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Metaxas, Theodore and Duquenne, Marie Noelle

University of Thessaly, Department of Economics, Greece,
University of Thessaly, Department of Planning and Regional
Development, Greece

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Small and Medium Sized Firms' Competitiveness and Territorial Characteristics by using a MLR approach

Theodore Metaxas

Assistant Professor
Department of Economics, University of Thessaly,
Korai 43, 38 333, Volos, Greece
Tel: ++30 24210 74917
Fax: ++30 24210 74772
Email: metaxas@econ.uth.gr

Marie Noëlle Duquenne

Associate Professor
Department of Planning and Regional Development, University of Thessaly
Pedion Areos, 38 334, Volos, Greece
Tel: ++30 24210 74438
Email: mdyken@uth.gr

Abstract

This paper investigates the importance of territorial characteristics on small and medium-sized firms' (SMEs) competitiveness. The analysis is based on primary data collected through questionnaires from 374 firms located in Bari (Italy), Varna (Bulgaria) and Thessaloniki (Greece). These firms operate in the sectors of industry, commerce and services. Through Exploratory Factor Analysis (EFA), the contribution of a large set of territorial characteristics has been assessed allowing us to extract some important and comprehensive factors for firms' competitiveness. Finally we implemented a multinomial logistic regression (MLR) in which the degree of firms' competitiveness (Low, Medium, High) is specified as a function of the territorial components identified through EFA. Three categories of firms' competitiveness are examined: competitiveness at national level, competitiveness against South-Eastern firms as well as North-Western firms. The MLR has been applied to all firms as well as to each one of the three sectors of activity. The results of the analysis confirm that the contribution of each major territorial component is largely conditioned by the type of competitiveness examined as well as the sector of activity.

Key words: Firms' competitiveness, Territorial characteristics, Exploratory Factor Analysis, Multinomial Logistic Regression

Jel codes: O18, R5, R11

1. INTRODUCTION

There are two basic theories of strategic management, the Resource-Based View and the Industrial Organization Theory, which focus on the investigation of firms' competitiveness. The first one refers to the internal environment of firms and their abilities and resources to be competitive (Barney, 2001; Wernerfelt, 1984). The second one focuses on the external dynamics of firms' environment that affect their competitiveness (Porter, 2000) and their ability to design strategically and to be effective (McLarney, 2001; Mukherji and Hurtado, 2001). Among the forces of the external environment, (the combination of) territorial characteristics (such as agglomeration economies, urban infrastructure, factors of labor and cost, development policies, qualitative factors) is of extreme importance (Deas and Giordano, 2001; Maskell and Malmberg, 1999). Several studies, most of them by using statistical, econometric and correlation analysis, measure firms' competitiveness at the international level. For instance, Bargegil and Modrego (2009) using sample of 2,357 firms in Spain, measure Impact of R&D organizations on medium-sized firms, Bayyurt and Duzu (2008) present a comparison of the relative efficiencies of manufacturing firms in China and Turkey, Kumar and Chadee (2002) evaluate the competitiveness of Asian manufacturing firms, while Parida (2008) using a sample of 1,471 ICT, conceptualize the dynamic capabilities, studied the influence of ICT in related small Swedish firms. Finally, Henderson and Cockburn (1994), through econometric and structural interviews, measure firms' productivity and the nature of competencies in pharmaceutical firms

Taking into consideration that the supply of a favorable business environment is crucial for both the attraction of new investments and the development of the existing ones, the paper, using the EFA, focuses on the evaluation of the territorial characteristics' impact on 374 SMEs, located in Bari (Italy), Varna (Bulgaria) and Thessaloniki (Greece), operating in the sectors of industry, commerce and services. The impact of the factors extracted through EFA on the overall firms' competitiveness is assessed econometrically (multinomial logistic regression). The contribution of the paper is of twofold importance: a) the findings come from a primary research; b) the relationship between local business environment and competitiveness has not been studied enough in the areas under consideration.

The next section of the paper presents literature review and in particular the variables (factors) under consideration as well as the corresponding sources. The third section describes the research profile and the methodology. The fourth section presents the results of the EFA for firms under consideration, overall and separately for each sector. The fifth section presents the results of the econometric analysis as regards the determinants of firms' competitiveness, overall and separately for each sector. The last section of the paper offers the conclusions.

2. LITERATURE REVIEW: VARIABLES AND DATA SOURCES

The majority of previous studies in the field (Herrin and Pernia, 1987; Head, *et al.*, 1999; Shangqin *et al.*, 2009; Trofimenko, 2010, *inter alia*) use econometric analysis in order to identify the factors that affect the location decision of (foreign) firms. Most of these studies use secondary data of

international and European organisations, banks or national statistical services. The current study follows a methodological approach based primary data.

The selection of the territorial characteristics which constitute criteria for firms' location in specific areas, was mainly based on the report of CEC (1993), and, also, on the empirical studies of Herrin and Pernia (1987) and Trofimenko (2010).

According to CEC report (1993), industrial firms pay more attention, comparing to the commercial/services ones, to the existence of agglomeration economies, to the geographical location, to the existence of supporting services, and to the low taxes in an area. In addition, factors associated to labor and to the existence of effective urban infrastructure (i.e. airports, ports, telecommunications) are considered important to their competitiveness. However, large commercial enterprises pay more attention to qualitative factors, to the workforce, and to economic factors that concern the size of the markets and their accessibility to customers and suppliers.

Herrin and Pernia (1987), on a basis of 34 criteria, which form 6 groups, and using primary data, on a 1 to 5 Likert scale, from 100 local and foreign firms in Philippines, found that closeness to major customers, easy road access, reliable electrical power, adequate telephone/telex services, availability of a suitable plot of land, availability of a suitable building, and adequate space for expansion are, more a less, equally important location factors for local and foreign firms.

Trofimenko (2010), using data from the World Bank's Study of Competitiveness, Technology and Firm Linkages, for 1,409 exporters and foreign-owned firms in China, examined 4 groups of location criteria. The empirical results indicated that exporters and foreign-owned firms are attracted by the size of the local market, the quality of telecommunications, and the supply of skilled labor, while the quality of the transportation was not significant.

The aforementioned studies besides traditional economic factors, such as the size of local market, the production structure, and the labor cost, give great importance on other, non-conventional, factors, such as the quality of cultural and social infrastructure, the existence of investment support agencies as well as partnerships among local public authorities and private sector (Metaxas, 2011). This list of non-conventional factors can be enriched with input from other studies, such as D' Archy and Keogh (1999), Rogerson (1999), and Craglia *et al.* (1999), which use the variables of land use and values, quality of life, and international connections, respectively. These studies examine how firms that belong to different sectors, and located in particular areas, evaluate and exploit local and regional assets and policies in order to support their development and competitiveness.

On the basis of the discussion held previously, the literature identifies 7 groups of local/regional factors that affect firms' location decisions.

Group 1: Agglomeration Economies and Access to European Markets (Factors: proximity to customers/suppliers – market size – availability of supporting services - accessibility to national and European markets (North-West and South-East) - Presence of foreign enterprises).

(Foreign) Firms' agglomeration can accentuate the competition locally, having great impact on the competitiveness of the existing firms, while supports effectively the creation of new ones (Crozet, *et al.*, 2004; Nachum and Keeble, 2003; Graham, 2007). Furthermore, easy access to markets is defined as primary factor, since the new markets, at regional and national level, are places where the new products have to be promoted to the new potential consumers, directly and effectively, increasing the demand levels of these products (Doeringer, *et al.*, 2004; Trofimenko, 2010). In addition, accessibility to European markets, constitutes a significant factor of economic activities' spatial re-segmentation in South Europe, and particularly in the Balkan Peninsula, (Papadaskalopoulos, *et al.*, 2005), providing the ability for the exploitation of opportunities in the new European and internationalised environment (Johansson and Elg, 2002).

Group 2: Regional characteristics / Policies (Factors: government attitude towards business - investments incentives - local taxes).

The role of local authorities is important since they contribute to the creation of a dynamic entrepreneurial environment, supporting the competitiveness of the existing firms but also the attractiveness of new ones (Fuller, *et al.*, 2003; Belso-Martínez, 2009). Furthermore, local taxes as well as a well-balanced national tax system play a crucial role in attracting foreign investments (Budryte, 2005).

Group 3: Labor (Factors: labor availability - labor quality and specialization - labor morality/ethics - good management relationships at local level).

Firms' competitiveness is closely related to the availability and the specialization of local workforce (Keune, 2001; Trofimenko, 2010). The management of labor relationships is related directly with the existence of employees' satisfaction that derives from this work. There are a number of studies stressing the fact that the provision or the absence of motives influences the behavior of employees and, consequently, the firms' efficiency (Herzberg, *et al.*, 1959; Locke, 1976; Parsons and Broadbridge, 2006).

Group 4: Urban Infrastructure (Factors: road/highway, train, seaport and air connections – telecommunications)

The existence of efficient transport and communication plays a crucial role on firms' competitiveness as well as on cities' development since it is strongly related with the direct distribution of goods, the easy access to markets, the decrease of transport cost and, finally, the price of the goods (Vickerman, 1996; Wheeler and Mody, 1992; EC 2003).

Group 5: Cost (Factors: cost of labor - cost of land use)

A number of studies support the importance of transport cost and land use cost on firms' decision making process for establishment (Harrington and Warf, 1995; Zhu 2000). In new economic geography models, in particular, firms seek to create new establishments in areas with lower costs (land, labor and transport) and market shares in the emergent states economically and geographically well-positioned (Disdier and Mayer, 2004; Vazquez-Rozas, 2009).

Group 6: Research – Development - Education (Factors: availability and quality of universities, research institutes and training programs)

The availability and the quality of universities and research institutes constitute a significant factor of firms' competitiveness, especially those related to technology and innovation (Doutriaux, 2003; Doutriaux and Barker, 1995). In addition, education and continuing training programs, contribute to business creativity, especially for SMEs, to the increase of their productivity and the development of innovative actions (Keune, 2001; Twomey, 2002).

Group 7: Quality of life – environment (Factors: urban aesthetic - attractiveness of physical environment)

International practice mentions cases of cities that improved their images, through the adaptation of regeneration and re-imagination policies, in order to attract investments and specialized human resources and to award their competitive advantages, based on their particularities as competitive destinations (Hall, 1998; Hope and Klemm, 2001). Of course, there is, also, the natural environment, which constitutes one of the basic factors in firms' competitiveness (CEC 1993).

Table 1, summarizing the above analysis, presents all the variables used in the current study, taking into consideration the corresponding data sources and corresponding previous studies.

.....[Table 1 about here].....

3. RESEARCH PROFILE AND METHODOLOGY

The paper examines which groups of factors have major importance on firms' competitiveness, comparing industrial to commercial firms and to services firms. The studied areas were chosen by taking into account some common characteristics. Specifically: a) they belong to the Objective 1 regions of EU; b) because of their geographical position, they are very important ports in their countries; c) they are located far away from the EU decision and economic centers. Research has been done with the collection of primary data by using questionnaires. Out of 450 questionnaires (170 were sent to industrial firms, 140 were sent to commercial firms and 140 were sent to services), 374 (134, 112, and 128 respectively) were completed, 83% percentage. More specifically: a) Research in Bari and Varna took place from May, 2006 to June, 2008. The method of programming was preferred, instead of random interviewing, in order to sustain the chance of clarifying ambiguous questions, and to avoid "quick" and "non-skeptical" answers; b) A Likert scale from 1 to 10 (Stathakopoulos, 2005) was used; c) The vast majority of firms (90%) had more than 30 employees; d) The vast majority of the firms responded was local (90%), something that means that the appreciation of firms is extremely important, since they are aware of the territorial environment (weaknesses and strengths) as well as of the development policies applied by the local authorities, for the benefit of the cities and the firms; e) interviews were made with high level managers and, also, business-owners; f) the selection of firms

was based on data from the Commercial and Industrial Chambers of Bari, Varna and Thessaloniki. The main variable for the selection of firms was the number of employees (> 30).

4. EXPLORATORY FACTOR ANALYSIS (EFA) RESULTS

EFA is a widely utilized statistical and multivariable technique in social sciences (Costello and Osborne, 2005; Chimboza and Mutandwa, 2007). Its objective is to explain variability among a number (p) of observable random variables (X_1, X_2, \dots, X_p) in terms of a smaller number ($k \leq p$) of unobservable random variables ($\Phi_1, \Phi_2, \dots, \Phi_k$), called “factors” (Pison *et al.*, 2003; Cunningham and Maloney, 1999) or “hyper-variables” (Rogerson, 2001), maintaining the maximum level of useful information. Among EFA, the principal component analysis (PCA) is a tool that allows identifying underlying variables “factors” that explain the pattern of correlations within the pre-selected set of observed variables, and most of the variance observed in the initial set of variables.

Table 2 presents the number of hyper-variables extracted (eigenvalues > 1) as well as the total variance explained for all firms under consideration and, separately, for the firms of each sector. In all cases, the proportion of the total variance explained by the new hyper-variables is quite satisfactory (at least 70%) while the compression of the dimensions is significant. In addition, the Kaiser-Meyer-Olkin (KMO) that evaluates whether the set of the initial variables is a coherent one, shows a significant degree of synergy among the initial variables (Table 2).

.....[Table 2 about here].....

For the interpretation of the factors, the Varimax rotation method was used (Kaizer, 1958; Abdi, 2003). Varimax is the most commonly used orthogonal rotation method, which maximizes the variance of the columns of the factor matrix without modifying the relative locations (coordinates) of the initial variables, and the total variance explained by the principal components (Forina *et al.*, 1988).

Loadings of initial variables (Tables 3 to 6) which are explaining the new hyper-variables are > 0.65 and mainly between 0.70 and 0.80, showing that these loadings can be considered very significant (Chang *et al.*, 2003). Furthermore, almost all the hyper-variables created exhibit excellent reliability. The reliability test (Cronbach’s α) determining the internal consistency or average correlation of factors in a survey instrument allows to gauge its reliability (Nunnally, 1967; Rust and Cooil, 1994; Jelenc, 2007; Bertan and Altintas, 2011). If internal consistency ranges between 0.0 and 1.0, a commonly-accepted rule of thumb is a Cronbach’s α of 0.6-0.7 indicating acceptable reliability, while 0.8 or higher indicates good reliability. In our cases, for the majority of the hyper-variables, Cronbach’s α takes excellent values, ranging for all firms from 0.758 to 0.989, for industrial firms from 0.896 to 0.950, for commercial from 0.835 to 0.932 and, finally, for services from 0.523 to 0.963. This fact indicates hyper-variables’ positive contribution to the model and very good reliability.

.....[Table 3 about here].....
.....[Table 4 about here].....
.....[Table 5 about here].....
.....[Table 6 about here].....

Table 7, presents the hyper-variables (factors) created for all firms under consideration and, separately, for the firms of each sector considered.

Taking into consideration all firms (n=374), the first hyper-variable AGGLAC, is a combination of the initial variables of the group ‘Agglomeration economies and access to markets’ and positioned high. Looking at the corresponding rankings of each sector, it is evident that this can attributed mainly to commercial firms. The significance of these factors is shown by the high percentage of participation of the hyper-variable (27%) in the total variance as depicted in Table 2. The second hyper-variable LAB is a combination of the initial values of the quality, the availability and the character of labor and employees. Variables that compose this hyper-variable have high loadings averages scores (from 0.741 to 0.822), showing the high correlation among these variables and their loadings, while present high percentage (11.4%) in the total variance. These factors are significant for almost all firms. In particular, for services LAB represents strongly the necessity for specialised workforce, while for commercial the interest for good labour management relationships at local level. This means that firms tend to invest and exploit human resources locally, contributing through this way on local development. So, a first estimation is that both groups of hyper-variables are important for all firms since they participate high enough (38%) in the total variance.

Significant enough are, also, the hyper-variables REDOU and REPOL (table 7) for almost all firms. In particular REDOU is of high significance for commercial and services firms, and REPOL is of high significance for industrial and commercial firms. Especially concerning REPOL, this finding is in harmony with the findings of previous studies (i.e. Deas and Giordano 2001; Peter Maskell and Andres Malmberg, 1999), showing that in the last couple of decades firms are interested in finding the appropriate local business climate, which, besides traditional/economic policies, includes “non-traditional” policies that facilitate development.

Also, factors that concern infrastructure (INFRA, INFRA-A and INFRA-B) seem to be very important for industrial firms and less important for commercial and services. Industrial firms appreciate that all urban infrastructure (land, sea and air connections) are crucial for their competitiveness, giving particular attention to the existence of harbors and airports, something that it does not count for the services firms.

.....[Table 7 about here].....

Less significant are the groups of hyper-variables COST and QULEN (table 7). These two hyper-variables represent cost factors and qualitative factors such as, natural environment and urban aesthetic. The hyper-variable COST seems to be not important for all firms. This finding contrasts the view that all factors that concern labor cost or land use are very important for the development of firms (Harrington and Warf 1995; Zhu 2000). In addition, COST factors are less significant than the others, because the labor supply of low cost is likely to be associated with the lack of expertise, which is a very important factor for both sectors, while the existence of land with low cost, is likely to attract non competitive enterprises, affecting even further the local factors, such as the quality of supporting services, or the creation of an unattractive entrepreneurial local environment for foreign business establishment. Finally, QULEN receives the last position of firms' estimation in general, accentuating the importance of traditional economic factors, comparing to the non-traditional ones, for firms development. This finding agrees totally with the empirical studies so far (i.e. Trofimenko 2010; Shangqin *et al.* 2009).

The above analysis awards only the significance of some particular factors for firms' competitiveness and in any case allows to assess how these factors affect firms' development and competitiveness. This important question is examined in the following section.

5. THE DETERMINANTS OF APPRECIATION FOR FIRMS' COMPETITIVENESS

In order to find out the effects of the territorial factors identified above on the appreciation for firms' competitiveness, multinomial logistic regression (MLR) was implemented with the dependent categorical outcome reflecting three levels of firms' competitiveness (Low, Medium and High). Moreover, three appreciations of firms' competitiveness are examined: firms' competitiveness comparatively to (i) national firms, (ii) to Southern European firms and finally (iii) to firms located in North and Western part of Europe. Consequently, MLR has been performed for these 3 dependent variables by considering not only the whole sample but also the sub-samples related to the three sectors of activity: industry, commerce and services. Globally twelve models have been examined. Examining the distribution of firms by competitiveness levels, we calculate the proportional chance accuracy rates which constitute one of the main criteria for evaluating the MLR pertinence. Generally, the percent of firms considering that they benefit of high competitiveness level is limited, especially in the industrial sector.

.....[Table 8 about here].....

MLR is considered as an attractive analysis because it does not assume multivariate normality, linearity or homoscedasticity but at the contrary, it requires no multicollinearity between the predictors as well as independence among the dependent variable's categories. In the present study, the independent variables have been generated through EFA with varimax rotation. Consequently the first assumption is de facto verified. As regards the second assumption, we can admit that each firm's competitiveness situation (low, medium or high) is independent from the two other ones.

In compliance with Hosmer and Lemeshow (2004), the MLR requires a minimum case-to-independent variables ratio about 10 while a desirable situation is a ratio of 20. All the models examined in the present study respect the minimum ratio.

As required in MLR, the dependent variable is non-metric and the parameters of one of its categories need to be normalized to zero. We selected "High firms' competitiveness" to be normalized (reference category) in order to focus the analysis on the two other situations, i.e. low and medium competitiveness. In such a model, the predicted dependent variable is a function of the probability that a particular firm will be in one of the three alternative competitiveness' situations. The regression model allows us to predict the logit, that is the natural log of the odds (generally referred as relative risk) of being in one or the other competitiveness' situation.

$$\ln(ODDS) = \ln \frac{\hat{Y}}{1-\hat{Y}} = \alpha_0 + \sum_{i=1}^k a_i X_i$$

For each one of the two situations considered (Medium or High competitiveness), we have: \hat{Y} = the predicted probability of the firm to be competitive rather than no competitive (normalized reference level).

X_i ($i= 1, \dots, k$) is a set of independent variables, i.e. the territorial factors derived from the EFA which have, as mentioned above, the property to be uncorrelated between.

6.1. Predicted appreciation of competitiveness for the whole sample

The existence of a relationship between the non-metric dependent variable and the set of independent variables is based on the statistical significance of the final model chi-square ratio (overall test of relationship). Table 9 confirms that the null hypothesis stipulating no difference between the model without independent variables and the final model with the independent variables is rejected (p -value < 0.01). For each one of the models examined, the evidence of the relationship is confirmed: the appreciation for firms' competitiveness can effectively be predicted by the territorial factors generated by EFA.

.....[Table 9 about here].....

The most efficient measure to assess the strength of the relationship is the classification accuracy which compares the *predicted percent* of firms with low, medium and high competitiveness, based on the logistic model, to the *actual and known percent*. Table 10 reports the classification accuracy rate (correct predicted percent by the model) and compares it to the proportional by chance accuracy rate (actual). It is admitted that the model is useful when the correct predicted percent is at least 25% more than the proportional by chance accuracy rate.

.....[Table 10 about here].....

The overall relationship between each one of the territorial factors and the firms' competitiveness is evaluated through the Likelihood ratio test. The results of this test allow us to confirm the existence of an overall relationship between most of these factors and the firms' competitiveness, especially cost factors, labor factors, R/D – Education as well as air and seaport connections (Table 11). Globally, agglomeration effects and qualitative factors are not statistically significant. As regards regional policies, they have a positive impact on firms' competitiveness against non national competitors while at national level they don't appear to be significant.

.....[Table 11 about here].....

Even if a territorial factor is globally significant, it might not be statistically significant in differentiating between pairs of competitiveness levels as defined by the dependent variable. For this reason, it is necessary to examine the parameters of the model and examine with caution the Wald test. The differentiating significance of the territorial characteristics (Table 12) reveals some important aspects. Obviously air and seaport connections (contrarily to highway and railway networks) as well as R/D are systematically significant and contribute largely to a better firm's competitiveness¹. Improvement of cost factors (decrease of labor and land costs) reduces systematically the odds of being in the group of low or medium competitiveness level except in one case: the reduction of costs does not contribute significantly to a higher probability for a firm to move from medium to high competitiveness level only with respect to West-Northern European firms. A quite similar conclusion appears as regards improvement of labor factors. Better qualities of this factor contribute to decrease the odds of being in the group of low competitiveness but not in the group of medium competitiveness with respect to all non national firms (models 2 and 3).

.....[Table 12 about here].....

¹ The parameters of these two territorial factors are generally associated with the highest values so that each improvement of one unit conduces to a significant decrease of the odds of being in group of low or medium competitiveness.

We also observe that agglomeration factors and access to markets seem to have a positive (but limited) impact on competitiveness with respect to non national firms. An improvement of these factors (about one unit) decreases the odds for a firm to be in the intermediate group (medium level) about 20% in model 2 as well as in model 3². Finally if the impact of regional policies is not confirmed in terms of national competitiveness, it appears significant for firms' competitiveness especially with respect to southern European firms.

6.2. Predicted appreciation of firms' competitiveness by main sector of activity

The analysis of firms' competitiveness by sector of activity confirms that territorial factors have a direct impact on the appreciation for firms' competitiveness with one exception relative to services' competitiveness against national firms. In this case, the firms' competitiveness is not efficiently predicted by the territorial characteristics of the city where the firm operates. Consequently the following analysis is not taking into account this model and will be focused on the other 8 models.

.....[Table 13 about here].....

As regards the Model accuracy rate (table 14), the criteria assessing the strength of the relationship is systematically verified especially in the case of industrial and services firms for which the model accuracy rate is clearly higher than the threshold.

.....[Table 14 about here].....

Considering the industrial sector, cost factors and regional policies have no significant impact on the appreciation for firms' competitiveness unlike the five other territorial characteristics which contribute in various degrees to its improvement (Table 15.1). It appears that local agglomeration factors and access to national markets contribute significantly to increase the likelihood for a firm of being in the group of high competitiveness. Due to the fact that the access to markets is mainly correlated with transport connections, it is not surprising that urban infrastructures - including air and seaport connections as well as highway and railway networks and telecommunications - are a significant predictor even if this factor does not seem to play a major role for competitiveness against the West northern market. The presence of research and development institutes as well as universities is also one of the major factors for firms' competitiveness while labor quality and availability have a limited impact, contributing mainly to the improvement of competitiveness against national firms.

.....[Table 15 about here].....

² The estimated parameter associated to agglomeration factors for the medium group is -0.222 (model 2) and -0.267 (model 3). Consequently, $\exp(b) = 0.801$ and 0.766 respectively which implies that for each increase of one unit in agglomeration factors, the odds of being in group of medium competitiveness decreased by 20% ($0.801-1 = -0,199$) and 23% ($0.766-1 = -0,234$), respectively.

Generally, as regards the differentiating significance of territorial characteristics, they are statistically more significant in differentiating between low and high competitiveness' level rather than between medium and high (Table 16). If their improvement contributes to decrease the likelihood to belong to the low competitiveness' group, it is not necessarily the case for the medium group.

.....[Table 16 about here].....

Examining the appreciation of *commercial firms*, if agglomeration factors and access to markets as well as research and development are globally significant predictors as in the previous sector, it clearly appears that for this group of firms, cost and labor factors are also determinant territorial characteristics for competitiveness (Table 15.2). As regards urban infrastructures, air and seaport connections have a significant impact contrarily to highway and railway networks.

The results of the models 2 and 3 (competitiveness at international level) reveal that the above mentioned factors are significant in distinguishing the group of low level from high level which is not the case between medium level and high level (Table 17).

.....[Table 17 about here].....

The examination of the results of the 3 models for commercial firms demonstrates clearly that cost considerations are predominant, especially for low competitiveness' firms (Table 17). A decrease of costs (about one unit) reduces intensively the odds for a firm to be in the group of low competitiveness at national as well as international level. It also reduces the likelihood for a firm to have a medium competitiveness level against national firms.

In the case of services, the multinomial model relative to competitiveness against national firms is not significant. There is no evidence of relationships between the territorial factors and the appreciation of firms' competitiveness. As regards competitiveness against European firms, the models 2 and 3 lead to some similar conclusions. Urban infrastructures, especially air and seaport connections, are in each case significant predictors (Table 18.3). An increase about one unit for this factor decreases the odds for a firm to belong to low or medium competitiveness' level against southern European firms about 60% and around 50% against North European firms.

.....[Table 18 about here].....

Availability of labor factors and to a lesser extent, cost factors are also significant predictors of competitiveness, especially compared to other firms in southern Europe (Table 18, Model 2). All the other territorial characteristics have not significant impact on competitiveness' appreciation. Through the comparative analysis of all the models examined, it appears that the overall significance of the territorial characteristics generally differs by sector of activity. Moreover, some of these factors

with overall relationship to the dependent variable are not significant between some pairs of competitiveness' level. This situation concerns mainly medium against high level. Finally it is important to mention that, in all cases of figures, urban infrastructures (air and seaport connections) have an overall positive impact while conversely there is no evidence of relationship between regional policies and appreciation of competitiveness' level.

9. CONCLUSIONS

Before concluding, we should stress that our study suffers from a number of limitations. The first one is related to the relatively small sample size since the aim of the study is to present a trend of the industrial, commercial and services firms' appreciation for the territorial environment where they activated. Consequently, it is difficult to come up on general conclusions for the wider area of Southern Europe. Finally, the selection of the studied firms based only on the number of employees, do not take into consideration variables such as, the age of firms or annual sales turnover and of course this fact may affect not the quality of conclusions but their wider generalization.

The second point is that the data concern the period before the financial crisis especially in Greece. Under this option the outcomes are not related with the current situation, but its still important to present the analysis the exact period before the crisis. We know the difficulties and the restrictions of primary field research and the most favour scenario it will be a comparative analysis of the period before and after the crisis. Something that it has started of course with many problems.

The objective of the paper was to investigate the importance of territorial characteristics/assets (i.e. agglomeration economies, urban infrastructure, factors of labor and cost, development policies, qualitative factors, *inter alia*) on small- and medium-sized firms' competitiveness located in Bari (Italy), Varna (Bulgaria) and Thessaloniki (Greece), and operated in the sectors of industry, commerce and services.

Because of the large number of variables, initially the EFA was used in order to limit the number of variables, creating hyper-variables. The EFA has accentuated the important role of agglomeration economies and access to markets (AGGLAC), education, training and research (REDOU) as well as specialized workforce and good working climate (LAB) for firms' development.

Independently of the sector of activity, most of the territorial characteristics have a positive impact on firms' competitiveness appreciation. The implementation of Multinomial Logistic Regressions allows us to confirm that firms' evaluation as regards their competitiveness is correlated with the capacity of the territory to offer a favorable business environment. The most important factor among those extracted from EFA is obviously related to the existence of research and development environment. For industrial as well as commercial firms, supporting services (research institutes, universities and technological centers) in combination with agglomeration economies and urban infrastructures are the main factors reinforcing their competitiveness, especially at international level.

As regards urban infrastructures, it is confirmed that international connections (air and seaport) are much more important than the national ones (highway and railway networks).

Conventional factors as land and labour costs seem to have a limited impact, excepted commercial firms for which the decrease of one unit reduces in a large extend the odds of belonging to low and medium competitiveness group.

Finally one of the major results of the MLR is the fact that regional policies regarding strong investment incentives and local government attitude against business are never perceived by firms as a really determinant factor, even if through Factor Analysis, it constitutes a principal component. This fact suggests that firms have a negative attitude against local development policies which are designed and implanted by local authorities. In other terms, we observe a global disappointment with regard to the handling of policies supporting the firms considered in the present study. This disappointment may be related with the traditional model of centralized administration and planning policy including local development. This model leaves little room for private initiatives, especially in South-east European small and medium cities. On the other hand, the lack of confidence in local administration bodies may be related to insufficient know-how and experiences as well as the absence of a clear vision of local development with clear definition of the firms' role and involvement in this process.

The contribution of the paper is of twofold importance: a) the findings come from a primary research; b) the relationship between local business environment and competitiveness has not been studied enough in the areas under consideration. Of course, the findings of the paper could be even stronger if we had studied a greater sample of cities and firms. This is, definitely, a task for future research. In any case, however, the findings of the paper offer valuable insight to policy-making as regards the development of small- and medium-sized firms located in the area of Southern Europe.

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TABLES

Table 1 - *The variables used in the current study*

Sources (Studies and Reports)	Variables (factors)	Method and Analysis
CEC (1993) Europe (Industrial, Commercial, Services and R&D sectors)	Size of local market, Proximity to customers/suppliers, Accessibility to other national markets, Presence of foreign business, Availability of support services, Availability of strong investment incentives, Low local taxes, Government attitude towards business, Good management relationships locally, Labour morality/ethics, Labour quality and specialisation, Labour availability	Empirical research–Likert scale
Trofimenko (2010) China (1,409 export firms)	Size of local market, Availability of strong investment incentives, Sufficient train connections, Quality of local higher education, Quality of local training/continuing education, Quality of research institutes, Availability of universities or technological institutes	Econometric Analysis
Shangqin <i>et al.</i> (2009) New Zealand (75 local firms)	Size of local market	Empirical research, descriptive and econometric analyses
Herrin and Pernia (1987) Philippines (100 firms)	Proximity to customers/suppliers, Availability of support services, Labour availability, Sufficient air connections, Sufficient road/highway connection	Empirical research–Likert scale
Redding and Venables (2004), USA counties	Accessibility to other national markets, Proximity to customers/suppliers	Econometric analysis
Papadaskalopoulos <i>et al.</i> (2005) Southeastern Europe	Access to European markets and networks	Statistical and econometric analyses
Johansson and Elg (2002) Sweden	Access to European markets and networks	Conceptual model
Head <i>et al.</i> (1999), USA (foreign firms)	Presence of foreign business, Availability of support services	Econometric Analysis
Head and Mayer (2004), Western Europe (Japanese firms)	Proximity to customers/suppliers, market potential	Empirical research, econometric analysis
Davies (2001), South Africa	Availability of support services	Case-studies
Fuller <i>et al.</i> (2003) UK cities	Government attitude towards business	Empirical research, descriptive analysis, case studies
Desai, <i>et al.</i> , (2004), USA (multinational firms)	Low local taxes	Secondary data and econometric analysis
Devereux and Griffith, (2002), USA, UK, France and Germany	Low local taxes	Secondary data and econometric analysis
Galindo-Rueda and Haskel (2005) England (Annual Business Inquiry and Employer Skills Survey)	Labour quality and specialisation	Descriptive statistics and econometric analysis
Henderson (1986), Brazil	Labour quality and specialisation	Secondary data and econometric analysis
D'Arcy and Keogh (1999), UK cities	Low Cost of land	Econometric analysis
Glaeser, <i>et al.</i> , (2001), USA cities	Urban aesthetic	Econometric analysis and case-study (Manhattan)
Marlet and van Woekerns (2005), Dutch cities	Urban aesthetic	Statistics and factor analysis

Source: Authors' elaboration

Table 2 - Total variance explained, under the PCA method, for all firms and firms by sector

Components	All firms (n=374)			Industrial firms (n=134)			Commercial firms (n=112)			Services firms (n=128)		
	Eigenvalues	Variance %	Cumulative %	Eigenvalues	Variance %	Cumulative %	Eigenvalues	Variance %	Cumulative %	Eigenvalues	Variance %	Cumulative %
1	7.277	26,952	26,952	6.832	25,304	25,304	9.123	33,790	33,790	4.485	16,610	16,610
2	3.072	11,377	38,329	4.411	16,338	41,642	3.243	12,011	45,801	3.251	12,041	28,651
3	2.325	8,610	46,938	2.079	7,700	49,342	2.140	7,925	53,726	2.488	9,215	37,866
4	1.744	6,458	53,396	1.807	6,940	56,036	1.649	6,107	59,833	2.120	7,851	45,717
5	1.46	5,407	58,803	1.650	6,110	62,146	1.541	5,708	65,541	1.530	5,667	51,384
6	1.24	4,591	63,394	1.285	4,759	66,904	1.182	4,378	69,919	1.474	5,459	56,842
7	1.183	4,380	67,774	1.041	3,856	70,760	1,018	3,771	73,691	1,315	4,872	61,714
8	1.028	3,806	71,580							1,118	4,140	65,854
9										1,017	3,767	69,621
	KMO = 0,840			KMO = 0,766			KMO = 0,825			KMO=0,696		

Source: Authors' elaboration

Table 3- Rotated component matrix and creation of hyper-variables for all firms

	Components							
	1	2	3	4	5	6	7	8
Access to Northern and Western European market	.780							
Presence of foreign business	.740							
Accessibility to other national markets	.727							
Access to Southern and Eastern European market	.681							
Proximity to customers/suppliers	.634							
Size of local market	.561							
Availability of support services	.553							
Good management relationships at local level		.822						
Labour quality and specialisation		.757						
Labour availability		.744						
Labour morality/ethics		.741						
Quality of local training/continuing education			.812					
Quality of local higher education			.780					
Quality of research institutes			.749					
Availability of strong investment incentives				.759				
Government attitude towards business				.737				
Availability of universities or technological institutes								
Sufficient air connections					.919			
Sufficient seaport connections					.903			
Cost of labour is low						.801		
Cost of land is low						.800		
Low local taxes								
Sufficient road/highway/connections							.804	
Telecommunications							.708	
Sufficient train connections							.702	
Attractiveness of physical environment								.790
Urban aesthetic								.564
Cronbach's α	0.915	0.948	0.935	0.925	0.989	0.934	0.893	0.758

Source: Authors' elaboration

Table 4 - Rotated component matrix and creation of hyper-variables for the industrial firms

	Components						
	1	2	3	4	5	6	7
Sufficient seaport connections	.822						
Sufficient train connections	.795						
Sufficient air connections	.756						
Telecommunications	.704						
Sufficient road/highway/connections	.683						
Attractiveness of physical environment							
Labour morality/ethics		.805					
Labour quality and specialisation		.772					
Labour availability		.763					
Good management relationships at local level		.702					
Government attitude towards business			.823				
Availability of strong investment incentives			.776				
Low local taxes			.637				
Urban aesthetic							
Access to Northern and Western European market				.770			
Access to Southern and Eastern European market				.751			
Presence of foreign business				.731			
Availability of support services							
Quality of local higher education					.843		
Quality of local training/continuing education					.805		
Availability of universities or technological institutes					.766		
Quality of research institutes					.663		
Size of local market						.782	
Proximity to customers/ suppliers						.770	
Accessibility to other national markets						.624	
Cost of labour is low							.828
Cost of land is low							.808
Cronbach's α	0.944	0.950	0.936	0.926	0.943	0.896	0.930

Source: Authors' elaboration

Table 5 - Rotated component matrix and creation of hyper-variables for the commercial firms

	Components						
	1	2	3	4	5	6	7
Access to Southern and Eastern European market	.792						
Access to Northern and Western European market	.737						
Presence of foreign business	.699						
Availability of support services	.683						
Accessibility to other national markets	.661						
Proximity to customers/ suppliers	.659						
Size of local market	.626						
Quality of local higher education		.875					
Quality of local training/continuing education		.813					
Quality of research institutes		.756					
Labour morality/ethics		.662					
Good management relationships at local level		.643					
Urban aesthetic							
Attractiveness of physical environment							
Government attitude towards business			.844				
Availability of strong investment incentives			.717				
Low local taxes			.648				
Availability of universities or technological institutes							
Sufficient seaport connections				.939			
Sufficient air connections				.924			
Sufficient train connections					.804		
Sufficient road/highway/connections					.727		
Telecommunications					.599		
Cost of land is low						.844	
Cost of labour is low						.838	
Labour availability							.734
Labour quality and specialisation							.688
Cronbach's α	0.949	0.952	0.924	0.936	0.911	0.931	0.835

Source: Authors' elaboration

Table 6 - Rotated component matrix and creation of hyper-variables for the services firms under

	Components								
	1	2	3	4	5	6	7	8	9
Labour availability	.824								
Labour quality and specialisation	.789								
Availability of strong investment incentives									
Sufficient air connections		.869							
Sufficient seaport connections		.869							
Telecommunications		.854							
Availability of universities or technological institutes			.785						
Quality of research institutes			.739						
Quality of local higher education			.729						
Quality of local training/continuing education			.711						
Urban aesthetic									
Accessibility to other national markets				.789					
Size of local market				.705					
Proximity to customers/ suppliers				.688					
Availability of support services									
Presense of foreign business					.770				
Access to Northern and Western European market					.721				
Access to Southern and Eastern European market					.646				
Labour morality/ethics						.761			
Good management relationships at local level						.711			
Cost of labour is low							.713		
Cost of land is low							.596		
Attractiveness of physical environment									
Sufficient road/highway/connections								.668	
Sufficient train connections								.656	
Government attitude towards business									.651
Low local taxes									.632
Cronbach's α	0.925	0.960	0.930	0.907	0.912	0.873	0.914	0.523	0.963

Source: Authors' elaboration

Table 7 - The hyper-variables (factors) created for all firms under consideration and, separately, for the firms of each sector considered.

	All firms		Industrial/Manufacturing firms		Commercial/Distributional firms		Services firms	
	Hyper-variables	Groups	Hyper-variables	Groups	Hyper-variables	Groups	Hyper-variables	Groups
1	AGGLAC	Agglomeration factors and access to markets	INFRA	Urban infrastructure (all factors)	AGGLAC	Agglomeration factors and access to markets	LAB-A	Labor factors (availability and specialization)
2	LAB	Labor factors	LAB	Labor factors	REDOU – LAB	R/D – Education – Training and good management -ethics	INFRA-B	Urban infrastructure (highway, railway network & telecommunications)
3	REDOU	R/D – Education - Training	REPOL	Regional policies	REPOL	Regional policies	REDOU	R/D – Education - Training
4	REPOL	Regional policies	AGGLAC-A	Agglomeration factors and access to European markets	INFRA-A	Urban Infrastructure (air and seaport connections)	AGGLAC-A	Agglomeration factors and access to European markets
5	INFRA-A	Urban Infrastructure (air and seaport connections)	REDOU	R/D – Education – Training	INFRA-B	Urban infrastructure (highway, railway network & telecommunications)	AGGLAC-B	Agglomeration factors and access to national markets
6	COST	Cost factors	AGGLAC-B	Agglomeration factors and access to national markets	COST	Cost factors	LAB-B	Labor factors (management, morality and ethics)
7	INFRA-B	Urban infrastructure (highway, railway network and telecommunications)	COST	Cost factors	LAB	Labor factors (availability and specialization)	COST	Cost factors
8	QULEN	Qualitative factors (environment, aesthetic)	-	-	-	-	INFRA-A	Urban Infrastructure (air and seaport connections)
9	-	-	-	-	-	-	REPOL	Regional policies

* L.A = Loadings Average ** Exclude loadings < 0.500

Table 8: Firms' competitiveness levels by sector of economic activity

Competitiveness' Levels	All Firms			Industry			Commerce			Services		
	Firms' Competitiveness against:			Firms' Competitiveness against:			Firms' Competitiveness against:			Firms' Competitiveness against:		
	N.F.	S.F.	W.F.	N.F.	S.F.	W.F.	N.F.	S.F.	W.F.	N.F.	S.F.	W.F.
1: Low	13,9	20,1	29,4	26,1	29,9	41,8	5,4	8,9	15,2	7,8	18,8	28,1
2: Medium	27,0	39,3	48,7	35,8	43,3	46,3	19,6	35,7	61,6	24,2	38,3	40,6
3: High	59,1	40,6	21,9	38,1	26,9	11,9	75,0	55,4	23,2	68,0	43,0	31,3
Proportional Accuracy Rate (%)	44	36	37	34	35	40	60	44	46	53	37	34

N.F. = National Firms, S.F. = South European Firms, W.F. = West Northern European Firms

The proportional accuracy rate is equal to the sum of squared percent, i.e. $\sum_{i=1}^3 p_i^2$

Table 9: Overall test of relationship

	Model 1: Competitiveness against national firms		Model 2: Competitiveness against Southern European firms		Model 3: Competitiveness against West Northern European firms	
	-2 Log Likelihood	Chi-Square	-2 Log Likelihood	Chi-Square	-2 Log Likelihood	Chi-Square
Intercept Only	702,172		789,273		780,277	
Final Model	554,522	147,649***	676,025	113,248***	677,161	103,116***

Note: df =16, ***: p-value < 0. 01

Table 10: Strength of the relationship: Proportional by chance accuracy criteria

	Proportional chance accuracy rate	Model accuracy rate	Criteria (>1.25xchance accuracy rate)
Model 1: Competitiveness against national firms	44%	65%	55% < 65%: Verified
Model 2: Competitiveness against Southern European firms	36%	55%	45% < 55%: Verified
Model 3: Competitiveness against West Northern European firms	37%	59%	46% < 59%: Verified

Table 11 Overall significance of the independent variables

Territorial factors	Model 1: Competitiveness against national firms		Model 2: Competitiveness against Southern European firms		Model 3: Competitiveness against West Northern European firms	
	Chi- Square	p- value	Chi- Square	p- value	Chi- Square	p- value
Intercept	114,262	,000	43,577	,000	56,528	,000
Agglomeration factors / access to markets	,147	,929	3,010	,222	3,591	,166
Labor factors	17,435	,000	5,158	,076	7,143	,028
R/D – Education and Training	36,677	,000	37,238	,000	34,774	,000
Regional policies	1,863	,394	5,667	,049	8,412	,015
Urban infrastructure (air and seaport connections)	57,600	,000	42,730	,000	25,789	,000
Cost factors	46,713	,000	23,363	,000	24,565	,000
Urban infrastructures (highway, railway network and telecommunications)	5,879	,050	3,896	,143	6,090	,048
Qualitative factors (environment, aesthetic)	2,850	,241	2,271	,321	2,700	,259

Table 12: Parameters' estimate for the whole sample

Model 1: Competitiveness against national firms		B	Std. Error	Wald	Df	p-value	Exp(B)
Low	Intercept	-2,007	,244	67,737	1	***	
	Agglomeration factors / access to markets	-,058	,187	,095	1	-	,944
	Labor factors	-,666	,183	13,209	1	***	,514
	R/D – Education and Training	-1,040	,185	31,490	1	***	,354
	Regional policies	,151	,183	,683	1	-	1,163
	Urban infrastructure (air and seaport connections)	-1,350	,242	31,106	1	***	,259
	Cost factors	-1,157	,200	33,334	1	***	,314
	Urban infrastructures (highway, railway network and telecommunications)	,226	,188	1,454	1	-	1,254
Qualitative factors (environment, aesthetic)	-,088	,190	,213	1	-	,916	
Medium	Intercept	-,741	,138	28,966	1	***	
	Agglomeration factors / access to markets	-,047	,137	,116	1	-	,954
	Labor factors	-,459	,143	10,247	1	***	,632
	R/D – Education and Training	-,469	,144	10,586	1	***	,625
	Regional policies	,176	,134	1,740	1	-	1,193
	Urban infrastructure (air and seaport connections)	-,840	,153	30,008	1	***	,432
	Cost factors	-,737	,151	23,776	1	***	,479
	Urban infrastructures (highway, railway network and telecommunications)	-,338	,143	5,620	1	**	,713
Qualitative factors (environment, aesthetic)	-,231	,139	2,749	1	*	,794	
Model 2: Competitiveness against Southern European firms							
Low	Intercept	-,891	,185	23,127	1	***	
	Agglomeration factors / access to markets	-,162	,166	,953	1	-	,850
	Labor factors	-,362	,162	4,983	1	**	,696
	R/D – Education and Training	-,977	,173	31,918	1	***	,377
	Regional policies	-,349	,168	4,320	1	**	,706
	Urban infrastructure (air and seaport connections)	-1,059	,192	30,552	1	***	,347
	Cost factors	-,791	,171	21,282	1	***	,454
	Urban infrastructures (highway, railway network and telecommunications)	,117	,166	,498	1	-	1,124
Qualitative factors (environment, aesthetic)	-,183	,166	1,213	1	-	,833	
Medium	Intercept	,148	,130	1,286	1	-	
	Agglomeration factors / access to markets	-,222	,129	2,970	1	*	,801
	Labor factors	-,177	,132	1,789	1	-	,838
	R/D – Education and Training	-,375	,139	7,264	1	***	,687
	Regional policies	-,257	,129	3,992	1	**	,773
	Urban infrastructure (air and seaport connections)	-,631	,135	21,761	1	***	,532
	Cost factors	-,385	,135	8,106	1	***	,680
	Urban infrastructures (highway, railway network and telecommunications)	-,254	,133	3,662	1	**	,776
Qualitative factors (environment, aesthetic)	-,177	,125	1,984	1	-	,838	
Model 3: Competitiveness against Northern and Western European firms							
Low	Intercept	,252	,184	1,877	1	-	
	Agglomeration factors / access to markets	-,284	,174	2,657	1	*	,753
	Labor factors	-,376	,173	4,709	1	**	,687
	R/D – Education and Training	-,919	,185	24,609	1	***	,399
	Regional policies	-,408	,175	5,395	1	**	,665
	Urban infrastructure (air and seaport connections)	-,864	,184	22,153	1	***	,421
	Cost factors	-,743	,179	17,291	1	***	,476
	Urban infrastructures (highway, railway network and telecommunications)	,251	,173	2,095	1	-	1,285
Qualitative factors (environment, aesthetic)	-,048	,163	,087	1	-	,953	
Medium	Intercept	1,004	,159	40,121	1	***	
	Agglomeration factors / access to markets	-,267	,151	3,115	1	*	,766
	Labor factors	-,056	,152	,136	1	-	,945
	R/D – Education and Training	-,271	,162	2,790	1	*	,763
	Regional policies	,037	,147	,064	1	-	1,038
	Urban infrastructure (air and seaport connections)	-,349	,148	5,545	1	**	,705
	Cost factors	-,170	,152	1,250	1	-	,843
	Urban infrastructures (highway, railway network and telecommunications)	-,369	,153	5,812	1	**	,691
Qualitative factors (environment, aesthetic)	-,199	,137	2,114	1	-	,820	

The reference category is High competitiveness level

***: p-value < 0.01, **: p-value < 0.05, *: p-value < 0.10

Table 13: Overall test of relationship

	Model 1: Competitiveness against national firms		Model 2: Competitiveness against Southern European firms		Model 3: Competitiveness against West Northern European firms	
	-2 Log Likelihood	Chi-Square	-2 Log Likelihood	Chi-Square	-2 Log Likelihood	Chi-Square
1. INDUSTRIAL SECTOR (a)						
Intercept Only	291,065		288,486		261,294	
Final Model	252,234	38,831***	250,920	37,566***	219,460	41,834***
2. COMMERCE (a)						
Intercept Only	155,060		204,017		206,887	
Final Model	111,926	43,134***	167,157	38,860***	175,673	31,214***
3. SERVICES (b)						
Intercept Only	206,093		267,358		278,067	
Final Model	190,178	15,915	233,200	34,168**	250,982	27,084**

Note: ***: p-value < 0. 01, (a) df = 14, (b) df = 18

Table 14: Strength of the relationship: Proportional by chance accuracy criteria

	Proportional chance accuracy rate	Model accuracy rate	Criteria (>1.25xchance accuracy rate)
1. INDUSTRIAL SECTOR			
Model 1.1: Competitiveness against N.F.	34%	51%	43% < 51%: Verified
Model 1.2: Competitiveness against S.F.	35%	51%	44% < 51%: Verified
Model 1.3: Competitiveness against W.F.	40%	63%	50% < 63%: Verified
2. COMMERCE			
Model 2.1: Competitiveness against N.F.	60%	78%	75 < 78%: Verified
Model 2.2: Competitiveness against S.F.	44%	60%	55 < 60%: Verified
Model 2.3: Competitiveness against W.F.	46%	65%	57 < 65%: Verified
3. SERVICES			
Model 3.2: Competitiveness against S.F.	37%	57%	46 < 57%: Verified
Model 3.3: Competitiveness against W.F.	34%	53%	43 < 53%: Verified

N.F. = National Firms, S.F. = South European Firms, W.F. = West Northern European Firms

Table 15: Overall significance of the territorial characteristics

Territorial factors	Model 1: Competitiveness against national firms		Model 2: Competitiveness against Southern European firms		Model 3: Competitiveness against West Northern European firms	
	Chi-Square	p-value	Chi-Square	p-value	Chi-Square	p-value
15.1. INDUSTRIAL SECTOR						
Intercept	4,277	,118	11,643	,003	37,200	,000
Urban infrastructures (all types)	5,336	,069	8,125	,017	1,958	,376
Labor Factors	6,571	,037	3,696	,158	3,234	,198
Regional policies	2,569	,277	1,146	,564	,112	,945
Agglomeration factors and access to European markets	2,144	,342	5,987	,050	3,528	,171
R/D – Education – Training	6,352	,042	10,374	,006	13,163	,001
Agglomeration factors and access to national markets	14,447	,001	7,135	,028	17,178	,000
Cost Factors	1,150	,563	,174	,917	2,220	,330
15.2. COMMERCE						
Intercept	110,759	,000	59,709	,000	52,096	,000
Agglomeration factors and access to markets	13,097	,001	12,645	,002	9,503	,009
R/D – Education - Training	11,866	,003	15,499	,000	11,764	,003
Regional policies	3,717	,156	4,501	,105	3,681	,159
Urban infrastructures (air and seaport connections)	13,159	,001	6,303	,043	4,421	,110
Urban infrastructure (Highway, railway network & telecommunication)	,574	,751	1,593	,451	1,399	,497
Cost Factors	17,225	,000	9,549	,008	7,154	,028
Labor Factors	5,282	,071	5,165	,076	2,654	,265
15.3. SERVICES						
Intercept			13,361	,001	5,357	,069
Availability of Labor Factors			7,822	,020	3,825	,148
Urban infrastructure (Highway, railway network & telecommunication)			2,312	,315	3,933	,140
R/D – Education - Training			,588	,745	,312	,855
Agglomeration factors and access to European markets			2,875	,237	,596	,742
Agglomeration factors and access to National markets			,395	,821	,672	,715
Labor factors (management, morality and ethics)			,390	,823	,960	,619
Cost Factors			4,483	,086	3,660	,160
Urban infrastructures (air and seaport connections)			13,775	,001	11,275	,004
Regional policies			4,239	,120	3,368	,186

Table 16: Parameter estimates for the Industry Sector

Model 1: Competitiveness against national firms		B	Std. Error	Wald	Df	p-value	Exp(B)
Low	Intercept	-.405	,269	2,266	1	-	
	Urban infrastructure	-.494	,266	3,434	1	*	0,610
	Labor Factors	-.628	,263	5,692	1	**	,533
	Regional policies	-.349	,260	1,799	1	-	,705
	Agglomeration factors and access to European markets	-.338	,262	1,668	1	-	,713
	R/D – Education – Training	-.615	,259	5,645	1	**	,541
	Agglomeration factors and access to national markets	-.842	,270	9,692	1	***	0,431
	Cost Factors	-.194	,253	,588	1	-	,823
Medium	Intercept	,097	,229	,177	1	-	
	Urban infrastructure	-.476	,233	4,163	1	**	0,621
	Labor Factors	-.158	,225	,490	1	-	,854
	Regional policies	,007	,220	,001	1	-	1,007
	Agglomeration factors and access to European markets	-.291	,231	1,585	1	-	,747
	R/D – Education – Training	-.200	,233	,740	1	-	,819
	Agglomeration factors and access to national markets	-.731	,238	9,404	1	***	0,481
	Cost Factors	,047	,223	,045	1	-	1,049
Model 2: Competitiveness against Southern European firms							
Low	Intercept	,226	,291	,600	1	-	
	Urban infrastructure	-.703	,292	5,815	1	**	0,495
	Labor Factors	-.487	,271	3,244	1	*	,614
	Regional policies	-.053	,273	,038	1	-	,948
	Agglomeration factors and access to European markets	-.654	,285	5,264	1	**	,520
	R/D – Education – Training	-.862	,293	8,642	1	***	,422
	Agglomeration factors and access to national markets	-.719	,281	6,531	1	**	0,487
	Cost Factors	-.111	,268	,171	1	-	,895
Medium	Intercept	,777	,260	8,953	1	***	
	Urban infrastructure	-.650	,260	6,249	1	**	0,522
	Labor Factors	-.169	,237	,506	1	-	,845
	Regional policies	,160	,241	,440	1	-	1,173
	Agglomeration factors and access to European markets	-.486	,257	3,575	1	*	,615
	R/D – Education – Training	-.365	,253	2,081	1	-	,694
	Agglomeration factors and access to national markets	-.388	,247	2,460	1	-	1,474
	Cost Factors	-.055	,242	,052	1	-	,946
Model 3: Competitiveness against Northern and Western European firms							
Low	Intercept	1,637	,420	15,189	1	***	
	Urban infrastructure	,482	,351	1,888	1	-	1,620
	Labor Factors	-.261	,347	,566	1	-	,770
	Regional policies	,055	,360	,023	1	-	1,056
	Agglomeration factors and access to European markets	-.611	,373	2,680	1	-	,543
	R/D – Education – Training	-1,190	,387	9,484	1	***	,304
	Agglomeration factors and access to national markets	-1,240	,394	9,891	1	***	0,289
	Cost Factors	-.157	,365	,185	1	-	,855
Medium	Intercept	1,888	,412	21,044	1	***	
	Urban infrastructure	,361	,328	1,207	1	-	1,434
	Labor Factors	-.102	,325	,099	1	-	1,108
	Regional policies	-.013	,340	,001	1	-	,987
	Agglomeration factors and access to European markets	-.335	,354	,896	1	-	,715
	R/D – Education – Training	-.639	,352	3,298	1	*	,528
	Agglomeration factors and access to national markets	,492	,358	1,893	1	-	1,636
	Cost Factors	,139	,346	,161	1	-	1,149

The reference category is High competitiveness level

***: p-value < 0.01, **: p-value < 0.05, *: p-value < 0.10

Table 17: Parameter estimates for the Commercial Sector

Model 1: Competitiveness against national firms		B	Std. Error	Wald	Df	p-value	Exp(B)
Low	Intercept	-8,001	3,239	6,101	1	**	
	Agglomeration factors and access to markets	-2,661	1,292	4,243	1	**	,070
	R/D – Education – Training	-2,001	,914	4,795	1	**	,135
	Regional policies	1,048	,831	1,589	1	-	2,852
	Urban infrastructures (air and seaport connections)	-3,305	1,727	3,662	1	**	,037
	Urban infrastructure (Highway, railway network & telecommunication)	-,450	,669	,452	1	-	,638
	Cost Factors	-2,668	1,316	4,113	1	**	,069
	Labor Factors	-1,700	1,067	2,540	1	-	,183
Medium	Intercept	-1,616	,305	28,076	1	***	
	Agglomeration factors and access to markets	-,211	,251	,711	1	-	,810
	R/D – Education – Training	-,527	,270	3,791	1	**	,591
	Regional policies	-,276	,297	,867	1	-	,759
	Urban infrastructures (air and seaport connections)	-,518	,273	3,589	1	**	,596
	Urban infrastructure (Highway, railway network & telecommunication)	,038	,249	,023	1	-	1,038
	Cost Factors	-,845	,321	6,906	1	***	,430
	Labor Factors	-,414	,258	2,571	1	-	,661
Model 2: Competitiveness against Southern European firms							
Low	Intercept	-4,318	1,231	12,312	1	***	
	Agglomeration factors and access to markets	-1,874	,709	6,993	1	***	,154
	R/D – Education – Training	-1,700	,540	9,892	1	***	,183
	Regional policies	,960	,572	2,817	1	-	2,613
	Urban infrastructures (air and seaport connections)	-1,295	,660	3,852	1	**	,274
	Urban infrastructure (Highway, railway network & telecommunication)	-,358	,417	,737	1	-	,699
	Cost Factors	-1,502	,598	6,307	1	**	,223
	Labor Factors	-1,115	,583	3,656	1	*	,328
Medium	Intercept	-,408	,211	3,730	1	**	
	Agglomeration factors and access to markets	-,173	,214	,652	1	-	,841
	R/D – Education – Training	-,246	,226	1,190	1	-	,782
	Regional policies	-,131	,220	,354	1	-	,878
	Urban infrastructures (air and seaport connections)	-,293	,211	1,938	1	-	,746
	Urban infrastructure (Highway, railway network & telecommunication)	,131	,213	,380	1	-	1,140
	Cost Factors	-,235	,220	1,140	1	-	,790
	Labor Factors	-,306	,211	2,095	1	-	,737
Model 3: Competitiveness against Northern and Western European firms							
Low	Intercept	-1,242	,520	5,699	1	**	
	Agglomeration factors and access to markets	-1,085	,426	6,484	1	**	,338
	R/D – Education – Training	-,880	,375	5,505	1	**	,415
	Regional policies	,495	,412	1,442	1	-	1,640
	Urban infrastructures (air and seaport connections)	-,764	,403	3,587	1	*	,466
	Urban infrastructure (Highway, railway network & telecommunication)	-,060	,331	,033	1	-	,942
	Cost Factors	-,905	,402	5,078	1	**	,404
	Labor Factors	-,611	,386	2,501	1	-	,543
Medium	Intercept	1,050	,250	17,680	1	***	
	Agglomeration factors and access to markets	-,111	,269	,171	1	-	,895
	R/D – Education – Training	-,172	,269	,409	1	-	1,188
	Regional policies	-,175	,264	,439	1	-	,840
	Urban infrastructures (air and seaport connections)	-,408	,265	2,369	1	-	,665
	Urban infrastructure (Highway, railway network & telecommunication)	,212	,242	,769	1	-	1,236
	Cost Factors	-,044	,242	,033	1	-	,957
	Labor Factors	-,107	,251	,183	1	-	,898

The reference category is High competitiveness level

***: p-value < 0.01, **: p-value < 0.05, *: p-value < 0.10

Table 18: Parameter estimates for Services

Model 2: Competitiveness against Southern European firms		B	Std. Error	Wald	Df	p-value	Exp(B)
Low	Intercept	-,973	,307	10,035	1	***	
	Availability of Labor Factors	-,776	,337	5,299	1	**	0,460
	Urban infrastructure (Highway, railway network & telecommunication)	-,299	,287	1,087	1	-	,741
	R/D – Education – Training	,009	,277	,001	1	-	1,009
	Agglomeration factors and access to European markets	,125	,287	,191	1	-	1,134
	Agglomeration factors and access to National markets	,116	,289	,160	1	-	1,123
	Labor factors (management, morality and ethics)	-,172	,277	,387	1	-	1,188
	Cost Factors	-,237	,288	,679	1	-	,789
	Urban infrastructures (air and seaport connections)	-,964	,331	8,510	1	***	,381
Regional policies	-,366	,286	1,644	1	-	,693	
Medium	Intercept	-,109	,222	,240	1	-	
	Availability of Labor Factors	-,476	,242	3,878	1	**	0,621
	Urban infrastructure (Highway, railway network & telecommunication)	,110	,223	,246	1	-	1,117
	R/D – Education - Training	,159	,224	,501	1	-	1,172
	Agglomeration factors and access to European markets	-,277	,219	1,611	1	-	,758
	Agglomeration factors and access to National markets	-,061	,213	,082	1	-	,941
	Labor factors (management, morality and ethics)	,062	,215	,084	1	-	1,064
	Cost Factors	-,460	,223	4,243	1	**	,631
	Urban infrastructures (air and seaport connections)	-,719	,259	7,730	1	***	,487
Regional policies	-,441	,226	3,818	1	*	,643	
Model 3: Competitiveness against Northern and Western European firms							
Low	Intercept	-,107	,270	,157	1	-	
	Availability of Labor Factors	-,538	,287	3,502	1	*	0,584
	Urban infrastructure (Highway, railway network & telecommunication)	-,337	,268	1,591	1	-	,714
	R/D – Education - Training	-,119	,260	,212	1	-	,887
	Agglomeration factors and access to European markets	-,181	,264	,467	1	-	,835
	Agglomeration factors and access to National markets	-,208	,259	,644	1	-	,812
	Labor factors (management, morality and ethics)	-,065	,259	,063	1	-	,937
	Cost Factors	-,392	,264	2,204	1	-	,675
	Urban infrastructures (air and seaport connections)	-,920	,312	8,719	1	***	,398
Regional policies	-,466	,265	3,107	1	*	,627	
Medium	Intercept	,402	,234	2,951	1	*	
	Availability of Labor Factors	,206	,226	,829	1	-	1,228
	Urban infrastructure (Highway, railway network & telecommunication)	,119	,228	,272	1	-	1,126
	R/D – Education - Training	,002	,228	,000	1	-	1,002
	Agglomeration factors and access to European markets	-,159	,232	,468	1	-	,853
	Agglomeration factors and access to National markets	-,127	,225	,318	1	-	,881
	Labor factors (management, morality and ethics)	-,205	,219	,869	1	-	,815
	Cost Factors	-,406	,229	3,152	1	*	,666
	Urban infrastructures (air and seaport connections)	-,619	,265	5,465	1	**	,538
Regional policies	-,301	,230	1,714	1	-	,740	

The reference category is High competitiveness level

***: p-value < 0.01, **: p-value < 0.05, *: p-value < 0.10