs are not targets of specific innovation policies. Instead, according to these authors, they

receive public support simply by virtue of being included in the broader definition of innovative companies.

4.5. Conclusions

The main aim of this study was to further the analysis of young innovative companies (YICs) and the role that innovation policies play as drivers of their business activities. We separated the different types of innovative firms, with a special focus on YICs. We then analyzed which features of innovative firms in general enable their access to subsidies or support in the form of advanced consultancy and advisory services. Finally, our results were contrasted with those obtained in previous studies focusing solely on the analysis of YICs.

The following conclusions of the study stand out as being of particular relevance and interest. First, practically all the features (*degree of innovation*, *size of the company*, *sector*, *degree of competition within the sector*, and *age* and *gender of the entrepreneur*) of innovative companies have significant relationships with access to innovation policies. The results imply that, when implementing their policies, innovation policymakers do consider the specific nature of innovative companies within the broader scope of existing firms in general. Second, upon comparing these results with those from samples made up solely of YICs, the same business features were found not to be related with the probability of accessing public policies. Therefore, despite policymakers' consideration of the features inherent in innovative firms, our findings show that innovation policies do

not take into account the specific characteristics of certain subgroups of innovative companies.

The above conclusions refine and complement the findings of Veugelers (2009), who stated that YICs do not have greater chances of obtaining public aid. In fact, if YICs receive public support, it is not so much due to their own potential but rather because they belong to a broader group of innovative companies. As shown in these studies, neither innovation policies providing subsidies nor those offering access to knowledge-intensive business services take into account the particular features of this type of business.

The innovation policies that have been put in place at the time of carrying out this study are based on business factors such as the development of technology or the location of the company, without considering the specific features of certain subgroups of innovative firms. This is despite the fact that YICs have an innovative potential that makes them key drivers of economic growth and development. Therefore, there is ample opportunity for the implementation of more highly specified policies. These tailored policies could account for the features of each subgroup of innovative companies, with a particular emphasis on companies that may produce greater socioeconomic impact (Schneider and Veugelers, 2010).

Audretsch and Link (2011), after revising the range of innovation policies that have arisen over the years, highlight the fact that Keynesian economics are little concerned with entrepreneurship and innovation. However, given the importance of these issues, new public policies are emerging whose

focus is on innovation. Thus, our conclusions allow us to make recommendations aimed at taking another step towards public policies specifically targeting innovative entrepreneurship. Taking into account the features of each individual subgroup of innovative firms could lead to benefits for the overall economy (Bridge et al., 2003; Stam et al., 2006).

Finally, this study is not without its limitations. Innovation policies normally take into account the features of the region where they are being implemented. In our study, we have analyzed the public policies of a region with low absorptive capacity, which does not allow us to draw generalized conclusions for other regions. This limitation could provide a future line of investigation through a study of innovation policies in regions with a variety of characteristics. In addition, this study has only studied innovative firms and YICs. Thus, although differences have been observed between innovative companies in general and YICs in terms of access to public support, future studies could look into the cases of other subgroups of innovative companies such as NTBFs, spin-offs, etc.

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Capítulo V

CONCLUSIONES

CAPÍTULO V

Conclusiones

En esta Tesis se ha analizado el perfil del conjunto de empresas innovadoras y de las *Young Innovative Companies* (YICs) -como subgrupo de empresas innovadoras- en relación con su probabilidad de acceso a políticas públicas, tanto en forma de subvenciones como de servicios intensivos en conocimiento.

El objetivo del trabajo ha sido examinar qué características de estas empresas aumentan su probabilidad de acceder a líneas de subvención por parte de las Administraciones Públicas, así como el rol que juegan los servicios intensivos en conocimiento como impulsores de la innovación. De este modo, se ha buscado establecer si las políticas públicas se adaptan a las especificidades de cada tipo de empresas ya que la literatura previa detecta que estas dos –financiación y acceso a servicios intensivos en conocimiento- son las dificultades más importantes que afrontan. Para ello, se ha utilizado, en primer lugar, una muestra compuesta por 189 YICs de la Comunidad Valenciana, que se corresponde con la práctica totalidad de las YICs de la región. La gran mayoría de estas empresas (84%) tiene menos de 10 empleados (son microempresas), ejerce su actividad en el sector servicios (59%) y se define como una Empresa de Base Tecnológica (51%). En segundo lugar, se ha realizado un contraste de este grupo de empresas

con el conjunto de empresas innovadoras de la región, Para ello, se ha ampliado la muestra hasta contar con un total de 521 empresas innovadoras.

A la vista de los resultados obtenidos en los tres trabajos que forman la Tesis, las conclusiones conjuntas, que corresponden al objetivo general, se pueden sintetizar de la siguiente forma. En primer lugar, la práctica totalidad de las características del conjunto de empresas innovadoras estudiadas tienen una relación significativa con el acceso a acciones públicas de soporte financiero y de apoyo mediante servicios intensivos en conocimiento. En segundo lugar, son pocas las particularidades de las YICs que resultan significativas a la hora de acceder a políticas públicas tanto directas como indirectas.

En este sentido, se puede concluir que los esfuerzos de los gobiernos regionales y nacionales para promover el emprendimiento podrían ganar en eficiencia si tales acciones estuvieran dotadas de mayor especificidad. Esto podría lograrse mediante políticas selectivas y segmentadas con programas adaptados a las necesidades concretas de los proyectos en función de las características concretas de los mismos. En todo caso, con carácter más general y de acuerdo con la experiencia internacional, convendría poner mayor énfasis en complementar las acciones de carácter financiero -subsidios e incentivos fiscales- con acciones indirectas -servicios de asesoramiento, consultoría, etc.-. Esta implicación también se puso de manifiesto en la investigación llevada a cabo por Lerner (2009).

Podría, por tanto, concluirse que las políticas públicas de fomento de la innovación están aplicando unos criterios estándares, sin tener en cuenta las peculiaridades de los diferentes grupos de empresas innovadoras (Schneider et al., 2010). Como señalan Bridge et al. (2003) y Stam et al. (2006), parece necesario establecer objetivos concretos y seleccionar grupos-objetivo para aumentar la eficiencia de las medidas de apoyo. Por ello, convendría que el diseño de las estrategias tuviera en cuenta, de una manera más específica, determinados segmentos de empresas que, por sus características, pueden tener un especial impacto económico, como es el caso de las YICs.

Asimismo, se van a señalar las conclusiones particulares extraídas en cada uno de los artículos que componen la tesis.

En el caso del artículo ***Young Innovative Companies and Entrepreneurship Policy*** destaca que, de las variables analizadas -la edad y el género del empresario, el sector de actividad, el tamaño y el grado de innovación de la empresa, la competencia del sector- sólo dos están relacionadas con la obtención de subvenciones por parte de las YICs. Estas variables son el género y el tamaño, variable esta última que pierde significatividad cuando interacciona con género. En consecuencia, las políticas públicas parecen tener una consideración específica con el género. Diversos estudios (Hisrich y Brush, 1984; Verheul y Thurik, 2001; Akehurst et al., 2012) concluyen que resulta más difícil para las mujeres emprendedoras acceder a los recursos financieros necesarios para el inicio de su actividad empresarial. En este sentido, parece que las políticas públicas analizadas han tomado conciencia de esta barrera y realizan una discriminación positiva de las mujeres que

promueven YICs. En cuanto al tamaño, aunque la mayor dimensión de las YICs incrementa la probabilidad de tener acceso a subvenciones públicas, este resultado ha de matizarse en un doble sentido. De un lado, porque hay que tener en cuenta que el 60% de la muestra está compuesta por YICs con menos de 5 empleados, por lo que hay un componente de escala que hay que tomar en consideración a la hora de determinar la mayor probabilidad de acceder a subvenciones públicas por parte de las YICs. De otro lado, porque en el caso de aquéllas empresas de mayor dimensión en los que la fundadora es una mujer, la probabilidad de obtener una subvención es menor que si se consideran ambas variables de forma independiente. Esto podría interpretarse como consecuencia de que las mujeres son propietarias, en la mayoría de los casos, de empresas de reducida dimensión (Hisrich y Brush, 1983; Scott, 1986; Carter y Rosa, 1998; Cowling y Taylor, 2001).

Finalmente, el resto de variables estudiadas no presentan una relación significativa con la obtención de subvenciones. Sin embargo, la revisión realizada revela que la literatura reclama un diseño más matizado de las políticas de ayudas públicas en cuanto a la toma en consideración de las características de las empresas.

Del artículo ***The level of innovation among Young Innovative Companies: the impacts of knowledge-intensive services use, firm characteristics and the entrepreneur attributes*** se concluye que la utilización de KIBS por parte de las YICs, a través de políticas de promoción, aumenta su capacidad innovadora. Estas políticas apoyan la innovación a través de la transmisión de conocimiento. Este resultado es especialmente relevante ya que las YICs

son empresas esencialmente innovadoras y juegan un papel fundamental en la transformación de la industria (Schneider y Veugelers, 2010). Siendo una de las funciones primordiales de los KIBS actuar como facilitadores y fuente de innovación para empresas, resulta interesante observar que los KIBS también potencian la intensidad innovadora de las YICs (Audretsch, 2012; Mas-Verdú et al., 2011). En segundo lugar, el tamaño afecta de manera positiva al grado de innovación. Esto es coherente con determinados análisis que señalan que la probabilidad de que las empresas emprendan actividades innovadoras está relacionada con la dimensión (Görg y Strobl, 2007). En tercer lugar, el resto de variables analizadas -sector de actuación, grado de competencia del sector, edad y género del emprendedor- no tienen una relación directa con el grado de innovación de las YICs. Por tanto, podría concluirse que las políticas de innovación siguen patrones uniformes, sin distinguir entre los diferentes grupos existentes de empresas innovadoras (Schneider et al., 2010).

Por último, del artículo ***Different innovation policies for different types of innovative companies?*** se deriva que prácticamente todas las características (grado de innovación, el tamaño de la empresa, el sector en el que actúa, el grado de competencia del sector y la edad y el género del emprendedor) de las empresas innovadoras que se han analizado tienen una relación significativa con el acceso a políticas públicas de promoción de la innovación tanto en forma de subvenciones como de acceso a servicios intensivos en conocimiento. Sin embargo, al contrastar estos resultados con los obtenidos para una muestra formada únicamente por un grupo de YICs, estas mismas características empresariales no guardan relación con la probabilidad de acceder a políticas públicas. Por lo tanto, parece que las

YICs se benefician de las políticas públicas por el hecho de estar integradas dentro del conjunto de las empresas innovadoras en general (Veugelers, 2010) y no tanto por sus propias características.

Las políticas públicas de apoyo a las empresas han ido modificándose a lo largo de los años como consecuencia del surgimiento de nuevas necesidades (Audretsch and Link, 2011). De esta manera, en las últimas décadas se han ido consolidando aquellas políticas públicas cuyo elemento clave es la innovación. Las conclusiones extraídas en esta investigación permiten realizar recomendaciones destinadas a dar un paso más hacia políticas públicas específicas del emprendimiento innovador. Esto pasa por tener en cuenta las diferentes características individuales de cada subgrupo de empresas innovadoras (Bridge et al., 2003; Stam et al., 2006).

Limitaciones y futuras líneas de investigación

Esta Tesis no está exenta de limitaciones. Así, en primer lugar, se podría considerar el número de YICs en la muestra relativamente pequeño (menos de 200 observaciones). Sin embargo, debido al diseño de la encuesta, se considera que la muestra es suficientemente representativa de la población total de este tipo de empresas en la región.

En segundo lugar, las variables dependientes son respuestas binarias a las preguntas "¿ha accedido a subvenciones por parte de alguna Administración Pública?", "¿ha utilizado servicios intensivos en conocimiento en el contexto de las políticas públicas?". Ello no da idea de la

frecuencia con la que se ha tenido acceso a políticas públicas de emprendimiento e innovación, ni cuál ha sido el tamaño de la subvención o los resultados del apoyo público. Esta limitación podría dar lugar a una futura línea de investigación mediante el diseño de un cuestionario a través del que se pudiera plantear un nuevo enfoque metodológico.

En tercer lugar, no se dispone de información sobre el momento en que la empresa tuvo acceso, en el contexto de las políticas públicas de promoción de la innovación y del emprendimiento, a las subvenciones o los servicios intensivos en conocimiento, lo que no permite hacer comparaciones dinámicas. Por ello, un análisis longitudinal de las políticas públicas podría ser una futura línea de investigación de interés.

En cuanto a las futuras líneas de investigación y aparte de las ya mencionadas, hay que tener en cuenta que este estudio se ha centrado en la investigación de las empresas innovadoras y las YICs. Así, se han observado las diferencias existentes entre el conjunto de empresas innovadoras y las YICs en su acceso a políticas públicas de innovación. En futuros trabajos también se podría estudiar qué sucede con otros tipos de empresa -NTBFs, spin-off, etc.- contrastando los resultados obtenidos y observando si los resultados se matizan para cada tipo de realidad empresarial.

Finalmente, en nuestro estudio se han analizado las políticas públicas de una región específica, la Comunitat Valenciana. Esta área tiene características propias, entre las que destaca su baja capacidad de absorción, lo que no permite extraer conclusiones generales para otro tipo

de zonas. Esta limitación puede convertirse en una futura línea de investigación: el análisis comparado de las políticas de innovación en distintos territorios con particularidades diferentes. De esta manera se podrían realizar comparaciones interregionales de las distintas políticas públicas de promoción del emprendimiento y la innovación.

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