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The incidence of regional factors on “competitive performance” of universities

by

Stefano De Rubertis^{*}, Fabio Pollice[^], Enrico Ciavolino[♥], Antonella Ricciardelli[♦]

Abstract

The performance of single universities, beyond internal determinants, is influenced by the conditions of their own territorial context, that is by a number of factors related to their local geographical area, meant as a space of territorial interactions, measurable by its previous relational dynamics. This set of factors can, directly or indirectly, affect both the organizational structure and strategic orientations of the single university, as well as the results achieved by it in the field of education and research. Through a multi-dimensional statistical model, the evaluation criteria for university performance will be compared to some territorial variables which, in scientific literature, are considered to be indexes of territorial competitiveness. The statistical model aims at measuring the impact local context has on the competitive performance of universities, explaining the nature and intensity of this relationship.

With reference to the objectives of the research, data we will use refer to two different sets of indicators: on the one hand, data used to evaluate university performance, on the other hand, the ones used to measure territorial competitiveness. In more detail, university performance is based on some of the indicators used by the CENSIS in the "University Ranking 2010" referring to the following databases: MIUR-Statistical Office; CINECA; CNVSU; National LLP Agency Italy; CRUI; CORDIS. Territorial data, instead, are extracted from the “Atlas of the Provinces and Regions competitiveness” elaborated by UNIONCAMERE. For both sets of indicators, the analysis will refer to the year 2008. If the indicators of university performance are correlated to territorial conditions, they don't really measure university productivity/competitiveness, but rather the competitiveness of its territorial context. This can lead to some distortions in the financial resources allocation and, more generally, in national supporting policies to public universities. In their conclusions, authors also tend to reverse the perspective through which the role of government intervention has been traditionally interpreted. If universities are qualifying elements of territorial competitiveness – as it is shown by the fact that they are frequently used within the set of indicators to measure it – the strengthening of university system should be one of the priority objectives of regional development policies. Consequently, national government should invest in university education and research, even where university performance, due to some specific local conditions, is not satisfactory or even below fixed national or international standards.

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1. Introduction: the region needs university¹

Technological progress, cause and effect of economic growth, is considered as a key factor to fill the regional gaps. Innovations, which are consequences of local socio-economic conditions, qualify territorial competitiveness and increase the capability of regions and enterprise clusters to successfully enter international markets, thus accelerating economic growth.

In many approaches, local and regional development is intended as a process of growth, and its discontinuities historically depend on structural changes, often brought about by technological and/or institutional innovations. Evidences of this view emerge in contributions of neoshumpeterian scholars (Kondratiev), of "flexible specialization" (Piore and Sabel), of "costs of transaction" (Coase, Williamson), of regulation (Aglietta, Boyer, Lipietz), of the institutionalist approaches (Polanyi, Granovetter), of the industrial districts (Becattini), of the *milieu innovateur* (Philippe Aydalot and GREMI), of the "regional innovation systems" (Cooke) and of *learning regions* (Florida). All of these approaches emphasize, although differently, the relevance of the interaction between socio-cultural and industrial contexts [Pike et al., 2006; Conti e Giaccaria, 2001; Benko, 1995; Cooke, 1992].

University is traditionally in-between processes of technological, institutional and, generally speaking, cultural innovation. Nevertheless, the procedure through which it has carried out its functions have changed throughout time. There exist a flourishing literature on this subject and it substantially unanimously recognizes to university, besides its traditional functions of teaching and research, the role of driver of regional development. The bottom-up approaches require that the region is capable of planning and self-fuelling growth based on the capability of innovating, emphasizing the role of immaterial resources and, in particular, the role of the economy of knowledge. Accordingly, university is ascribed the task of stimulating and sometimes leading such processes, orienting education and research towards the fulfilment of the new needs of regional economies [OECD, 1999].

Many universities in the world have thus integrated their traditional mission and, in Europe, the process has been accelerated by EU policies: on the one hand, the Lisbon strategy has promoted the revitalization of research in Europe, by increasing investments and forms and degrees of cooperation between university and enterprises; on the other hand, the Bologna process has launched the creation of a European higher education space based upon continuous learning and on the capability of meeting the needs of the territory.

The reframing of its role has been followed by a clarification or realignment of the strategy: efforts to devise measurement and assessment instruments for university performance have significantly improved, particularly in order to identify best practices, to acknowledge meritocracy (efficiency, effectiveness, transparency) and to allocate resources on initiatives that provide higher quality assurances.

At an international level, the increasing commitment is aimed at planning assessment systems that enable players involved to appraise local peculiarities in which universities are asked to operate [Aoki et al., 2010]. There is a raising awareness of the new mission of higher education (becoming "applicative" instead of "disciplinary") as well as of the unfeasibility to separate the impact evaluation from expectations and the role attributed to it by the context [Brennan, 2008]. In some cases, the measurement and assessment instruments proposed take on the sinister aspect of synthetic indicators of the "usefulness" represented by university for regional development [see, for example: Youtiea and Shapira, 2008; Tavoletti, 2007; Karlsen, 2005]. Probably stressed by a sort of performance anxiety, universities might spur studies proving their positive impact on the region, by

¹Although this paper is the result of a joint reflection, Stefano De Rubertis wrote paragraphs 1, 1.1 and 1.2; Antonella Ricciardelli wrote paragraph 2 and 2.3; Enrico Ciavolino wrote paragraphs 2.1 and 2.2 and Fabio Pollice wrote paragraph 3 and 4.

methods and variables that sometimes overestimate the positive effects, in order to document requests for greater funding [Siegfrieda et. Al., 2007].

On the whole, attempts to identify satisfactory assessment criteria of the role of university show the prevalence of a deterministic approach, according to which it is assumed that university conditions regional development, regardless of the effects produced by the regional context on university development.

1.1. University and region co-evolve

Numerous, interesting studies focus on the analysis of the quality of relations between university and region, recognizing their biunivocal nature. Two main approaches can be identified [Gunasekara, 2006] and most of the literature on this subject is ascribable to them.

The first approach is based on the "triple helix" model; according to it, the regional demand can be intercepted through the interaction of three institutions: government, industry and university.

«The underlying model is analytically different from the national systems of innovation (NSI) approach (Lundvall, 1988, 1992; Nelson, 1993), which considers the firm as having the leading role in innovation, and from the "Triangle" model of Sabato (1975), in which the state is privileged [...]. We focus on the network overlay of communications and expectations that reshape the institutional arrangements among universities, industries, and governmental agencies» [Etzkowitz e Leydesdorff , 2000, p.109].

It is not about attributing or acknowledging a new role to university [as in Gibbons et al., 1994, quoted in Etzkowitz e Leydesdorff , 2000], but constructing an heuristic model that, under a systemic point of view, interprets the relations between the three institutions (university/industry/government) as the output of a co-evolution (a structural matching) enhancing the role of university and of its functions in the processes of regional economic development. The relation between the three institutions is (and has been) various and variable. Thus, in "socialist-inspired" economies, the governmental sphere included and led the other two spheres; whereas the frameworks of autonomy of the three institutions have been very clear and weakly interconnected in free market regimes. In the triple helix model, the respective areas of influence show wide margins of overlapping/interaction: the rigid boundaries are replaced by boundary-spanning frameworks, rich in productive contaminations [Etzkowitz and Leydesdorff, 2000; Leydesdorff and Meyer, 2006].

According to Gunasekara [2006, p.102], theoretical and empirical bases of the model are still weak, «nonetheless, the emphasis on academic entrepreneurialism in the triple helix model, centred on knowledge capitalisation and other capital formation projects, may be regarded as conceptualising a generative role for universities, where these institutions drive development».

The second approach, on which significant literature pivots, can be called "engaged university" approach [Gunasekara, 2006]. It envisages the need to plan manifold and flexible solutions corresponding to the variability of contexts in which universities operate. In order to optimize the "local" commitment of university numerous obstacles must be overcome, such as the difficulty of bending teaching according to regional educational needs (in particular of SMEs), often besieged by pressures and supra-local needs, the high cost to start cooperation project, with scarce funding and often assessed (by academic corporations and partition of resources) as less relevant, compared to national and international projects. What is needed are targeted and cross-sectional initiatives, which coordinate economic policies for regional development with university policies [Chatterton e Goddard, 2000, p. 491], allowing the latter to assume adaptive strategies more flexible than those described by the *triple helix* model [Gunasekara, 2006].

«The challenge is to link within the institution the teaching, research and community service roles by internal mechanisms [...] and to engage the institution with all facets of the regional development process (e.g. skills enhancement, technological development and innovation, cultural awareness) in a region/higher education institution 'value added management' process in the 'learning region'. [...] the introduction of a regional agenda within such national systems is likely to require a stronger regional planning framework which brings together a number of regional stakeholders to co-manage, coordinate, and regulate the management and funding of teaching and research. Such mechanisms may pose a challenge to institutional autonomy» [Chatterton e Goddard, 2000, pp. 475, 478].

Obviously, there exist contributions highlighting the risks of loss of identity and adherence to traditional academic objectives (teaching and research), deriving from the extreme openness to regional and corporate needs in particular: the value of research could downsize as well as the interest in teaching and education quality of the youth; public resources allocated to research could considerably decrease, thus causing a consequent further loss of quality and autonomy [Krimsky, 1991, Geuna, 1999, Pavitt, 2000, quoted in Lazzeroni and Piccaluga, 2008]. Moreover, in many countries, the changing role of university (and of its "contamination" with the world of enterprises) has progressively introduced private-oriented managerial criteria, which could further undermine some peculiarities of the academic tradition (i.e., independent judgment, role of public interest, capability to take on critical points of view in society) [Currie and Vidovich, 2000]. However, most of the authors seem to unanimously acknowledge the importance of the so-called third mission of university and its increasing interaction with industry.

1.2. University needs the region

According to what described before, the idea that university plays a crucial role in the regional economic development seems to be well-established. On the contrary, it seems to be less evident the extent to which regional quality should be important for the university achievement or, simply, for its full, effective functionality.

In an interesting study carried out in Italy on the relations between production and research in microelectronics, in showing that cooperation between industry and university is essential for the success of both institutions, it is pointed out that:

«[...] (i) the best academic centres of research are those more closely connected to industry; (ii) the interactions are founded on research teams, comprising both industrial and academic researchers, engaged in face-to-face knowledge exchanges, and give rise to a well connected network; (iii) links with strongly connected, qualified universities are particularly useful to firms for effective recruiting (i.e. they allow firms to hire productive individuals as researchers or designers); (iv) border-crossing connections linking individual researchers of the two spheres tend to be driven by cognitive proximity and personal relationships» [Balconi and Laboranti, 2006, p. 1617].

Given the fact that these assumptions may be considered as valid only related to the Italian experience and the sector examined by the authors, it is presumably clear to wonder what happens in regions de-structured at an economic and social level, where university cannot rely on a real industrial fabric.

Empirical analyses have proved that European universities, including those located in the peripheries, consistently with the dominant models, are capable of providing important benefits to the relative local economies. Moreover, these analyses have proved paradoxical situations, in which university, though resulting one of the most important local firms, job and wage provider, is not

capable of leading to any significant drive to growth processes [Davies, 1998]: in these cases, the relation with the territory would seem to change from opportunity into constraint.

Actually, externalities are as important for knowledge production as for other production activities; for instance, in some studies localizations in industrial areas characterized by a considerable technological content and/or located near medium-to-large sized cities as particularly favourable; furthermore, the synergy enterprise/industry apparently has better aftermaths in regions where more innovative "new industries" prevail on more mature traditional industries [Arizona State University, 2006].

In Italy, the attention is particularly focused on measurements, sometimes sophisticated, of the teaching effectiveness, often following the concept of *customer satisfaction* [Iezzi, 2005; Chiandotto, 2004; Bini and Chiandotto, 2003; Biggeri and Bini, 2001; Minelli et al., 2005].² A university performance is ranked according to the way the human capital educated enters the labour market [Vittadini, 2002, 2004], and, only recently, according to its capability to produce research quality. On the contrary, the influence exerted by regional dynamics on the destinies of local universities does not seem to be taken into due consideration.

The MIUR - *Ministero dell'Università e della Ricerca* [2010] has examined the problem of the influence exerted by socio-economic characteristics of the context on the results achieved by universities, but this issue has been exclusively dealt with aiming at achieving satisfactory distribution criteria of public financial resources. According to the MIUR, the performance indicators must be rectified considering the positional disadvantages (negative externalities) generated by their context,

«considering, for example, the GDP per capita as a variable of the context with a non-linear effect on the drop-out rate, university education is particularly important in provinces where the income per capita is lower on average, where the human capital plays a crucial role in order to improve its social status, whereas it is relatively less important where the average wealth is higher and the labour market more dynamic (for example, the reference here is to the North-eastern districts). Finally [...] an estimate of the level expected of the efficiency indicators on the basis of models including the impact of the socio-economic context has been provided. What emerges from this analysis is that, for example, some provinces show lower drop-out rates compared to what would be predictable observing only the context variables. It means that in those provinces there exist a stronger individual contribution of each university than everywhere else; these are the universities that, in socio-economic contexts sometimes not completely favourable, have made a trump card out of their excellence. [...] the method used to measure efficiency considerably impacts on the faculty ranking and in particular on the central positions. The lack of analysis of the contextual factors in comparing faculties determines a wrong assessment of efficiency, particularly for middle-ranking faculties. The most efficient and the less efficient faculties tend to be more stable and sound compared to the method used in assessment» [MIUR, 2010, p.187].

Hence, the focus is on each university (or faculty) performance and not on the way it interprets or can interpret the role of driver of local development. More attention to the impact produced by

² After the first testing (Campus One), at least on paper, the opinion of *stakeholders* about the imposition of the teaching offer of each university has been institutionalized with the D.M. 509/99 and reinforced with the D.M. 270/2004, together with the assessment of *customer satisfaction*. The labour and professional fields has thus the opportunity of driving the development of the teaching offer and, to some extent, research.

regional qualities on university performance is paid in a study carried out by the ARTI - *Agenzia Regionale per la Tecnologia e l'Innovazione della Puglia* [ARTI, 2010], according to which national university policies do not consider the decrease in potential needed by Southern Italy (in order to compete with Northern Italy), ascribable to regional "deficits". This study highlights that, compared to the rest of Italy, Southern Italy records a lower density of universities and a lower educational offer to residents. The "density" of researchers is lower (almost 2 out of 1.000 inhabitants in Southern Italy and 4 out of 1.000 inhabitants in Northern Italy), and less financial resources are allocated per student. Despite the weakness of the context, professors of Southern universities, on average, attract research funding which, as a share of the regional added value, is more than that attracted by their colleagues of Northern Italy [Arti Puglia, 2010]. Moreover, provisions aiming at rationalizing the university offer seem to be in contrast with empirical evidences which prove that the variety and "uniqueness" of the teaching offer and of its connected research activities is in direct relation to the positive effects observed in the regional economy [Davies, 1998, p. 63; Ai-Xia et al., 2009].

In short, in our perspective, the question is not how to assess merit (that is obviously extremely important), but is to consider the regional effects that this assessment can or should produce. Given the manifold functions currently attributed to universities, it cannot be ignored that the procedures of their funding cannot obey only to the ratio of merit described, but must keep into consideration and support wider strategies and ambitions of regional development: university policies can no longer be planned and implemented separately from development policies.

2. The evaluation model

The aim of the statistical model developed in this paper is to assess the impact that local context has on the competitive performance of universities. Therefore, two families of indicators have been identified: the first one is made up of variables which measure university competitiveness, while the second one consists of a set of parameters representing local context.

As indicators of the "University Performance" we adopted the evaluation indices elaborated by Censis-La Repubblica and used in the annual ranking of the Italian University System³. The increasing role played by knowledge in economic development and the diffusion of competition among universities has contributed, in recent years, to the spread of tools and methodologies aiming at creating rankings in order to evaluate and compare university performances. These rankings can be considered as tools of assessment which, provide a summary judgment of university performances by measuring different parameters. In order to achieve a ranking allowing us to compare the performances of Universities, different indicators are used to measure specific aspects of higher education. Obviously, the methodology of construction of evaluation indices depends on specific organization purposes, so, the same university can be differently ranked according to several rating systems.

Even in the Censis ranking, the construction of the final score is the result of the measurement of different indicators grouped into specific "families"⁴, depending on the parameter they intend to measure. In 2010, the families of indicators identified by Censis and used in this study are the following ones:

³ Since 2000, the daily newspaper La Repubblica and Censis publish "The Great University Guide" which provides an overview of the university system by faculty. This work takes the form of a comparative study which represents an instrument of service and guidance for students. In this guide a ranking of universities based on specific dimension in order to measure the performance of universities is published.

⁴ In the Censis ranking the articulation of the family of indicators is drawn up every year based on data availability and on the transformations occurred in the university system offer. In this paper we used the methodology described in the Methodological Note, "The families of evaluation and indicators" 2010.

- a) **Productivity:** it measures universities' ability to ensure a regular course of studies;
- b) **Teaching:** it measures universities' ability to provide an adequate educational offer;
- c) **Research:** it measures universities' and teachers' ability to plan for research;
- d) **International Relationships:** it measures universities' degree of openness to international experiences.

Each index is the synthesis of a series of indicators. These four indicators are, in our model, the Latent Variable measuring universities' performances. It is useful to specify that, in order to ensure homogeneity to the collected data (due to the need to cross data from different sources), it was chosen the academic year 2007/2008 as reference period, because, for this period, we found all data we needed for the construction of the model.

For the second group of indicators, defined "Territorial Variables", data were extracted from the "Atlante della Competitività delle Province e Regioni Italiane" drawn up annually by Unioncamere. From the complex set of indicators 16 socio-economic variables were extracted in order to describe the local context of the towns where universities are located. In this case, too, in order to ensure uniformity and consistency to the dataset, we chose the same period as the one used for the indicator system of universities.

Based on the assumption that local factors may differently affect the performance of each Faculty, we identified, for each university, the performance indicators of two Faculties: Faculty of Engineering and Faculty of Literature and Philosophy, as representative respectively of the Scientific branch and of that of Humanities. Therefore, we identified 35 Faculty of Engineering and 37 Faculty of Literature and Philosophy. Then, we proceeded to define the structure of the territorial dimensions through the Principal Component Analysis (PCA). Through this kind of analysis, it was possible to remove those variables with a low quality representation, to select those that best explain the model among the correlated variables, and finally to organize the Latent Variables into two specific groups: *Production and Distribution, Labour Market*.

The variables used for the model are shown in Table 1. In the first column we have the distinction between "University Variables" and "Territorial Variables". The second column shows the Latent Variables, while in third one contains the Manifest Variables and the data source used.

Table 1. Manifest and Latent Variables of the Model

	LATENT VARIABLES	MANIFEST VARIABLES
UNIVERSITY VARIABLES	PRODUCTIVITY	ECTS Regularity (Source: Miur) Regular Enrolled Students Rate (Source: Miur) Graduate Regular Rate (Source: Miur)
	TEACHING	Professor/ECTS-credits (Source Miur; CNVSU-NUCLEI) Professor/Students (Source: Miur) Researcher/Full Professor (Source: Miur) Monitored Lesson/Total Lesson (Source: CNVSU-NUCLEI)
TERRITORIAL VARIABLES	LABOUR MARKET	Un-employment (Source:Istat)
	PRODUCTION AND DISTRIBUTION	Per-Capita Income (Source:Istat) Manufacturing Added Value (Source: Istituto Tagliacarne)

As can we see from the table, for the development of the two models (Faculty of Engineering and Faculty of Literature and Philosophy) we managed to collect data for the measurement of only two out of the four families of indicators used in the Censis methodology: Teaching and Productivity. For the other dimensions, in fact, it was not possible to retrieve data because of their unavailability or due to their different levels of aggregation.

In conclusion, in our model we used 10 Manifest Variables grouped in 4 theoretical constructs: the first two are representative of the university dimension and selected following the Censis

methodology, the last two, are representative of the territorial dimension and selected on the basis of the assumptions of the model and validated through the PCA-analysis.

Once identified all Latent and Manifest components, it was possible to build a model through the PLS approach, in order to measure the influence of territorial variables on the competitive performances of universities.

2.1. High-Order PLS Path Modelling

Due to its ability of estimating complex models, PLS-PM can be used to investigate models with a high level of abstraction. The basic PLS design was completed for the first time in 1966 by Herman Wold for the use in multivariate analysis, and subsequently extended for its application in the structural equation modelling (SEM) by Wold himself in 1975. An extensive review on PLS approach is given in Vinzi *et al.* 2010. The model-building procedure can be thought of as the analysis of two conceptually different models (Ciavolino *et al.*, 2009). A measurement (or outer) model specifies the relationship of the observed variables with their (hypothesized) underlying (latent) constructs; a structural (or inner) model then specifies the causal relationships among latent constructs, as posited by some theories.

In our model, latent variables (LVs) are expressed by *Productivity*, *Teaching*, *Labour Market* and *Production and Distribution*; they are measured by the corresponding manifest variables (MVs) reported in the second column of Table 1. The relationships between LVs and MVs are defined by using formative specification (or Mode B), as variables represent concepts and they are not expression of single behaviours, as in the case of answers to questionnaire.

In order to measure the University Performance we define the theoretical model by using the approach of High-Order PLS-PM with the two-step method.

As a matter of fact, many concepts, in the psychological as well as in the economic field, are not directly observed but are rather inferred from other observable variables. In our case, performance is defined as the synthesis of two dimensions: teaching and productivity. These dimensions both measure Faculties' performance.

The dimensions of a higher-order construct could be then conceptualised under an overall abstraction, and it is theoretically meaningful to use this abstraction for the representation of the dimensions, instead of merely interrelating them. The method to specify the high-order LV is the two-step approach. In this approach the LV scores are initially estimated in a model without second-order constructs. The LV scores are subsequently used as indicators in a separate higher-order structural model analysis. It may offer advantages when estimating higher-order models with formative indicators [Diamantopoulos *et al.*, 2001; Reinartz *et al.*, 2004; Ciavolino *et al.*, 2011]. The implementation is not a simultaneous PLS run.

2.2. Estimation results

The Faculties' performance model has been estimated through a tailor-made algorithm developed in MATLAB, by considering both the Faculty of Engineering and the Faculty of Literature and Philosophy. The first model analyzed refers to the Faculty of Engineering. The following Figure 1 shows the path diagram, which is a graphical representation of the defined theoretical model. The circles in the figure represent the first-order LVs; the double circle refers to the second-order LV; the rectangles are the MVs.

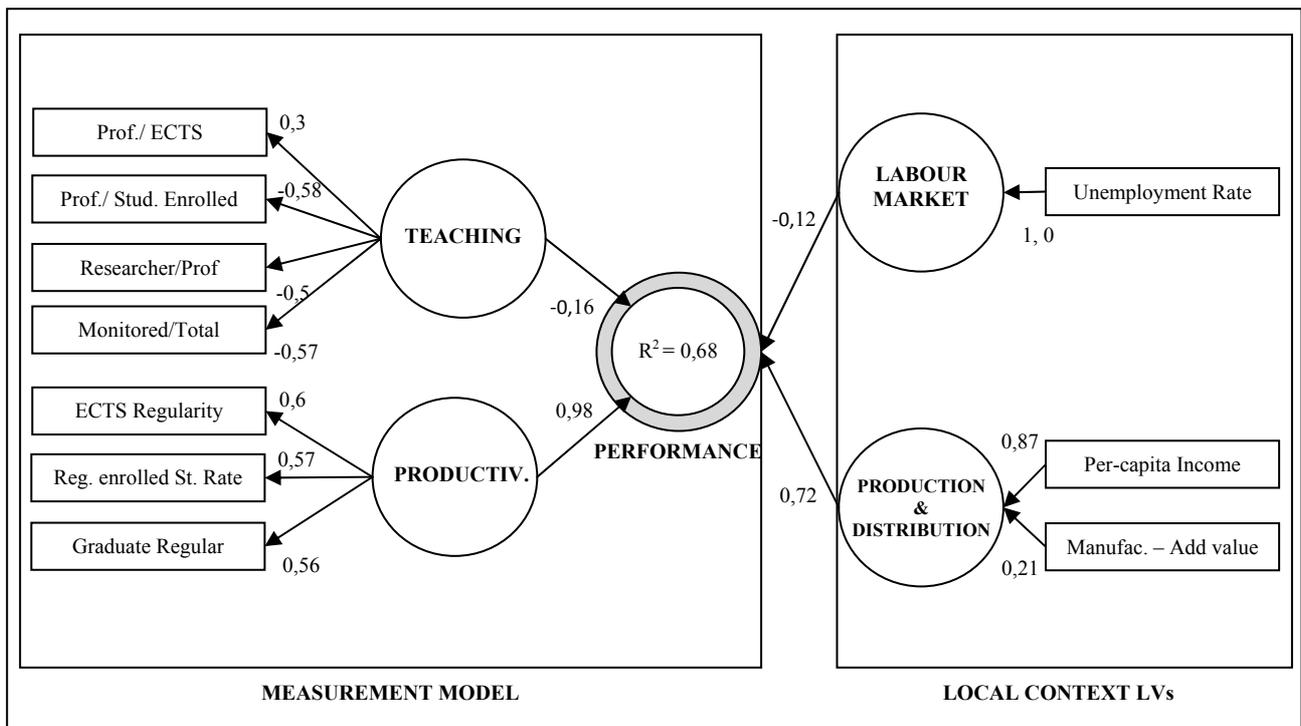


Figure 1. Path diagram for the Engineering Faculty

Moreover, the model shows on the left side the performances' measurement model, which measures each single MVs' contribution to defining *Teaching* and *Productivity* and how this first-order LVs contribute to determining the Faculty's performance; on the right side, local context variables measure the effect the *Labour Market* and *Production and Distribution* have on the performance. Moreover, the *Production and Distribution* measurement model is defined.

By analyzing the measurement model of the performance, the estimated weights show that the MVs variables 'Prof./Stud.', 'Research/Prof.' and 'Graduate Regular Rate' have a high and negative value, compared with the 'Prof./ECTS'. This means that these three variables are inversely correlated with the first MV: this shows that there is incoherence in the definition of the theoretical construct *Teaching* [Checchi *et al.*, 2010]. All the estimated weights of *Productivity* are positive: among them, 'ECTS Regularity Rate' shows the highest value. All relationships are statistically significant. Variables significance was assessed by bootstrap re-sampling, by using 200 samples of size 120. The first-order LVs *Teaching* and *Productivity* measure the performance with weights equal respectively to -0.16 and 0.98. As the structural coefficient that ties *Teaching* with *Performance* is negative, thus faculties presenting higher value for this dimension will be penalized. In this case a solution should be the use of a subjective evaluation of the teaching quality, because the *Teaching* variable as defined in this work and in the Censis approach, does not represent the level of quality, but the Faculty ability to offer teachings. It is also true that the subjective data are not available on a national level. Another solution to avoid the incoherence of the sign should be the introduction of prior information on the relationship between the *Teaching* and the *Performance*, defining a range of value constrained to only positive value [Golan *et al.*, 1996]. Considering only the results of the above mentioned high-order measurement model, it is possible to make a ranking of the Engineering Faculties.

In this paper, we propose the introduction of local context variables and their impact on the university performance. Context variables which have been taken into account are: *Labour Market*, measured by the 'Unemployment Rate'; the *Production and Distribution*, measured by the 'Per-capita Income' and the 'Manufacturing added value'. The result obtained for the *Labour Market* confirm some previous researches [De Battisti, Nicolini, Salini, 2011]. In fact, a high level of unemployment reduces universities' performance, penalizing the Faculties located in a local context

with a low level of employment. On the contrary, the effect of the *Production and Distribution* is positive; this means that faculties which are located in a context with high level of *Production and Distribution* show a better performance. In particular, the variable which has the main effect is the per-capita income, with a coefficient equal to 0.87

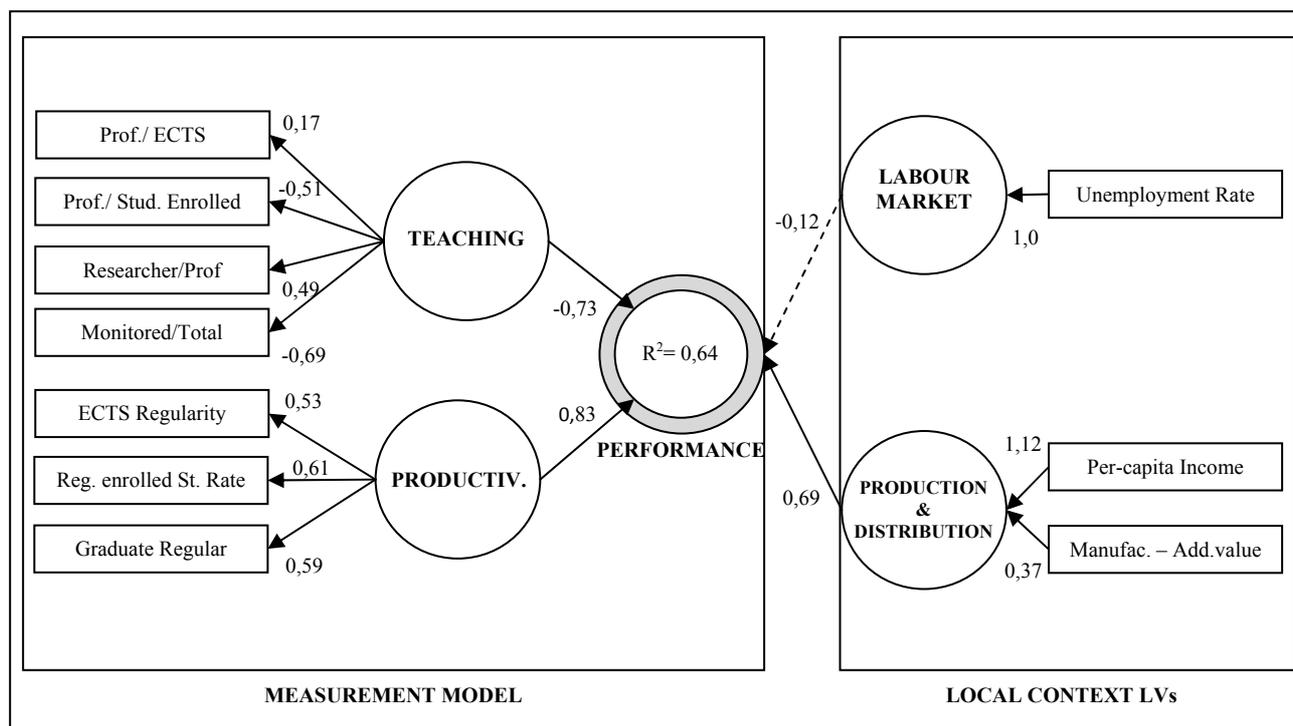


Figure 2. Path diagram for the Literature and Philosophy Faculty

Figure 2 shows the results for the Literature and Philosophy Faculty. They are quite similar to those obtained for the Engineering Faculties. The effects of the first-order LVs are equal in terms of coefficient sign, but in this case, *Teaching* has a higher negative impact on performance.

Besides, the MVs linked to the LV teaching shows an incoherence with reference to the coefficient sign: while the ‘Prof./Stud. Enrolled’ and ‘Monitored/Total’ have negative coefficients, the ‘Prof./ECTS’ and ‘Researcher/Prof’ have positive coefficients. This difference underlines an incoherence in the definition of this LV *Teaching* and shows that different models should be adopted for different faculties.

In fact, for the faculties of humanities, the effect of the *Labour Market* is different, because, though presenting a negative coefficient (-0.12), the result is not statistically significant and it is represented, in the figure, by a broken line.

In this case too, the *Production and Distribution* has a positive impact on the performance, with a value slightly lower than the one of engineering faculties. Moreover, the per-capita income is the variable which mainly characterizes the local context variable with a coefficient equal to 1.12.

2.3 Towards the development of an interpretative model

The human capital theory suggests that the benefits of education depend not only on factors related to teaching, such as years of progress and abilities of students, but also on other factors such as the organization of the university system, the social background and the labor market and production system performance. In particular, the interaction between education system and regional economic performance is important especially in the case of Italy.

“In fact, Italy is trapped in a low skilled equilibrium, with the majority of firms being staffed by poorly trained managers and workers, who produce low quality, low value-

added products. Economic growth depends on the education level, but also the education level depends on the economic performance, so they are mutually influenced. In fact, the young individual can choose to continue in full-time further education if the market can offer better possibilities of earning with higher level of education or in alternative to work if earning probabilities are high enough without further education” [Carmeci and Chies, 2002, p. 3].

The geo-statistical model confirms this theoretical approach. In particular, both in the case of the Faculty of Humanities than in Engineering, the indicators that have shown positive effect on universities performance were: *Labour Market* and *Production & Distribution*.

With reference to the *Labour Market*, empirical research points out that the unemployment rate, although lower than the other considered variables, has a direct influence on the performance of universities. Specifically, the link is significant and with expected sign in the regression on *Performance*, in the case of Faculty of Engineering, while the same result is not achieved for the Faculty of Literature and Philosophy.

One explanation for this phenomenon may lie in the fact that a low employment rate is generally indicative of a reduced number of employees especially in the private and industrial sector, and then refers to an economic structure that can't absorb the labor supply and, above all, uncompetitive.

Evidently, a context with deficit of employment will have a negative impact on performance especially in the case of science faculties, that establish a closer link with the local production system.

“National differences in the general unemployment rates may have an impact on the performance of higher education systems. The impact on the employability dimension is an obvious one, but the labour market situation may also have an effect on performance dimensions such as Access and Graduation, as well as on the Capacity to attract funds. Unemployment rates can be seen as another indication for the general economic context” [Boer et Al, 2010, p. 99].

You can also say that in a context characterized by high rates of unemployment, the university is perceived by young people as a "waiting strategy" with respect to their entering the labor market. Suffice it to say that the actual duration of the three-year degree course is getting longer: was 4.2 years in 2005, became equal to 4.7 years in 2008; moreover in 2005 graduates with 3 or more years of delay were 13%, in 2008 they became 26% [CNVSU, 2009].

Clearly, given the current university performance evaluation system based also on the regularity of the studies, the presence of a large proportion of unmotivated students in completing their studies in time, due to lack of employment prospects, will determine the negative results in terms of rating (see Livi Bacci, 2008). The influence of the economic background, in determining the competitive performance of universities, is clear with even more evidence if we consider the link between *Performance* and *Production & Distribution*. The model estimation results show that, for both the Faculty of Engineering and in those of Literature and Philosophy, this link provides higher coefficients; in fact *Production & Distribution* (a theoretical construct designed to measure the level of individual wealth and the manufacturing sector) represents the context variable that most affects the competitiveness of universities. High levels of income per capita and value added in manufacturing may be indicative of a vibrant and competitive environments that can create the foundation for a successful cooperation between universities and enterprises capable of generating corporate investments in R&D.

“[...] Among the cases in which signs of this integration are very obvious we remember the generations of spin-off led by teams of professionals and academic, the integration

of experts in research institutes, and the trend to entrust more and more emphasis on direct practice [...] as a key point of the training course” [Sacco, 2005, p. 5].

It is quite intuitive to think that those areas, with greater per capita income and that are capable of producing high levels of manufacturing value added, will be able to trigger virtuous relationships between universities and enterprises that will affect positively on the quality of education and level of productivity of students. Be included in innovative contexts, in which is so clear that we need to invest in education and research to achieve goals of excellence, produces a virtuous cycle of knowledge transfer and regional development with positive effects on the same academic performance. It follows that check the level of competitiveness of the universities also means measuring the level of competitiveness and local development. Hence the need to include, among indicators of university performance, variables that are able to express the so-called "impact area", because the local context is a central dimension in evaluating performance of individual universities.

In conclusion we can say that there are mutual influences between universities and local context and, although the University is an entity driving local development, it is also true that the local context affected, through its characteristics, the results obtained from university system in terms of productivity, teaching, research and international projection.

3. Supporting universities to promote local development.

If the indicators of university performance are related with local conditions, what they actually estimate is not university productivity/competitiveness, but rather the competitiveness of the local context in which they are located: this can lead to dangerous distortions about both the distribution of financial resources and, more generally, policies supporting the public university system.

These distortions become more crucial by stepping up the role of public funding. In fact, though in the past two decades the role of private sector has increased with the participation of private organizations in financing public universities, according to the cost-sharing model [Johnston, 2003], universities, in Italy as well as in Europe, are still largely dependent on public funding. The latter, because of increasing university autonomy, shows itself also as the main means of influencing and controlling university system by the Government and its other involved levels – we could think of the role of Regions in Italy, for instance.

As it has been rightly pointed out,

«In a context in which public finance is still the main resource for the university system and in which institutions have full autonomy under different perspectives (financial, managerial, educational, etc.), the funding mechanism turns out to be an important means for public policies in order to pursue the achievement of its goals» [Agasisti and Catalano, 2005, p. 2] .

What are therefore the "purposes" that underlie or should underlie national policies supporting universities? To answer this question, firstly we have to reflect on the changes occurred since the early nineties in the funding policies to the university system and on the reasons that have brought about it. At the end of that decade, in a report on global evolution of the management and financing mechanism of higher education system drawn up by World Bank, Johnstone [1998] brought out least five different determinants of changing processes at that moment: expansion of student enrolments and diversification of types of institutes; fiscal pressure; ascendance of market orientations and the search for non-governmental revenue; demand for greater accountability; demand for greater quality and efficiency. In particular, access to higher education tends to widen more and more, demand for university services becomes increasingly wide and different, the world of work requires more developed technical skills and their constant adaptation to the changing

context conditions (Technology & Markets); at the same time, the amount of public resources that governments can allocate to education, in general, and to higher education, in particular, becomes more and more limited because of more and more stringent budgetary constraints [Guni, 2005]. Under conditions of limited resources, therefore, governments can do nothing but rationalize the financing mechanism – in the field of education as well as in other sectors of public policy – by linking it to university efficiency (productivity) and effectiveness (achievement of institutional objectives), thus contributing to increase competition among universities. The competition is interpreted as a way of improving university performance and, consequently, it is promoted and supported by institutions. Besides, the same scientific thinking about the subject has tended to give further evidence of this approach in recent years, underlining the opportunity of increasing competition in the field of higher education [Barr N., 2010; Mas-Colell, 2004; Hansmann, 1999]. The introduction and the development of competitive mechanisms inside higher education leads to equate university systems with quasi-markets, as this creates «a sort of competition among different producers, “managed” by the Government which thus plays as regulator and funder of the system» [Agasisti e Catalano, 2005: 4]. As a regulator, interested in achieving social, cultural and economic purposes, governments are called to identify some criteria for the allocation of financial resources which can promote a virtuous competition among universities, ensuring at the same time the fulfillment of their institutional role in the best way possible. Otherwise, we could suppose that less competitive universities are destined to “exit the market” with serious social, cultural and political effects for their local context and for the educational offer as a whole. Beyond this contradiction that we will discuss later, the promotion of a competition among universities seems to be based on a clear policy choice: to leave the achievement of efficiency, effectiveness and quality of the university educational offer to the market, relegating the State and the other levels of government to the role of mere regulators/funders. A neoliberal choice [Chomsky, 1999] which doesn't seem to consider totally the limits and contradictions of this approach, and also seems to lose the deep value of education and the strategic role it plays in the cultural, economic and social development of a country. Underneath the “new university policy” it seems that there are the failure of managing institutions and the idea that education and culture are “goods” which can be left to the free interaction between supply and demand. And, as it may seem contradictory, this happens simultaneously to the emerging of what is called “knowledge economy” at a global scale (see above); a model of economic development which tends to emphasize the strategic role of tangible and intangible infrastructures aimed at producing and reproducing of knowledge . Universities are the most representative cultural “armature” of a place, as institutions responsible for production and transfer of knowledge and, besides, for the contextualization of knowledge produced elsewhere; it is an unavoidable condition in order to weave relationships based on reciprocity and synergistic interaction between local and global networks. Universities, therefore, are interpreted as a local “stronghold” of knowledge and as an “engine” for development, as institutions able to promote and support the processes of local innovation.

Distributing funds on the basis of university performance, which, as we have seen, is affected by specific local conditions, may mean an acceleration and intensification of divergence processes, thus draining from a cultural point of view areas already characterized by marginalization and problems in economic development and on the other hand, strengthening those ones which, thanks to better conditions for development, can rely on a more fruitful interaction between universities and territory instead. Concerning the already mentioned co-evolutionary processes university-place, which can operate both in a virtuous sense and in the opposite one, the lack of equalizing interventions may cause dangerous distortions on the university system as a result of the competition among universities. At the end of the millennium, Hansmann has already revealed the presence of cumulative processes in the attractiveness of universities, showing how universities which get a better reputation for the quality of their students, continue to maintain it over time [Hansmann, 1999]. So, in the resource distribution models focused on demand, universities

considered to be the best ones, thanks to the increase of the number of students enrolled, tend to capture an increasing share of public and private funds: for this reason, they can further improve their performance; while the ones which are considered to be the worst will be destined to a reduction of the amount of public funds at their disposal and should therefore lower the quality of their educational offer. What we want to emphasize here is not the ineffectiveness of the assessment tools for university performance, or, simply, the effects this can have on the geography of the university system – something which could already be questioned regarding the current university policy – but rather the logic behind them and, in particular, the lack of attention to their spatial effects. What is amazing about it is the fact that in the analysis of the risks coming from a public financing mechanism which over-emphasize the competition among universities there is little attention to their spatial impacts, rather focusing on the consequences for higher education demand. The literature on the subject analyses in fact the distortions which occur due to asymmetric information, economic inequality, unequal access to higher education and flattening trends in the educational offer. The competition among universities is necessary [Barr, 2010], but without corrective interventions and an equalizing policy that reduces distortions arising from regional divergences, it could have strong negative effects on the university system and weaken the educational, cultural and technological infrastructure of weaker areas. In other words, what is worrying is not the competition among universities itself, but the consequences that it may have on economic convergence and social cohesion.

Similarly, university evaluation, though with the corrections that this paper wanted to suggest, is a necessary and, in many ways, absolutely indispensable procedure in order to measure the efficiency and productivity of the university system [Miur, 2010] and to promote an improvement of its performance in the interests of stakeholders and of the country as a whole. As the European Commission already stressed in an important document on the role of universities in the Europe of knowledge, “universities have to use their limited financial resources as effectively as possible” as a sort of obligation to “students whom they educate, public authorities which finance them, the labor market which uses the competences and skills they transmit and the society as a whole” .

If public funding to universities has to take into account the performance of single universities, giving priority to the virtuous ones, the university policy, just because of the strategic role of higher education institutions, cannot be reduced to an efficient allocation of financial resources. It must aim at making universities the “engines” of development, promoting their synergistic interaction with the respective local contexts and its international projection as a moment of interconnection between the local and the global scale.

It is therefore necessary to reverse the perspective through which we read and interpret the role of public intervention in the field of higher education. If universities are qualifying factors of territorial competitiveness – so as to be frequently used within the framework of indicators which measure it – the strengthening of the university system should be one of the primary aims of regional development policies. This means that governments should invest in education and scientific research, even when the performance of a university, because of some specific local conditions, is not satisfactory or below national or international standards. This paper shows how in Italy – but this reflection can be extended to any other national context – universities are affected by local conditions, so that their effectiveness, in terms of the achievement of their institutional goals, is a function of the constraints and opportunities of the local context rather than of internal factors.

A more appropriate strategy for the valorization of universities may lead to reverse this relationship, making these institutions a driving force for local economy.

4. Conclusions

Beyond the considerations developed in this paper, two are the most relevant results obtained from this research: firstly, it demonstrates the influence that certain local context variables have on university performance, as measured by the current rating systems; secondly, it highlights the criticality of a principle of allocation of resources that, in order to pursue a goal of "justice " of distribution, have the opposite effect, penalizing those universities whose performance is negatively influenced by the context. As regards the influence of context variables on academic performance, the geo-statistical model showed a strong and significant correlation between the performance of universities and the regional level of economic well-being. It is possible to assume that it is a dependency relationship in which is the University to take advantage of the well-being conditions of its national context.

The economic well-being, as an indicator of the competitiveness of the territorial context, shows the presence of a production system extremely dynamic and innovative, able to establish collaborative relationships (transactional and non transactional) with the university system, which can stimulate and enhance its material and immaterial "productivity". Moreover, since the economic well-being is accompanied by a socio-professional growth and by a improvement of educational levels, the universities that operate in regions characterized by better economic performance have user basins with better basic education that can, therefore, achieve better teaching performance. Finally, no less important are the effects due to the attractiveness of the local context in respect of strategic and qualified resources.

If the economic well-being is an indicator of territorial competitiveness, and this acts as a pull factor on human and financial resources, it is possible that with increasing local competitiveness will also increase the capacity of local institutions to attract qualified resources. The universities which are situated in rich and particularly dynamic and innovative contexts are also able to attract the best teachers and researchers. In the same way the best universities tend to attract the most talented and motivated students, gaining significant benefits in terms of teaching productivity. If these assumptions are confirmed by ongoing research, due to the cumulative effects just described, it would be created a dualistic model of development of the university system like the one that characterizes the whole Italian economy. The task of the institutions – as in the case of economic gaps – is not to support the processes of divergence, but to deter and reverse their course.

We arrive at this point in the second research result: the evaluation of financing policies of the university system. As highlighted in this paper, the model results show how the evaluation system of academic performance, based on which public resources should be allocated, does not measure the competitiveness of universities, but those of the territories in which they are located.

Keep this allocation policy means not only help to increase the gap between the universities, but also - because of the role that universities involved in the processes of local development - the territorial differences, with all the social and economic consequences that this may have on the growth prospects of the entire country system. Seems more appropriate to rethink objectives and procedures of university policy so that this institution can be, regardless of the context in which is located, the flywheel of economic and cultural development, and also representative of the culture of this country. It can be said, therefore, that this paper focuses not only on the elaboration of a geo-statistical model, but also on political considerations that open new perspectives for a interdisciplinary reflection.

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