Venture capitalists in Spain: cluster analysis of criteria used in the screening process

M. Camino Ramón-Llorens and Ginés Hernández-Cánovas

Ivie

Los documentos de trabajo del Ivie ofrecen un avance de los resultados de las investigaciones económicas en curso, con objeto de generar un proceso de discusión previo a su remisión a las revistas científicas. Al publicar este documento de trabajo, el Ivie no asume responsabilidad sobre su contenido.

La Serie EC, coordinada por Matilde Mas, está orientada a la aplicación de distintos instrumentos de análisis al estudio de problemas económicos concretos.

Todos los documentos de trabajo están disponibles de forma gratuita en la web del Ivie http://www.ivie.es, así como las instrucciones para los autores que desean publicar en nuestras series.

Venture capitalists in Spain: cluster analysis of criteria used in the screening process

M. Camino Ramón-Llorens and Ginés Hernández-Cánovas[*]

Abstract

This paper uses a survey dataset of 51 Venture Capital Companies to address a segmentation of the venture capital industry. Our paper yields two specific contributions. First, we analyze in a Continental European bank-based system the most important investment criteria identified by previous empirical literature. Second, we show that existing differences in the use of the investment criteria depend on the specific characteristics of the venture capital companies. Therefore, the same business proposal might obtain different decisions depending on the venture company that the entrepreneur approaches. Our paper provides a better insight into the screening process of venture capitalists and the results have clear implications for entrepreneurs and venture capital companies. The knowledge of what investment criteria are most important to venture capitalists might help entrepreneurs to elaborate better proposals, addressing them to the most suitable venture capital company.

Keywords: venture capital, cluster analysis, screening criteria, decision-making.
JEL Classification: G24.

Resumen

El presente estudio usa una encuesta postal realizada a 51 entidades de capital riesgo (ECR) con el objetivo de establecer diferentes tipologías de gestores y de empresas en la industria del capital riesgo. Nuestro trabajo realiza dos contribuciones específicas. En primer lugar, analizamos para el modelo bancario de la Europa Continental aquellos criterios de selección de inversiones más importantes identificados en la literatura empírica previa. En segundo lugar, mostramos que las diferencias en el uso de los criterios de selección de inversiones dependen de las características de las ECR. Por tanto, una misma propuesta de negocio podría obtener diferentes respuestas según la ECR que la evalúe. Nuestro trabajo proporciona una mejor comprensión del proceso de selección realizado por los gestores, y los resultados tienen claras implicaciones tanto para los empresarios como para las ECR. Conocer cuáles son los principales criterios de selección de inversiones podría ayudar a los empresarios a elaborar mejores propuestas, y buscar la financiación en ECR más adecuadas.

Palabras clave: capital riesgo, análisis de conglomerados, toma de decisiones.

---

[*] M.C. Ramón-Llorens and G. Hernández-Cánovas: Polytechnic University of Cartagena. Contact author: camino.ramon@upct.es.

1. Introduction

In the last decades, existing research has shown the investment criteria used by venture capitalists when evaluating new proposals, and has established their relative importance (Wells, 1974; Poindexter, 1976; Tyebjee and Bruno, 1984; MacMillan et al., 1985; Ray, 1991; Ray and Turpin, 1993; Fried and Hisrich, 1994; Rah et al., 1994; Muzyka et al., 1996; Pandey and Jang, 1996; Ramón et al., 2007). Intriguingly, this venture capital investment literature hasn´t concluded what type of factors provides the most important decision making criterion for venture capitalists. We hypothesize that this lack of agreement arises due to the heterogeneity of the venture capital industry. However, we are not aware of any study assessing this question.

This paper aims to fill this gap in the literature using a survey dataset of 51 Spanish venture capital companies. This dataset suits perfectly our purpose for three reasons. First of all, Spanish venture capital sector, which is made up of companies with different kind of resources, objectives, investment focus, venture capitalist styles and legal types is really heterogeneous (Carzorla et al., 1997). Secondly, the survey asks venture capitalists the importance they give to the most common investment criteria indentified in the literature regarding the (1) entrepreneur personality and experience, (2) the characteristics of the product or service of the venture, and (3) the market of the venture. In the third place, we also have access to characteristics of the venture capital companies such as origin of the resources, legal type, investment strategy, reliance on the venture capitalists intuition, and number of proposals and volume of funds managed annually.

We first carry out a cluster analysis that allows us to identify those venture capital companies sharing the same investment criteria within a group, but which are heterogeneous across groups. Next, we characterize each cluster using different factors related with the venture capital company. Our results reveal the existence of three groups. Cluster 1 is a big group of venture capital companies that are lacking in terms of all the desirable screening criteria. There could be two kinds of members in this group. On the one hand, private venture capitalists looking for an entrepreneur with professional experience that manages a project in a late stage of development. On the other hand, public venture capital companies with a mixed objective function that includes nonfinancial items such as political and employment goals. Cluster 2 is made up of members that run away from innovative products. Most of the resources of this

group are private and the predominant legal type is the venture capital management company. Therefore, profit-based objectives and short-term expectations would explain why this group focuses on projects in late stages of development where the market investment factors provide the most prominent decision making criterion. In cluster 3, venture capitalists appreciate high-tech projects, which have a functioning prototype, and use their intuition to evaluate qualitative characteristics related to the management team and the product of the proposals.

Our paper yields two specific contributions. First, we perform a segmentation of the venture capital industry in a Continental European bank-based system. Financial intermediation literature shows the existence of differences between the Anglo-Saxon and the Continental models in the way resources are channelled (Mayer, 1994) and the behaviour of financial intermediaries (Hernández-Cánovas and Martínez-Solano, 2010). In addition, the only related work by McMillan et al. (1987), analyzes a sample of US firms. Second, we investigate whether the existing differences in the use of the investment criteria depend on the specific characteristics of the venture capital companies. If the screening process is dependent on the nature of the venture capital company it means that the same business proposal might obtain different decisions depending on the venture company that the entrepreneur approaches.

The paper proceeds as follows. Section 2 discusses previous research. Section 3 presents the data and method. Section 4 presents the results, and section 5 concludes.

2.   Literature Review

In an attempt to reduce the negative effects of the adverse selection problem, venture capitalists screen out ex ante unprofitable new venture proposals applying an intensive due diligence and evaluation process (Barry, 1994; Fried and Hisrich, 1994). A number of empirical contributions have analyzed the screening process, identifying the most common selection criteria used by the venture capital community, in addition to how each criterion was weighted. The studies of Wells (1974), MacMillan et al. (1985), Ray (1991), Ray and Turpin (1993), Ramón et al. (2007), among others, suggest that the most common selection criteria are related with the experience and personality of the entrepreneur and her team. MacMillan et al. (1985) and Muzyka et al. (1996) establish that venture capitalists base the evaluation of a new investment on the ownership and uniqueness of a product or service. However, Fried and Hisrich, (1994)

and Tyebjee and Bruno, (1984) show the importance of market characteristics such as a significant potential for earnings and market growth as well as the competitive conditions. According to Poindexter (1976) and Pandey and Jang (1996), the return of the investment is an important feature to justify a venture capital funding. However, the variation of results and conclusions across studies leaves open the question regarding to what type of factors plays the most important role.

Existing literature suggests that the characteristics linked to the venture capital company are important in determining what factors provide the most prominent investment criteria for venture capitalists. When evaluating and selecting new proposals, the investment behaviour is highly dependent on the objectives pursued by the venture capitalists which, in turn, might be driven by the characteristics of the venture capital company. The stage of development of the project (Norton and Tenenbaum, 1983; Hall, 1989; Barry, 1994; Carter and Van Auken, 1994; Ramón et al., 2007), the geographic focus of the investments (Gupta and Sapienza, 1992), the captivity or independence in fundraising (Ramón et al. 2007), the public or private origin of the resources (Leleux and Surlemont, 2003; Cornelius, 2005; Brander et al., 2009; Brander et al., 2010; Ramón et al., 2007; Munari and Toschi, 2010), the reliance on his own venture capitalist intuition to evaluate the investment (Khan, 1987; MacMillan et al., 1987; Ray, 1991; Ray and Turpin, 1993; Zacharakis and Shepherd, 2001), and the legal type of the venture capital company (Carzorla et al., 1997) are characteristics that might influence the making decision process. In this paper we focus our attention on the origin of the resources, the importance of the intuition, the stage of development of the investment, and the legal type of the venture capital company.

Public and private venture capital firms have different objectives (Del Palacio et al., 2010), which might originate differences in the use of the investment criteria in two ways. First, Cumming and MacIntosh (2006), Brander et al. (2009) and Munari and Toschi (2010) show that unlike private, public venture capital funds undertake projects where the main objective is to foster the economic development rather than to obtain a high profitability. Second, Leleux and Surlemont (2003), Cornelius (2005), Brander et al. (2010) and Munari and Toschi (2010) find that public and private investors have different investment strategies, which drive them towards projects in different stage of development. In addition, Lerner (2002) and Leleux and Surlemont (2003) suggest that public venture capitalists are, compared to private venture capitalists, lacking in the knowledge and experience required in the screening process and due diligence of the

companies. This might give rise to differences in the valuation process and, therefore, in the determination of those factors that provide the most prominent investment criteria for each type of venture capitalists.

Zacharakis and Shepherd (2001) show that intuition plays an important role during the evaluation and selection of new proposals. Experienced venture capitalists usually deviate from corporate objectives and rely on their intuition to choose the investment criteria that should be the most important during the decision process (Khan, 1987; MacMillan et al., 1987; Zacharakis and Shepherd, 2001; Bein and Levesque, 2004). According to Ray (1991) and Ray and Turpin (1993), intuitive venture capitalists focus on those qualitative aspects of the proposals related with the entrepreneur, while rational venture capitalists rely on economic and financial aspects.

According to Gupta and Sapienza (1992), Norton and Tenenbaum (1993), Ruhnka and Young (1991) and Carter and Van Auken (1994) variations in the investment criteria used by venture capitalists during the evaluation of business proposals might also arise due to different objectives regarding the investment strategy of the venture capital company. Existing literature suggests that significant differences across venture capital companies are dependent on their investment strategy, i.e., the stage of development of the projects where they prefer to invest (Robinson, 1987; Florida and Kenney, 1988a, 1988b; Sapienza and Timmons, 1989; Fried and Hisrich, 1991; Bygrave and Timmons, 1992; Elango et al., 1995). In addition, venture capital companies face a higher risk when they fund businesses in early stage of development because the firm is not consolidated and there is not verifiable and testable information about it (Ramón et al., 2007).

Finally, variations in objectives due to differences in the legal type of the private venture capital companies might also determine which factors provide the most relevant investment criteria for venture capitalists. Venture Capital Companies are created without a deadline and they manage their own resources, which can be incremented rising new capital. Venture Capital Management Companies promote and manage venture capital funds, which have limited resources and duration, in return for a fixed commission plus benefits. According to Cazorla et al. (1997), the main objective of Venture Capital Management Companies will be to obtain the maximum profitability in the minimum time. Therefore, they will focus their investment strategy in low risk projects carried out by experienced and consolidated firms.

3.   Data and Method

3.1.   Data

We obtain our dataset using a postal survey addressed to the 63 venture capital companies registered in the ASCRI (*Asociación Española de Entidades de Capital Riesgo*) in March, 2001. The design of the questionnaire was improved through several pre-test completed by prestigious economists specialized in financial risk assessment and particularly related with the valuation of ventures. The reception of surveys was until June of 2001. We obtained 51 valid answers, which represent a response rate of 80.952%.

First of all, the questionnaire collects information regarding general characteristics of the venture capital company such as the organization of the investment fund, the origin of the capital, amount of funds managed, number of proposals received each year, and investment preferences regarding the development stage of the target ventures. Table 1 shows that out of the 51 respondents in our sample, 17 (33.333%) are "Venture Capital Firm", 18 are (35.294%) "Venture Capital Management Company", 7 (13.726%) are "Society of Industrial and Regional Development", and 9 (17.647%) are classified as "other". The capital is private in 34 venture capital companies and it is public in 17. Annually, 66.667% (33.333%) of these venture capital funds receive more (less) than 50 proposals and 70.588% (29.412%) of them manage more than 15 millions euro each year. Depending on the different stages in a company´s life cycle, 25.490% of funds in our sample prefer the investment in early stages of development (seed or start-up financing), whereas 74.510% show a clear preference by late stages of development (post-creation or expansion financing).

Table 1. Venture capital fund characteristics

	n	%
Type of entity		
Venture Capital firm	17	33.333%
Venture Capital Management Company	18	35.294%
Regional/Industrial Development Society	7	13.726%
Other	9	17.647%
Type of Venture Capital		
Public	17	33.333%
Private	34	66.667%
Intuition in decision making		
Little	17	34.694%
A lot	32	65.306%
Development stage		
Early	13	25.490%
Late	38	74.510%
Proposals received annually		
Less than 50	17	33.333%
Over 50	34	66.667%
Volume of fund managed		
Less than 15 millions euros	15	29.412%
More than 15 millions euros	36	70.588%

Finally, using a five-point scale (1=little important; 5=very important) the questionnaire collects information concerning the most important selection criteria identified by previous empirical literature. These variables measure several attributes related with three dimensions: (1) the entrepreneur personality and experience, (2) characteristics of the product or service and (3) characteristics of the market. 45 venture capital companies of the 51 valid questionnaires give their scores in all the variables. Table 2 shows that out of the ten most valued variables, eight are related to the entrepreneur dimension, being the honesty and integrity of the entrepreneur (4.843) and her knowledge of the sector (4.745) the most valued variables. The other two factors in the top ten are the target market growth rate (4.451) and market acceptance (4.440).

Table 2. Active cluster variable means

	Overall mean n=45	Standard Deviation
Entrepreneur		
Capacity reaction and risk assessment	4.580	0.575
Capacity for intense effort	4.240	0.771
Honesty and integrity	4.843	0.367
Physical and mental ealth	3.959	0.889
Organization's management team	4.490	0.579
Ability to articulate well when discussing venture	3.250	0.838
Professional experience	4.686	0.547
Knowledge of the sector	4.745	0.440
Familiarity with the venture objectives	4.360	0.663
Personal compatibility with venture capitalist	4.200	0.926
Product or service		
The company owns the patent	4.000	0.990
The product enjoys demonstrated market acceptance	4.440	0.760
Product developed to the point of functioning prototype	3.891	1.016
The product was high tech	2.857	1.155
The product reflects the quality and reputation of the venture	3.816	0.950
There is a potential overseas market	3.667	0.816
The product lifecycle	4.143	0.736
Marketing strategy	4.000	0.728
Market		
The target market enjoys a significant growth rate	4.451	0.577
Venture capitalist is familiar with the market	3.388	0.975
There is little threat of competition during the first three years	3.224	0.872
High number of potential customers	3.961	0.799
Company capable of creating a new market	3.980	0.761
There are barriers to entry for new products	4.122	0.927

3.2. Method

Cluster analysis is an inductive statistical method aimed at gaining knowledge about a population by reducing the data into homogenous groups and interpreting the characteristics of their members. In this paper we use cluster analysis to analyze and identify different classes of venture capitalists depending on the screening criteria they use to valuate ventures.

3.2.1. Active clusters variables

One of the main problems in cluster analyses is to select the active variables, which are those variables that intervene directly in the formation of groups. Our active variables are the most common selection criteria used by the venture capital industry, which represent aspects of personality and experience of the entrepreneur's, characteristics of the product or service, and market factors.

Backhaus et al. (2006) recommend conducting a factor analysis prior to the cluster analysis in order to determine the applicability of the active cluster variables. In our sample, there are no indications that sufficient correlations exist among the variables to proceed with the factor analysis due to the results shown by the correlation matrix, the anti-image correlation matrix, and the Kaiser-Meyer-Olkin criteria. The variables can only explain the variance in the data to a limited degree and our variables are not adequate for factor analysis. Moreover, the data structure of the variables is so heterogeneous that they are adequate for application as active cluster variables.

3.2.2. Cluster analysis methodology

The basic principle of the cluster analysis is to identify groups of subjects with a maximal homogeneity of observations within the group, while simultaneously having a maximum heterogeneity between the groups (Hair, 2006). Following both Milligan and Sokol (1980) and Punj and Stewart (1983), we increase the stability and validity of our solution by performing a combination of cluster analysis methodologies (Hair, 2006). First, the Single Linkage method helps us to identify the outliers from the database (Backhaus el al., 2006). In our sample three outliers were detected and eliminated.

Second, we use the Ward method of minimum variance, which is a hierarchical-agglomerative approach, to obtain a preliminary solution that creates the most homogeneous clusters (Bergs, 1981). To determine the number of clusters we analyze the squared Euclidean distance, which is given under the column labelled "agglomeration coefficient" in Table 3. This measure is the highest at the beginning of the cluster procedure and begins to decrease as we split the sample in new clusters. When the heterogeneity within the clusters decreases only minimally

from one clustering step to the next, the number of clusters can be determined. In our sample three clusters appear to be the appropriate solution (Table 3).

Table 3. Coefficients at the last stages of merging

Number of clusters	Agglomeration coefficient	Absolute difference	% difference to next stage
1	606.381	94.452	**7.248%**
2	511.928	42.636	**1.103%**
3	469.291	33.908	**1.192%**
4	435.383	26.270	-0.108%
5	409.113	25.125	-0.250%
6	383.988	24.541	-0.087%

Finally, the k Means procedure is a non hierarchical, iterative partitioning method which begins with partitioning the objects into the number of clusters given by the Ward method and subsequently reassigning the objects to the clusters until a predetermined decision rule stops the process (Bühl and Zöfel, 2005). In our study five iterations took place until all the cases were reassigned and the centroids were no longer subject to change. The number of cases in each cluster is 18 in cluster 1 (42.857% of the sample), 12 in cluster 2 and 12 in cluster 3.

4.   Results

In this section, we first assess the internal validity of our cluster solution and next we characterize and describe each cluster.

4.1.   Validation of the cluster solution

To assess the validation of our cluster solution, first we measure the degree of homogeneity of the objects within the groups, and second we perform a discriminant function analysis.

The evaluation of the homogeneity within clusters is necessary before drawing general conclusions about the characteristics of the venture capitalists in each group (Wedel and Kamakura, 1998). For metric variables, such as those used in our cluster analysis, the F-value can be used to assess internal homogeneity of our cluster solution.

Based on Backhaus et al. (2006), we obtain the F-value using the following equation:

$$F = \frac{V_{i,g}}{V_i}$$

where

$V_{i,g}$ is the variance of variable i in cluster g.

V_i is the total variance of the variable i in our sample.

Variables with F-values above 1 have a greater variance in this group than in the total sample, indicating that the cluster members are more heterogeneous in these variables in comparison to the overall sample. Table 4 shows the F-values of the three cluster solution. Only 25% of the F-values are above 1, indicating that the homogeneity within the clusters can be considered adequate.

Table 4. F-values of the cluster analysis solution

	Cluster 1	Cluster 2	Cluster 3
Entrepreneur			
Capacity reaction and risk assessment	1.000	1.266	0.579
Capacity for intense effort	0.963	1.167	0.406
Honesty and integrity	1.654	0.000	0.586
Physical and mental health	0.797	0.407	0.296
Organization's Management team	0.852	1.287	0.429
Ability to articulate well when discussing venture	0.742	0.495	0.933
Professional experience	0.550	1.890	0.729
Knowledge of the sector	0.924	1.224	1.033
Familiarity with the venture objectives	1.220	0.900	0.514
Personal compatibility with venture capitalist	0.912	0.794	0.191
Product or service			
The company owns the patent	1.303	0.959	0.719
The product enjoys demonstrated market acceptance	0.688	1.502	0.255
Product developed to the point of functioning prototype	0.323	0.634	0.589
The product was high tech	0.628	0.666	1.137
The product reflects the quality and reputation of the venture	0.800	1.243	0.472
There is a potential overseas market	1.268	0.485	0.444
The product lifecycle	1.205	0.794	0.837
Marketing strategy	0.975	0.696	0.696
Market			
The target market enjoys a significant growth rate	0.743	0.794	0.794

Venture capitalist is familiar with the market	0.795	0.679	0.824
There is little threat of competition during the first three years	0.706	1.242	0.992
High number of potential customers	0.966	0.627	1.075
Company capable of creating a new market	1.000	1.266	0.579
There are barriers to entry for new products	0.963	1.167	0.406

In a second step, we perform a discriminant function analysis to show the existence of differences across clusters and whether the clustering variables are able to differentiate between the three groups (Morrison, 1969). Since we have 3 clusters, the number of canonical functions computed in the analysis is two. The first discriminant function estimates the primary differentiating power of the cluster solution and the second discriminant function explains the remaining variance between the clusters.

In this study, we use multivariate Wilks´ lambda to evaluate the statistical significance of both the discriminant functions and the discrimination between the groups.[1] Wilks´lambda can take on values between zero and one (Huberty, 1994), where measures close to zero (one) are highly (low) significant. Wilks´ lambda test statistic shows a value of 0.022 and, thus, achieving a high significance ($p<0.001$) for the discriminant functions. In addition the first canonical discriminant function has an eigenvalue of 11.180 and accounts for 80.718% of the total variance between the clusters in the sample (see table 5). It has a canonical correlation of 95.8%, which means that the first canonical function accounts for more than 95 per cent of the variation between the canonical variates of the dependent variables and the independent variables. Therefore, we can say that the cluster solution is not random and that the data can be classified into the specified groupings to a highly significant degree by the discriminant functions.

Table 5. Eigenvalue of the discriminant function analysis

Function	Eigenvalue	% of variance	Cumulated %	Canonical correlation	Wilks' Lambda
1	11.180	80.718	80.718	0.958	
2	2.671	19.282	100.000	0.853	0.022

Have used the first 2 canonical discriminant functions in the analysis.

---

[1] Multivariate Wilks´ lambda applies when there are more than two clusters to validate.

Next, when testing for the discriminatory significance of each active cluster variable in Table 6, the discriminant function analysis shows that 75% variables significantly discriminate between the clusters. The product is high tech with a Wilks' lambda value of 0.462 is best able to divide the data into the three cluster solution, followed by the variable physical and mental health of the employer (0.518) and the entrepreneur's personality is compatible with the venture capitalist with a Wilks' lambda value of 0.518 and 0.642 respectively. The Fischer value also supports the assumption that the variable "product is high tech" is the best discriminating between the three clusters with the highest score of 22.668.

Table 6. Univariate discriminatory contribution of the clustering variables

	Lambda de Wilks	F	Sig.
Entrepreneur			
Capacity reaction and risk assessment	0.909	1.939	0.157
Capacity for intense effort**	0.821	4.232	0.021
Honesty and integrity**	0.842	3.635	0.035
Physical and mental health***	0.518	**18.083**	0.000
Organization's management team**	0.813	4.467	0.017
Ability to articulate well when discussing venture***	0.690	**8.722**	0.000
Professional experience	0.930	1.456	0.245
Knowledge of the sector	0.988	0.221	0.802
Familiarity with the venture objectives*	0.885	2.532	0.092
Personal compatibility with venture capitalist***	0.642	**10.857**	0.000
Product or service			
The company owns the patent**	0.842	3.656	0.035
The product enjoys demonstrated market acceptance	0.990	0.180	0.835
Product developed to the point of functioning prototype***	0.756	6.271	0.004
The product was high tech***	0.462	**22.668**	0.000
The product reflects the quality and reputation of the venture***	0.744	6.704	0.003
There is a potential overseas market***	0.791	5.126	0.010
The product lifecycle***	0.774	5.665	0.006
Marketing strategy	0.937	1.308	0.281
Market			
The target market enjoys a significant growth rate***	0.777	5.571	0.007
Venture capitalist is familiar with the market***	0.758	6.209	0.004
There is little threat of competition during the first three years***	0.733	7.071	0.002
High number of potential customers***	0.732	7.104	0.002

Company capable of creating a new market	0.892	2.358	0.107
There are barriers to entry for new products**	0.857	3.243	0.049

Statistical significance at the 10%, 5%, 1% level is indicated by *, **, ***, respectively.

Finally, we apply Fisher´s linear discriminant function, which is a classification function to the survey data (Backhaus et al., 2006), to test the overall fit of the discriminant function analysis. In our analysis, the percentage of correctly classified cases reveals the accuracy of the discriminant function when classifying the objects. 100% of the objects are correctly classified (Table 7) with a value of Wilks' lambda of 0.022. This assesses a high predictive accuracy of the results. [2]

Table 7. Classification matrix for discriminant function analysis

	Actual	Predicted	Predicted validity
Cluster 1	18	18	100%
Cluster 2	12	12	100%
Cluster 3	12	12	100%
Sum	42	42	

4.2.   Description of cluster solution findings

In this section we characterize and describe each cluster applying three different analytical techniques to the active (the variables applied in the cluster analysis procedure) and the passive (other variables included in the post experiment questionnaire) cluster variables.

4.2.1. Measurement of the T-value of the active cluster variables

We obtain a first interpretation of our cluster solution calculating the T-values of the active cluster variables. This allows us to know the weight that each active cluster variable has in each group.

Based on Backhaus et al. (2006), we calculate the T-value using the following equation:

---

[2] Although satisfactory, there is an upward bias in predictive accuracy due to the use of the same data to compute the discriminant functions and the hit rate (Huberty, 1994). Unfortunately, due to the small sample size we cannot cross-validate the results by splitting the sample and testing one half for the fit of the discriminating functions and the other half for predictive accuracy (Brush, 1995; McDougall, 1989; Punj and Stewart, 1983).

$$t = \frac{\overline{X}_{i,g} - \overline{X}_i}{S_i}$$

where

Xi,g is the average of every variable in each cluster.

Xi is the total average of the variable *i* in our sample.

Si is the standard deviation of variable *i* in our sample.

The results indicate the variance between the centroid of a cluster and the total average values of the active cluster variable in relation to the standard deviation of the variable. A positive (negative) T-value means that the average of the variable in the cluster is higher (lower) than the average of the variable for the whole sample.

Table 8 shows that most of the variables have a negative t-value in cluster 1, which means that the centroids are below the overall average in this cluster. Only the variables professional experience (0.239), marketing strategy (0.144), knowledge of the sector (0.085), the product was high tech (0.021) and product develop to the point of functioning prototype (0.003) have positive values and, therefore, are overrepresented in this cluster in comparison to the total sample. The opposite is the case in cluster 3, where all variables displays a positive t-value indicating that the weight of these active variable in cluster 3 is higher than in the overall sample. The t-value en cluster 2 specifies a positive score for thirteen variables, highlighting the variables high number of potential customers (0.549), and honesty and integrity (0.451), while the other variables are underrepresented within the cluster.

Table 8. T-values of active clustering variables

	Cluster 1	Cluster 2	Cluster 3
Entrepreneur			
Capacity reaction and risk assessment	-0.314	0.107	0.387
Capacity for intense effort	-0.390	-0.030	0.617
Honesty and integrity	-0.433	0.451	0.230
Physical and mental health	-0.748	0.294	0.846
Organization's management team	-0.434	0.034	0.595
Ability to articulate well when discussing venture	-0.495	-0.089	0.824
Professional experience	0.239	-0.387	0.046
Knowledge of the sector	0.085	-0.165	0.022
Familiarity with the venture objectives	-0.319	0.005	0.490
Personal compatibility with venture capitalist	-0.650	0.255	0.723
Product or service			
The company owns the patent	0.000	-0.519	0.519
The product enjoys demonstrated market acceptance	-0.059	-0.059	0.151
Product developed to the point of functioning prototype	0.003	-0.642	0.648
The product was high tech	0.021	-0.975	0.941
The product reflects the quality and reputation of the venture	-0.506	0.065	0.696
There is a potential overseas market	-0.490	0.170	0.567
The product lifecycle	-0.313	-0.275	0.740
Marketing strategy	0.144	-0.388	0.182
Market			
The target market enjoys a significant growth rate	-0.540	0.401	0.401
Venture capitalist is familiar with the market	-0.326	-0.264	0.772
There is little threat of competition during the first three years	-0.588	0.442	0.442
High number of potential customers	-0.577	0.549	0.338
Company capable of creating a new market	-0.349	0.419	0.105
There are barriers to entry for new products	-0.422	0.390	0.262

4.2.2. Description of active cluster variable weights

In Table 9, we apply ANOVA (analysis of variance) to assess which variables are more significant when testing for cluster membership. The variable the product was high tech has the highest F-statistic value of 22.669, followed by physical and mental health with a value of 18.081, and personal compatibility with venture capitalist with a

value of 10.857. Although these variables are the most significant, which is consistent with the results of the discriminant function analysis, there are 18 variables that contribute to divide the three groups with a high significance.

In the following we interpret the average mean values of the active clustering variables in each cluster. Since the active clustering variables are measured on a five-point-Likert scale (1=little important; 5=very important), the higher the centroid (positive t-values and high mean values) the stronger the inclination of the venture capitalist towards the different dimensions of the information: entrepreneur, product and market.

In cluster 1, only three significant variables don´t show a bellow average centroid[3], and all active clustering variables, except five, have the lowest centroid across all clusters. Thus, a below average propensity to use the selection criteria can be attributed to the members of cluster 1. Measured on a five-points scale (1=little important, 5=very important), the mean values in cluster 1 range between 2.667 for the variable there is little threat of competition during the first three years, and 4.667 for honesty and integrity.

In cluster 2, the variables honesty and integrity (5), high number of potential customers (4.333) and there are barriers to entry for new products (4.583) have the highest centroid across all clusters. There is also an above average centroid of the variables physical and mental health (4.167), organization's management team (4.5), personal compatibility with venture capitalist (4.417), the target market enjoys a significant growth rate (4.667), there is a potential overseas market (3.833), and there is little threat of competition during the first three years (3.583). Therefore, this group is the most oriented toward the market variables in comparison to the other clusters, considerably more interested on the entrepreneur characteristics than cluster 1 and just as concerned as cluster 1 regarding the variables containing information of the product or service.

---

[3] The company owns the patent (4), product developed to the point of functioning prototype (3.833), the product was high tech (2.833),

Table 9. Active clustering variables mean

	Cluster 1	Cluster 2	Cluster 3	Overall mean N=42	F	P
Entrepreneur						
Capacity reaction and risk assessment	4.333	4.583	4.750	4.524	1.939	0.157
Capacity for intense effort**	3.889	4.167	4.667	4.190	4.232	0.022
Honesty and integrity**	4.667	5.000	4.917	4.833	3.636	0.036
Physical and mental ealth***	3.222	4.167	4.667	3.905	**18.081**	0.000
Organization's management team**	4.222	4.500	4.833	4.476	4.468	0.018
Ability to articulate well when discussing venture***	2.833	3.167	3.917	3.238	**8.722**	0.001
Professional experience	4.778	4.417	4.667	4.643	1.457	0.245
Knowledge of the sector	4.778	4.667	4.750	4.738	0.222	0.802
Familiarity with the venture objectives*	4.111	4.333	4.667	4.333	2.532	0.092
Personal compatibility with venture capitalist***	3.611	4.417	4.833	4.190	**10.857**	0.000
Product or service						
The company owns the patent**	4.000	3.500	4.500	4.000	3.656	0.035
The product enjoys demonstrated market acceptance	4.333	4.333	4.500	4.381	0.181	0.835
Product developed to the point of functioning prototype***	3.833	3.167	4.500	3.833	6.271	0.004
The product was high tech***	2.833	1.750	3.833	2.810	**22.669**	0.000
The product reflects the quality and reputation of the venture***	3.222	3.750	4.333	3.690	6.704	0.003
There is a potential overseas market**	3.278	3.833	4.167	3.690	5.126	0.011
The product lifecycle***	3.889	3.917	4.667	4.119	5.665	0.007
Marketing strategy	4.056	3.667	4.083	3.952	1.308	0.282
Market						
The target market enjoys a significant growth rate***	4.111	4.667	4.667	4.429	5.571	0.007
Venture capitalist is familiar with the market***	3.111	3.167	4.083	3.405	6.210	0.005
There is little threat of competition during the first three years***	2.667	3.583	3.583	3.190	7.071	0.002
High number of potential customers***	3.444	4.333	4.167	3.905	7.104	0.002
Company capable of creating a new market	3.722	4.333	4.083	4.000	2.359	0.108
There are barriers to entry for new products**	4.056	4.583	4.500	4.333	3.244	0.050

Measured on five point likert scale: 1 (I completely disagree) to 5 (I completely agree)

Across all groups, cluster 3 shows the highest centroid for all the variables related to the product or service and the entrepreneur (except for the variable Honesty and integrity). Thus, the inclination towards these selection criteria is the highest for venture capitalist in cluster 3. This group is slightly less market oriented than cluster 2.

In summary, with respect to the characteristics of the clustered survey respondents: Cluster 1 is the weakest pronounced in all three dimensions of screening criteria. The exact opposite is the case for cluster 3, with all three dimensions overrepresented in terms of mean value, this group has the highest overall level of orientation towards the entrepreneur and the product variables. While cluster 2 is weakly pronounced in the entrepreneur and product dimensions, the highest level of orientation towards the market variables is observed in this group.

In accordance with the insights from the discriminant function analysis, the variables linked to the entrepreneur characteristics are the most highly represented in terms of mean value and, consequently, is the most pronounced dimension in the selection criteria.

4.2.3. Description of the cluster characteristics

The above description of the active cluster variables allows a first characterization of the three groups of Spanish venture capital companies, showing the existence of differences in the use of the selection criteria. Our hypothesis is that the variation in our results arises due to the heterogeneity of the Spanish venture capital industry. In addition to the characteristics of the project that´s being analyzed, existing literature suggests that the due diligence process might depend on factors linked to the venture capital company. We try to assess this question in this section by analyzing the passive cluster variables, which were also included in the questionnaire, but which were not used to create the clusters. The absolute and relative frequencies of these variables for each cluster are reported in table 10.

Table 10. Attributes of the passive clustering variables

	N	Cluster 1	Cluster 2	Cluster 3
Origin of the resources				
Public	12 (28.571%)	6 (33.333%)	2 (16.667%)	4 (33.333%)
Private	30 (71.429%)	12 (66.667%)	10 (83.333%)	8 (66.667%)
Type of entity				
VC Company	13 (30.952%)	5 (27.778%)	4 (33.333%)	4 (33.333%)
VCMC	14 (33.333%)	7 (38.889%)	5 (41.667%)	2 (16.667%)
SIRD	6 (14.286%)	4 (22.222%)	0	2 (16.667%)
Other	9 (21.428%)	2 (11.111%)	3 (25.000%)	4 (33.333%)
Intuition in decision making				
Little	14 (34.146%)	7 (41.176%)	5 (41.667%)	2 (16.667%)
A lot	27 (65.854%)	10 (58.824%)	7 (58.333%)	10 (83.333%)
Development stage				
Early	10 (23.810%)	4 (22.222%)	1 (8.333%)	5 (41.667%)
Late	32 (76.190%)	14 (77.778%)	11 (91.667%)	7 (58.333%)
Proposals received annually				
Less than 50	12 (28.571%)	8 (44.444%)	1 (8.333%)	3 (25.000%)
Over 50	30 (71.429%)	10 (55.556%)	11 (91.667%)	9 (75.000%)
Volume managed annually				
Less than 15 millions €	12 (28.571%)	5 (27.778%)	2 (16.667%)	5 (41.667%)
Over 15 millions €	30 (71.429%)	13 (72.222%)	10 (83.333%)	7 (58.333%)

VCC: Venture Capital Company
VCMC: Venture Capital Management Company
SIRD: Society of Industrial and Regional Development

Cluster 1, is the largest group in the sample (18 respondents) and has the lowest scores in the screening criteria. 6 of the venture capital companies in this cluster are public (33,333%), which is above the sample average of 28,571%, and 4 of them are classified as Society of Industrial Development. The predominant type of fund in this group is the Venture Capital Management Company (7 of the 18 respondents). Only 10 of the 17 venture capitalists of this group (58.824%) recognize that the intuition plays an important role in the decision making process, which is below the sample average of 65.854%. The largest part of the group (72.222%) manages more than €15 million a year. This is above the sample average of 71.429%. 10 of the 18 respondents in cluster 1 (55.556%) receive more than 50 proposals a year, which is the lowest proportion in comparison to the other groups and well below the sample average (71.429%). Additionally, 14 of the 18

respondents in cluster 1 prefer investments in companies in late stages of development.

Made up of 12 firms, the second cluster has the highest level of orientation towards the market variables. 10 of the 12 (83.333%) respondents of this cluster use mainly private resources, which is the highest proportion in comparison to the other groups and above the sample average (71.429%). Cluster 2 is the weakest pronounced in the use of the intuition. Only 7 of the 12 (58.333%) members identify a significant impact of the intuition in their decision process. This group consists of 4 Venture Capital Firms, 5 Venture Capital Management Companies and 3 respondents classified as other.11 (91.667%) of them receive more than 50 proposals a year and 10 (83.333%) manage over €15 million. In comparison to the other clusters, this group also has the highest proportion (91.667%) of members (11 of the 12 members) focused on the investment in companies in late stages of development.

The 12 respondents of the third cluster show the highest overall level of orientation towards the entrepreneur and the product variables, and they have an above average inclination in the market dimension. 10 of the 12 respondents in cluster 3 (83.333%) recognize that the intuition plays an important role in the decision making process, which is the highest proportion in comparison to the other groups and well above the sample average (65,854%). 33,333% of firms in this group indicate that their capital is mainly public, but only two of them are classified as Society of Industrial and Regional Development. The largest part of this group (75%) receives over 50 proposals a year. In comparison to the other clusters, this group also has the highest proportion (41.667%) of members (5 of the 12 members) focused on the investment in companies in early stages of development. In addition, the average funding manage in this group is the lowest, with only 7 of the 12 firms (58.333%) above the €15 million.

4.3.   Association between screening criteria and cluster characteristics

As we hypothesized, the empirical evidence presented in the above sections suggests that differences across venture capitalists in the use of investment criteria might arise due to the heterogeneity of the venture capital industry.

Cluster 1 is a big group of venture capital companies that show some preference for innovations. However, they are lacking in terms of all the desirable screening criteria, and they can´t be clearly characterized in terms of the origin of their resources, the use of intuition or their legal type. There could be two kinds of members in this

group. On the one hand, venture capitalists, mainly in private venture capital management companies, which are looking for an entrepreneur with professional experience that manages a project in a late stage of development. On the other hand, public resources mostly organized as societies of industrial and regional development, with a mixed objective function that includes nonfinancial items such as political and employment goals, which are easier to achieve with projects in late stage of development. In both cases, venture capitalists wouldn´t give much relevance to the screening criteria. We label this group as the "poor screening type".

Members of cluster 2 run away from innovative products. Most of the resources of this group are private and the predominant legal type is the venture capital management company. Therefore, profit-based objectives and short-term expectations would explain why this group focuses on projects in late stages of development. Market investment factors provide the most prominent decision making criterion for venture capitalists in this group, hoping to achieve the required profitability in the pre-established period of time. Qualitative considerations are almost limited to the honesty and integrity of the management team, which reduces the use of intuition in the selection process. We label this group as the "private-type and market oriented".

Venture capitalists in cluster 3 appreciate high-tech projects which have a functioning prototype. The success of these businesses highly depends on the assessment of qualitative characteristics related to the management team and the product of the venture. As a consequence, due diligences carried out by firms in cluster 3 rely on the intuition originated from the experience of the venture capitalists. This cluster also has the highest orientation towards investments in early stage of development, probably because they have the lowest representation of short-sight venture capital management companies and a high influence of public resources aiming to promote innovative projects. We label this group as the "intuitive-type and product-entrepreneur oriented".

5.   Conclusion

This study examines the investment process of a sample of 51 venture capital firms, to address a segmentation of the venture capital industry based on the most important selection criteria identified by previous empirical literature. Our results reveal the existence of a relationship between the investment criteria used in the

evaluation of new business proposals and the characteristics of the venture capital company. The importance of factors related with the product, the entrepreneur and the management team increases in venture capital companies, both private and public, with a preference for high-tech products and projects in early stage of development and with the use of the intuition. Regarding those factors related with the market of the venture, their relevance increases with the preference for projects in late stage of development and in private venture capital management companies.

Our paper provides a better insight into the screening process of venture capitalists and the results have clear implications for entrepreneurs and venture capital companies. The knowledge of what investment criteria are most important to venture capitalists might help entrepreneurs to elaborate better proposals, addressing them to the most suitable venture capital company.

There is one note of caution with regard to our results. Qualitative information about venture capital firms is difficult to obtain and often has to come from survey data, like in our sample. We recognize that survey data might create potential biases and possible measurement problems. However, we believe that our sample has large enough coverage of the venture capital industry (80.95%) that, although cautiously, valid conclusions can be drawn.

Further studies could expand the scope of research to include financial variables. It could also compare investment decisions within our typologies of venture capitalists in Spain and other countries. Also, the behavior of each type of venture capitalist could be studied from the moment the contract is signed until the contract runs out.

References

Backhaus, K., Erichson B., Plinke W. and Weiber R. (2006). "Multivariate Analysemethoden – Eine anwendungsorientierte Einführung". 11th ed. Berlin: Springer.

Barry, C.B. (1994). "New Directions in Research on Venture Capital Finance", Financial Management, 3, 23, 3-15.

Bein, G. and Levesque, M. (2004). "Selecting Projects for Venture Capital Funding: A Multiple Criteria Decision Approach". Technical Memorandum Number 791. Departament of Operations, Weatherhead School of Management. Case Western Reserve University (Cleveland, Ohio).

Bergs, S.(1981). "Optimalität bei Cluster Analysen". Dissertation at the University of Muenster.

Brander, J., Egan, E. and Hellmann, T. (2009). "Government Sponsored versus Private Venture Capital: Canadian Evidence". Forthcoming in Lerner, J. and Shoar, A. (eds.) International Differences in Entrepreneurship. NBER volume based on conference held in Cambridge, Mass. February 1-2, 2008, to be published by the University of Chicago Press.

Brander, J. Du, A., and Hellmann, T. (2010). "The Effects of Government-Sponsored Venture Capital: International Evidence. Globalization of Alternative Investments", Working Papers, Vol. 3: The Global Economic Impact of Private Equity Report 2010, World Economic Forum. Available at SSRN: http://ssrn.com/abstract=1573257

Brush, C.G. (1995). "International entrepreneurship: The effect of the firm age on motives for internationalization". New York: Garland.

Bühl, A. and Zöfel, P. (2005). "SPSS 12: Einführung in die moderne Datenanalyse unter Windows". 9th ed., München: Pearson Studium.

Bygrave, W.D. and Timrnons, J.A. (1992). "Venture Capital at the Crossroads". Boston MA. Harvard Business School Press.

Carter, R. B. and Van Auken, H. E. (1994). "Venture capital firms' preferences for projects in particular stages of development", Journal of Small Business Management, 32, 1, 60-74.

Cazorla L., Céspedes, J. and Cano, C.J. (1997). "Estrategia inversora de las Entidades de Capital Riesgo: un análisis de los principales factores determinantes". Investigaciones Europeas de Dirección y Economía de la Empresa, 3, 1, 77-91

Cornelius, B. (2005). "The institutionalisation of venture capital". Technovation 25, 599–608

Cumming, D. and MacIntosh, J. (2006). "Crowding Out Private Equity: Canadian Evidence". Journal of Business venturing, 21, 569-609

Del Palacio, I., Zhang, X., Sole, F. (2010). "The capital gap for small technology companies: public venture capital to the rescue?" Small Business Economics. DOI 10.1007/s11187-010-9275-6

Elango, B.; Fried, V.H.; Hisrich, R.D. and Polonchek, A. (1995)."How venture capital firms differ". Journal of Business Venturing 10, 157-179.

Florida, R. and Kenney, M. (l988a). "Venture capital an high technology entrepreneurship". Journal of Business Venturing 3, 301-319.

Florida, R. and Kenney, M. (l988b). "Venture Capital, high technology, and regional development". Regional Studies 22; 33-48.

Fried, V.H. and Hisrich, R.D. (1991). "Venture capital firms commonalities and differences". Management Research News 14, 3, 17-33.

Fried, V.H. and Hisrich, R.D (1994). "Toward a model of venture capital investment decision making". Financial Management, 23, 28–37.

Gupta, A., and Sapienza, H., (1992). "Determinants of Venture Capital Firms´ Preferences Regarding the Industry Diversity and Geographic Scope of their Investments". Journal of Business Venturing 7, 347-362.

Hair, J.F. (2006). "Multivariate data analysis". 6th ed. Englewood Cliffs, NJ: Prentice Hall.

Hall, H. J. (1989). "Venture capital decision making and the entrepreneur: an exploratory investigation". Unpublished doctoral thesis. University of Athens, Georgia.

Hernández Cánovas, G. and Martínez Solano, P. (2010), "Relationship lending and SME financing in the continental European bank-based system". Small Business Economics, 34, 4, 465-482.

Huberty, C.J. (1994). "Applied discriminant analysis". New York: John Wiley & Sons.

Khan, A. M. (1987). "Assessing venture capital investments with non-compensatory behavioural decision Models". Journal of Business Venturing, 2, 193–205.

Leleux, B. and Surlemont, B. (2003). "Public versus private venture capital: seeding or crowding out? A pan-European analysis". Journal of Business Venturing 18, 81–104.

Lerner, J. (2002). "When bureacrats meet entrepreneurs: The design of effective ''Public Venture Capital'' programmes". The Economic Journal, 112, 2, F73–F84.

MacMillan, I.C., Siegel, R. and Subbanarasimha, P.N (1985). "Criteria used by venture capitalists to evaluate new venture proposals". Journal of Business Venturing, 1, 119–28.

MacMillan, I. C., Zemann, L. and Subba Narasimha, P. N. (1987). "Criteria distinguishing successful from unsuccessful ventures in the venture screening process". Journal of Business Venturing, 2, 123 – 137.

Mayer, C. (1994). "The assessment: Money and banking: Theory and Evidence". Oxford Review of Economic Policy, 10, 4, 1–13.

McDougall, P.P. (1989): "International Versus Domestic Entrepreneurship: New Venture Strategic Behaviour and Industry Structure". Journal of Business Venturing, 4, 6, 387-400.

Milligan, G. and Sokol, L. (1980). "A two stage clustering algorithm with robust recovery characteristics". Educational and psychological measurement, 40, 3, 751-755.

Morrison, D. (1969). "Discriminant Analysis". Journal of Marketing Research, 6, 156-163.

Munari, F. Toschi, L. (2010). "Assessing the impact of public venture capital programmes in the United kingdom: do regional characteristics matter". Available at SSRN: http://ssrn.com/abstract=1539384.

Muzyka, D., Birley, S. and Leleux, B., (1996). "Trade-offs in the investment decisions of European venture capitalists". Journal of Business Venturing, 11, 273–287.

Norton, E. and Tenenbaum, B. H. (1993). "The effects of venture capitalists' characteristics on the structure of the venture capital deal", Journal of Small Business Management, 31, 4, 32-41.

Pandey, I.M. and Jang, A. (1996). "Venture capital for financing technology in Taiwan". Technovation, 16, 9, 499-514.

Poindexter, E. A. (1976). "The efficiency of financial markets: the venture capital case". Unpublished doctoral dissertation, New York University, New York.

Punj, G. and Stewart, D.W. (1983). "Cluster Analysis in Marketing Research: Review and suggestions for application". Journal of Marketing Research, 20, 2, 134-148.

Rah, J., Jung, K., and Lee, J. (1994). "Validation of the Venture Evaluation Model in Korea". Journal of Business Venturing, 9, 509-524.

Ramón, T., Garcia, D., and Van Auken, H. (2007). "Venture Capital in Spain by Stage of Development". Journal of Small Business Management, 45, 1, 68-88.

Ray, D.M. (1991). "Venture Capital and Entrepreneurial Development in Singapore". International Small Business Journal, 10, 1, 11-26.

Ray, D.M. and Turpin, D.V. (1993). "Venture capital in Japan". International Small Business Journal, 11, 4, 39-56.

Robinson, R.R. (1987)."Emerging strategies in venture capital industry" Journal of Business Venturing 2, 167-184.

Ruhnka, J. C. and Young, J. E. (1991). "Some Hypotheses About Risk in Venture Capital Investing". Journal of Business Venturing 6, 115-133.

Sapienza, H. J., and Timmons, J.A. (1989). "The Roles of Venture Capitalists in New Ventures: What Determines Their Importance?" Proceedings of the Academy of Management, 74-78

Tyebjee, T.T. and Bruno, A.V. (1984). "A model of venture capitalist investment activity". Manage Science, 30, 1051–66.

Wedel, M. and Kamakura, W. (1998). "Market segmentation: conceptual and methodological foundations". Boston, MA: Kluwer Academic Publishing.

Wells, W. A., (1974). "Venture Capital Decision Making". Unpublished doctoral dissertation, Carnegie Mellon University, Pittsburgh.

Zacharakis, A. and Shepherd, D. (2001). "The nature of Information and Overconfidence on Venture capitalists' Decision making". Journal of Business Venturing 16, 311–332.

WP-EC 2009-01	"The effects of immigration on the productive structure of Spanish regions" J. Martín, G. Serrano, F. Requena. February 2009.
WP-EC 2009-02	"Corporate governance and impression management in annual press releases" B. García, E. Guillamón-Saorín. March 2009.
WP-EC 2009-03	"Factores determinantes de la salida a Bolsa en España" J.E. Farinós, V. Sanchis. April 2009.
WP-EC 2009-04	"New challenges in competitiveness: knowledge development and coopetition" C. Camisón-Zornoza, M. Boronat-Navarro, A. Villar-López. April 2009.
WP-EC 2009-05	"The determinants of net interest income in the Mexican banking system: an integrated model" J. Maudos, L. Solís. April 2009.
WP-EC 2009-06	"Explaining protectionism support: the role of economic factors" N. Melgar, J. Milgram-Baleix, M. Rossi. April 2009.
WP-EC 2009-07	"Determinants of interest rate exposure of Spanish banking industry" L. Ballester, R. Ferrer, C. González, G.M. Soto. May 2009.
WP-EC 2009-08	"Entrepreneurial orientation, organizational learning capability and performance in the ceramic tiles industry" J. Alegre, R. Chiva. June 2009.
WP-EC 2009-09	"El coste y el desequilibrio financiero-actuarial de los sistemas de reparto. El caso del sistema Español" J.E. Devesa Carpio, M. Devesa Carpio. July 2009.
WP-EC 2009-10	"Imposición y protección social: efectos sobre el nivel de empleo en la OCDE" J.R. García Martínez. July 2009.
WP-EC 2009-11	"The role of learning in innovation: in-house *versus* externally contracted R&D experience" P. Beneito, M.E. Rochina, A. Sanchis. October 2009.
WP-EC 2009-12	"Do process innovations boost SMEs productivity growth? J.A. Máñez-Castillejo, M.E. Rochina-Barrachina, A. Sanchis-Llopis, J.A. Sanchis-Llopis. October 2009.
WP-EC 2009-13	"Esperanza de Vida Libres de Discapacidad por sexo y Comunidad Autónoma:2004-2006" F.J. Goerlich, R. Pinilla. October 2009.
WP-EC 2009-14	"How do market imperfections affect working capital management?" S. Baños-Caballero, P.J. García-Teruel, P.Martínez-Solano. November 2009.
WP-EC 2009-15	"The effect of outplacement services on earning prospects of unemployed" E. Alfonso Arellano. December 2009.
WP-EC 2009-16	"The market integration process under different regulatory regimes: evidence from the European car sector" J. Balaguer. December 2009.
WP-EC 2010-01	"Devolution dynamics of Spanish local government" M.T. Balaguer-Coll, D. Prior, E. Tortosa-Ausina. January 2010.
WP-EC 2010-02	"Output complexity, environmental conditions, and the efficiency of municipalities: a robust approach" M.T. Balaguer-Coll, D. Prior, E. Tortosa-Ausina. March 2010.
WP-EC 2010-03	"Spatial density, average prices and price dispersion. Evidence from the Spanish hotel industry" J. Balaguer, J.C. Pernías. April 2010.
WP-EC 2010-04	"Product placement in video games as a marketing strategy: an attempt to analysis in Disney company" I. Küster, E. Pardo, T. Suemanotham. May 2010.
WP-EC 2010-05	"Efectos de los videojuegos en las marcas emplazadas: la asociación y transferencia de imagen a través de las emociones" V. Castillo, I. Küster, N. Vila. May 2010.
WP-EC 2010-06	"Renewable sources, technology mix, and competition in liberalized electricity markets: the case of Spain" A. Ciarreta, C. Gutiérrez-Hita, N. Georgantzís. May 2010.
WP-EC 2010-07	"Contribution of individual to collective brands" J.L. Nicolau, F.J. Mas. September 2010.
WP-EC 2010-08	"Venture capitalists in Spain: cluster analysis of criteria used in the screening process" M.C. Ramón-Llorens, G. Hernández-Cánovas. September 2010.
WP-EC 2010-09	"Strategic accounting choice around firm level labor negotiations" B. García Osma, A. Mora, A.M. Sabater. September 2010.

---

[*] Please contact Ivie's Publications Department to obtain a list of publications previous to 2009.