Toward a Data-driven Classification of European Higher Education Institutions

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Since the adoption of the Bologna Declaration in 1999, we have seen moves toward a system-level convergence and transnational harmonization of higher education in the European Union and the larger European Higher Education Area. However, in response to global competitiveness in higher education and encouraged by some policy makers and European institutions, we have also observed growing diversification of European higher education institutions (HEIs). Unfortunately, unlike in the United States where the Carnegie classification provides a clear understanding of the main types of institutions in the system, there is currently no widely accepted classification of European HEIs capturing their increased diversity.

The Value of Classification
Classification is a basic tool for research and decision-making. Its value and purpose are twofold. Firstly, classification allows for summarizing the diversity of objects about which inductive generalizations can be made into a limited number (between five and 10) of categories that fit the human mind's cognitive abilities. Secondly, characteristics of the objects and their relationships with others can be predicted according to their classification before it has been verified for all within the category. This allows, for example, for more rapid strategy development.

In higher education, institutional classification is used as a tool for research and basis for governmental policy making, recognizing and describing institutional diversity, allowing for analysis of institutional performance and meaningful representation of large systems, and identifying "research universities" competing in international rankings.

Designing a Classification of European HEIs
Previous HEI classifications in Europe have primarily focused on institutional categories such as universities and colleges, which, however, are not comparable across countries, even if similar labels are used. Further, the distinctions between categories have been blurred in the recent decades, with nonuniversity institutions in some countries developing sizable research activity (e.g., in Switzerland) and even acquiring the right to award a PhD (e.g., in Ireland and Norway). This calls into question the value of such classifications. Finally, existing classifications focus on the research vs. education missions and activities of HEIs, overlooking the so-called third mission and differentiation along subject profiles. Overall, this makes it increasingly challenging to identify the main types of institutions that are present in European higher education.

Given this context, we felt the need to develop a new, comprehensive classification of European HEIs, focusing on differences in activity profiles (education vs. research vs. third mission) *and* subject scope (generalist vs. specialist institutions, a long tradition in the European context). Key to this process, described in detail in our recent article, is a statistical analysis of data on most of the HEIs to be classified, to identify distinctive characteristics of classes and to attribute HEIs to classes. We have used the European Tertiary Education Register (ETER), which for the first time provides a register and comparable data on a population of more than 3,000 HEIs in nearly 40 countries. Based on this, and thanks to the integration of ETER with research and technology output data from the RISIS research infrastructure project, we were able to develop and empirically test a comparable classification of European HEIs.

Abstract
The differentiation of profiles of institutions over the past several decades emphasizes their relevance for higher education. Unlike in the United States, there is currently no broad classification of higher education institutions in Europe. Building on European Tertiary Education Register data, we propose a new comprehensive and cross-country classification in six classes that recognizes the diversity of functions and specializations of institutions within European higher education.

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The New Classification

Our proposed classification comprises six classes of HEIs showing distinct characteristics in terms of relative orientation toward research vs. education and subject specialization (natural sciences vs. social sciences and humanities).

Through the empirical analysis, we identified a class of about 300 research universities, including all top-ranked European universities. Research universities constitute the core of European higher education, accounting for the lion's share of scientific publication, but also enrolling 40 percent of students. The second main research component of European higher education are so-called science and technology-oriented HEIs, such as the Technical University of Munich and ETH (Swiss Federal Institute of Technology) Zurich, with a strong research focus and high technology production. These institutions account for 40 percent of all patents filed by European HEIs. Further, a large class of generalist HEIs includes younger and less-research-oriented universities, alongside large universities of applied sciences, enrolling nearly 40 percent of the bachelor and master students. This class represents the main areas of overlap between the traditional university and nonuniversity sectors in Europe. Finally, the European HEI system also includes a group of highly specialized HEIs in social sciences and humanities, such as art, music, and theology schools—some of them ancient and highly reputed in their domain, and a large number of educational-only HEIs, comprising many private institutions.

We believe that with six classes, our proposed classification strikes a reasonable balance between parsimony and detail. The ex-post analysis shows that the classes can be described and labeled consistently on the basis of their characteristics and—although the relation with nationally defined categories is somewhat complex—the names borne by the HEIs. Thus, the classification satisfies the first important criterion of being narrable in a meaningful way. Furthermore, the classification provides a delineation of "research universities" that is more selective than the Carnegie classification, but still includes most European HEIs featuring in international rankings. In particular, besides the traditional classes of (research-oriented) "universities" and educational HEIs, we were also able to identify a large class of generalist HEIs with some research activity that cuts across the traditional distinction between universities and universities of applied sciences. The importance of this development is underscored by the fact that more than a quarter of all students at the bachelor and master levels in Europe are enrolled in this particular class.

The new classification allows for a better understanding of the European higher education structure and identifies groups of institutions with similar characteristics, for example, as targets of European policies. The ongoing extension of ETER will allow for its successive refinement and for analysis of changes over time. The challenge, as shown by the example of the Carnegie classification, will be to add dimensions while keeping the original simplicity of the classification.