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Exploring Research Collaboration of Private Universities in Emerging EU Countries: A Comparison with Public Sector

Alexander Dmitrienko[1], Nataliya Matveeva[2], Maria Yudkevich[3]

[1]*a.dmitrienko@e-kvadrat.com*, [2]*n.matveeva@e-kvadrat.com*
E-Quadrat Science & Education (Germany)

[3]*myudkevic@univ.haifa.ac.il*
University of Haifa (Israel)

Abstract

We study the research performance of research-active universities in the five countries with European Union candidate status (Albania, Bosnia and Herzegovina, Georgia, North Macedonia, and Serbia). We examine to what extent "research active" private HEIs differ in their research activities from public ones and why. Using knowledge capabilities theory, we demonstrate how patterns of national and international co-authorship can explain the survival strategies of private universities and their position in the academic markets of these countries today. Based on the publication data 2010-2022 from Scopus, we analyze the characteristics of universities' publication output and their scientific collaboration. The Wilcoxon signed-rank test was applied to assess significant differences between the two university groups. To estimate the similarity of universities' collaboration patterns, we apply the blockmodeling procedure to both non-normalized and normalized (using Balassa normalization) co-authorship networks of the universities. We reveal that private and public universities demonstrate similar characteristics in publication output and scientific collaboration. They are statistically different only in size, measured by the number of students and scientific staff, value of publication output, and the number of papers produced independently. Private universities almost do not collaborate with each other inside the country; their collaboration is skewed towards one or two public universities. Moreover, the position of private universities within the national academic network is often peripheral, and they do not fully realize their potential for collaboration. Our study reveals that private universities in the analyzed countries tend to mimic existing public ones in their research activities, adopting similar research practices.

Introduction

Private sectors of higher education systems in the last several decades have experienced a rapid growth (Levy, 2018). In different countries, they vary in size and functions (Reisz, Stock, 2012) and therefore relate to the public sector in various ways (e.g. complementing it in empty niches, competing with - Teixeira et al., 2012). Accordingly, depending on the relationships between the private and public sectors and their relative roles within the national systems, higher education institutions (HEI) from different sectors may constitute a homogenous group or perform differently within one country (Teixeira et al., 2017).

In most countries, the private sector has evolved evolutionarily and has a relatively long history (Levy, 2024; Altbach, Levy, 2005). However, in some countries and regions, it has emerged relatively recently due to significant changes in legislation and the changing political-economic context (Spain or the region of interest - Brankovic, 2014; Casani et al., 2014). It is not uncommon to see that low dynamics in the number of public institutions is accompanied by an explosion and consequent

decline in the number of private organizations. Indeed, for various reasons, many of them do not survive (for the case of Russian universities, see Kuzminov, Yudkevich, 2022).

What is the place of the private HEI sector in the national system after such an initial "rapid growth phase", and to what equilibrium state does the system converge? What differences do we see between "surviving" private HEIs and public HEIs? Existing studies predominantly focus on the teaching aspects of these differences. In our paper, we answer these questions by focusing on the research component of university performance.

We use network capabilities theory (Eisenhardt, Martin, 2000; Ritter et al., 2002) to explain the patterns of university collaborations as instruments to acquire additional knowledge capital and general embeddedness in the academic market. While in existing literature this theory is mainly applied to business firms (Mitrega et al., 2011; Sullivan, Weerawardena, 2006) and only few papers make an attempt to use it for an analysis of university strategies (King'oo et al., 2020; Huang, 2014), we demonstrate that this theory can be a powerful tool for analysis of organizations centered around human capital.

Data and Methodology

We study universities with a non-zero research output in international journals indexed in the Scopus database. We selected a relatively long time period of 12 years, 2010-2022, to form robust publication statistics for the analysis. Our sample consists of 43 public and private universities from five EU enlargement countries that by 2023 had candidate status to join the European Union: Albania, Bosnia and Herzegovina, Georgia, North Macedonia, and Serbia. In the sample, we include all universities with at least one publication in the analyzed period. Of the 43 universities studied, 14 are private, and 29 are public. For these universities, we collected bibliometric data on publications (articles and reviews) related to their profiles in the Scopus database, as well as data from open internet sources (QS World University Rankings, WHED by IAU, Rankless by CCL, universities' official websites, etc.).

We use variables that characterize overall and per capita publication output to analyze publication activity. For scientific collaborations, we include variables that characterize collaboration at the author, organizational, and country levels. All variables are presented in Table 1. To determine whether the observed differences between public and private university groups are statistically significant, we apply the Wilcoxon signed-rank test (Woolson, 2005). In the final stage of our analysis, we assess both the collaborative proximity and the similarity of collaboration patterns between public and private universities across countries. Collaborative proximity is measured by the share of joint publication output and key research fields, while similarity is evaluated using an indirect blockmodeling procedure applied to co-authorship networks (where nodes are universities and links represent joint publications). Given the substantial differences in publication volume between universities, we apply Balassa normalization. Compared with other normalization methods (e.g., Jaccard and Affinity normalization), Balassa normalization is less

sensitive to unit size. It allows for the estimation of the collaboration potential of the analyzed units (Matveeva, Batagelj, and Ferligoj 2023). All computations were done using the programs R (R Core Team (2023)) and Pajek (http://mrvar.fdv.uni-lj.si/pajek/).

Results

We observe that the essential characteristics of public and private universities are similar. Figure 1 shows the analyzed characteristics' median value and distribution within each university group. Private universities have slightly fewer publications per person than public ones, with a median value of 2 papers per person for private universities compared to 2.7 for public universities. Even though private universities more often have fewer publications than public universities, they demonstrate a relatively high share of high-quality output. The median share of Q1 publications in private universities is 32%, while in public universities, it is 30%, which indicates that private universities also focus on high-quality research. Another similar characteristic of the two university groups is the number of students per scientific staff: both groups have a median value of about 15 students per person. This means that the teaching load of staff is quite similar in public and private universities. At the same time, private universities have a higher share of dominant research fields compared to public universities, which describes them as more specialized universities. For private universities, the median value of the share of the dominant research area is 20%, while for public universities, it is about 5%. At the end of the next section, we estimate the significance of the observed differences.

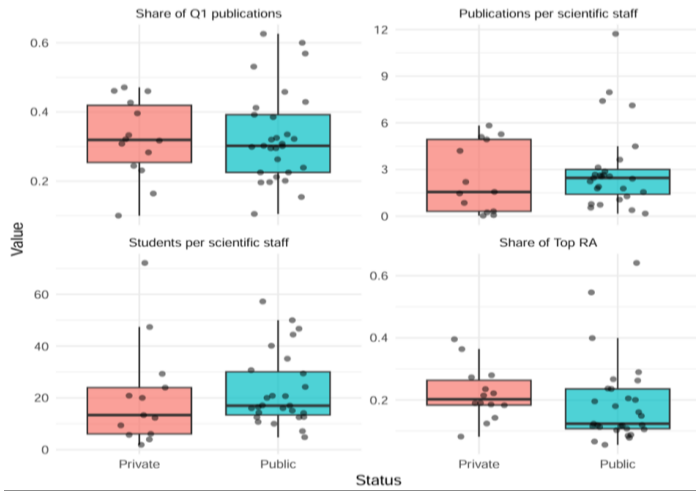

Figure 1. Publication characteristics of public and private universities. The line inside the boxes represents the median value, the size of the boxes covers 50% of the observations.

We find that at all three analyzed levels public and private universities are very similar in the share of papers prepared in co-authorship (Fig.2). Only the share of papers prepared by the university itself is a bit higher in the public university sector:

38% when in the private group it is 29%. Both university groups have a share of single-authored works, about 10%. The share of national collaboration is about 30% in both groups. Thereby, we observe that public and private universities actively collaborate with other countries and other organizations (about 70% of publications), and most papers (90%) are prepared in co-authorship.

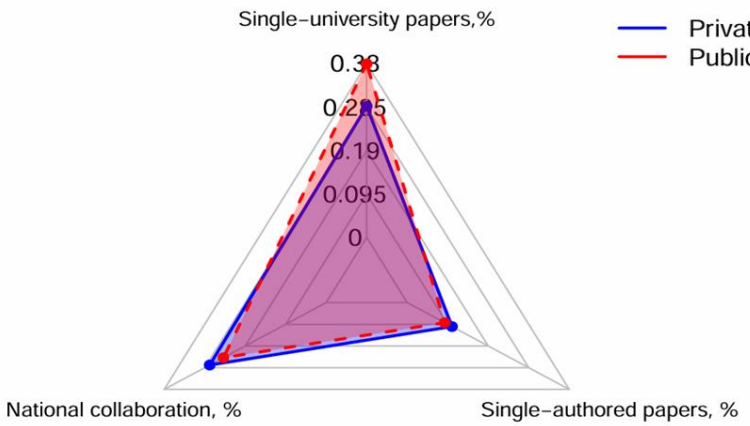

Figure 2. Share of publications without collaboration on different levels (author, organization, country).

We apply the Wilcoxon test to answer whether the observed difference between public and private universities is statistically significant. The results of the Wilcoxon test demonstrate that public and private universities in our sample differ statistically in size: the number of publications, the number of scientific staff, and the number of students (Table 2). Among the collaboration characteristics, only the share of publications with a single affiliation is statistically significant: public universities have more publications prepared independently. This result is quite logical: public universities are bigger than private ones, so they have the capacity to produce research publications on their own. Other characteristics become non-significant, which means that their variation cannot be explained by university status.

Table 1. Wilcoxon signed-rank test results.

Variable	Private_vs_Public universities
Number of publications	0.0016*
Number of scientific staff	0.0001*
Number of students	0.0001*
Students per person	0.2788
Share of Q1 publications	0.7361
International collaboration. %	0.8256
Average number of authors per work	0.0634
Number of publications per scientific staff	0.4238
Share of publications with 1 affiliation	0.0292*
Share of top research area	0.0848
Share of publications with 1 author	0.3782
Average number of affiliations in the work with 1 author	0.0900

*Significant at 0.05 level

In Fig. 3, the universities are grouped into clusters according to the similarity of their collaboration patterns with others in the network. We observe that a clear core-periphery structure is evident in Georgia, Serbia, and North Macedonia. There is a core of well-collaborating universities and a periphery of universities that collaborate very weakly with others. Private universities in these countries are typically located in the periphery. In Albania, and Bosnia and Herzegovina, a different collaboration structure is observed: there is a core, a semi-core, and a periphery. The core consists of universities that collaborate extensively, the semi-core includes universities that actively collaborate with both the core and the periphery, and the periphery comprises universities that collaborate weakly. Private universities in our sample are in the same clusters, which indicates the similarity of their collaboration patterns. However, their cluster position is often in the periphery. Only two private universities in Bosnia and Herzegovina are located in the semi-core.

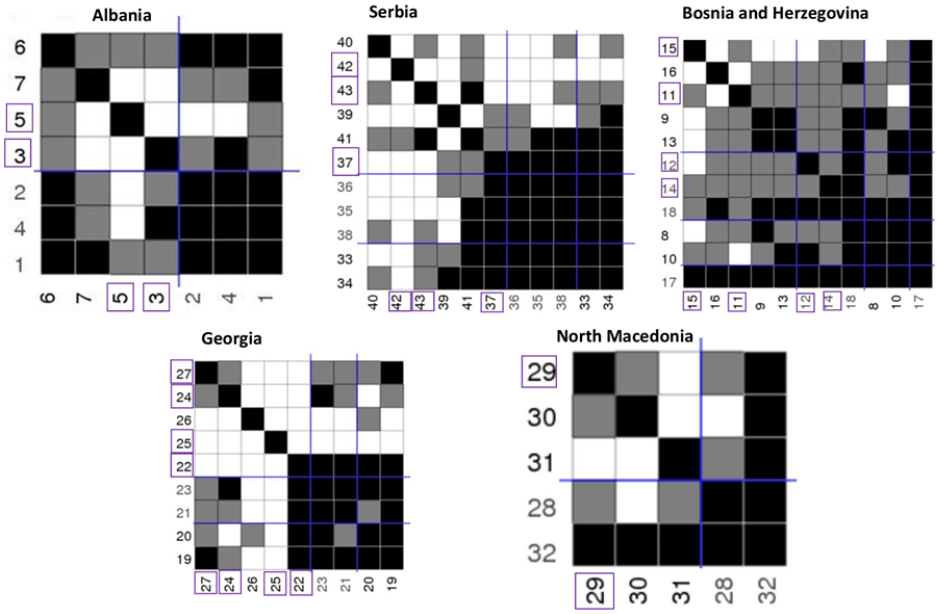

Figure 3. Blockmodeling of universities' collaboration inside the countries. Private universities are in purple frame. White cells represent no publication, grey from 1 to 10, black 10 and more.

Discussion and Conclusion

Our analysis demonstrates that research-active public and private universities in countries under consideration differ significantly in size, measured by a number of scientific staff and students. The lower number of publications in private universities is explained by their size: private universities are smaller. Individual research productivity (measured by the number of publications per person) and the share of most impactful publications (measured by the share of Q1 publications) are similar in both groups of universities. Private and public universities also have similar collaboration characteristics measured via the share of publications prepared in co-authorship on individual, organizational, and national levels. The research competitiveness of private universities can be attributed to their capacity to adapt and strategically reallocate resources and build effective research governance structures, aligning closely with the dynamic capabilities theory.

We observe that private universities primarily collaborate with public ones and almost do not collaborate at all with other private universities. With that, the 'follow by leaders' strategy results in private universities taking a peripheral position in the country's academic network, with reduced independent access to resources. With all its disadvantages, a peripheral position still allows private universities to adopt the experience of public universities and build a research background for future development. A peripheral position provides limited access to material and symbolic

resources (Fumasoli, Barbato, and Turri 2020); as a result, private universities have a reduced capacity to support their research activities.

Our study is limited to research-active universities; hence, we do not include institutions without non-occasional Scopus publications. However, Scopus does not comprehensively cover local national journals, particularly those published in national languages. Moreover, many private universities have very few publications. Consequently, some observed characteristics are not statistically significant and may be associated with more profound underlying differences. These limitations should be addressed in future research.

We conclude that private universities in analyzed countries enroll in the research system by mimicking public universities rather than filling empty niches. Such a mimicry strategy is also observed in other countries with developing academic sectors, for instance, the UAE (Ashour & Kleimann, 2024). Research activities allow private universities to gain legitimacy and elevate their status, and they actively use collaborations as a resource for development. We contribute to the literature by explaining the survival strategies of private universities in countries with relatively new private sectors. Our findings will allow for the design of evidence-based policy measures and initiatives aimed to support collaborative inter-institutional research and to provide an impact toward the balanced development of higher education national systems in a broader European context.

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