



What ETER is...

... a European Commission database initiative collecting information on Higher Education Institutions (HEIs) in Europe



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Dual vs. unitary systems in Higher Education

European Tertiary Education Register

The ETER project, 2019

Dual vs. Unitary Systems in Higher Education

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The European higher education sector is, despite important commonalities, a very heterogeneous gathering of national higher education systems. In a rough classification, systems could be divided into two large groups: unitary systems, which are systems dominated by universities, and dual systems, where HEIs outside the university sector enrol a considerable share of students. Such institutions can be universities of applied sciences and similar types of higher education institutions, including *Fachhochschulen* (Austria, Germany), *Hogescholen* (Netherlands), *University colleges* (Norway) or also *Polytechnics* (Portugal).

The analysis of different system types is highly relevant in order to understand – and in further consequence steer – higher education in Europe. As will be shown in this report, dual and binary systems in Europe are the outcome of the policy decision to increase diversity in higher education by implementing new types of HEIs as the answer to increasing demand of higher education and increasing needs for professional qualification. Even though national higher education systems may be classified the same way, national systems are barely comparable with each other. There exist many characteristics (e.g. their distribution and distinction of types of institutions, their historical development as well as the diversity and differentiation within countries), which have to be taken into account when comparing systems and countries.

Key findings

Country-level patterns

- Universities of applied sciences are more widespread in Western (32% of all HEIs) and Northern European countries (25%) than in Eastern European countries (3% of all higher education institutions in this geographical area).
- Even among dual systems, the distribution and differentiation of higher education is extremely heterogeneous within Europe. In Bulgaria for example, 97% of students are enrolled in universities. The Netherlands on the other hand have a high share of (mostly professional) higher education concentrated in UAS (61% of all enrolled students). In Latvia, as a further example of students' distribution, other institutions as academies and private, specialized higher education institutions enrol a larger share of students (34%) than universities and UAS.
- Universities of applied sciences started in some countries as pure teaching universities. However, research activities were subsequently developed at some of these institutions on their own initiative and in part also on political initiative. Research activities in universities of applied sciences are especially frequent in Western and Northern European countries.
- Main subjects of specialized universities of applied sciences and other institutions differ strongly between European regions, with the exception of Arts and Humanities, which are popular main subjects across Europe. Specialized other institutions in Eastern European countries also often have a focus on Business and Law as well as Services. On the contrary, Engineering and Education are popular main subjects in specialized institutions in Western European countries.
- In countries with dual systems, a large share of higher education at the bachelor as well as at the master level can be found in institutions, which do not deliver doctoral degrees. In countries with unitary systems, doctorate-awarding institutions enrol the largest part of students.

Institutional level patterns

- Universities have a clear mandate for research activities, while this is partly true for UAS and other institutions. 89% of all universities in the ETER dataset are research active, which is also true for 72% of all UAS and 33% of all other institutions.
- Universities of applied sciences and other institutions are more likely to be specialized than universities, which are often delivering many subjects at the same time. Other institutions, which are specialized, in many cases deliver education in Arts and Humanities, Business and Law and Education, while universities of applied sciences are often specialized on the subjects Business and Law as well as Health and welfare.
- While research takes largely place in universities, education is a main mission for universities of applied sciences and other institutions. This is displayed by the students/staff-ratio, which is 12.5 for universities and around 20 for UAS and other institutions.

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1. This report

This report offers a helicopter view on different and comparable patterns, but also relevant backgrounds, of dual and unitary national higher education systems within the European higher education landscape. As shown in the following chapters, numerous studies have been published in order to characterize the differences between European countries regarding education and research in universities vs. non-universities as well as the role of professional education in the tertiary sector. The differentiation between dual and unitary higher education systems is of great relevance for higher education policy for reasons of achieving European educational goals, national and international permeability and also with regard to the governance perspective.

The performed analysis offers a new approach on the topic, since it is now possible to extend the work from previous studies, which were often case studies focused on few countries, to most parts of Europe. This is enabled by the European Tertiary Education Register (ETER), which offers longitudinal data (currently the academic years 2011/12 to 2016/2017) at the level of higher education institutions (HEIs) for 37 countries (the European Union plus the candidate countries Albania, Serbia, North Macedonia, Montenegro and Turkey as well as the EFTA countries Switzerland, Norway, Iceland

and Liechtenstein). Large-scale studies on higher education in Europe were difficult before the implementation of the ETER database, since a collection of standardized data on higher education institutions over all Europe was not available.

The present report focuses on the following questions:

- Which national higher education systems in Europe exist in which countries and how are the boundaries between these system types defined?
- How and when have these systems developed and which types of higher education institutions do they include?
- How are different types of higher education institutions distributed over Europe and how can they be distinguished in different regions?
- How are diversity and differentiation between different types of higher education institutions characterized?

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What is ETER?

The European Tertiary Education Register (ETER) is a database of European Higher Education Institutions (HEIs) delivering degrees at tertiary level. It provides data on descriptors and regulatory characteristics, geographical information, students and graduates, staff, HEI expenditures, research and transfer activities, as well as a set of pre-defined indicators characterizing relevant dimensions of HEI activities, like the extent of subject specialization, international mobility, gender balance.

ETER currently provides information on nearly 3,000 HEIs in 37 European countries from the year 2011 (academic year 2011/2012) to 2016 (2016/2017), including EU-28 countries, EEA-EFTA countries (Iceland, Liechtenstein, Norway and Switzerland) and candidate countries (Albania, North Macedonia, Montenegro, Serbia and Turkey). However, for some of these countries, no data (French part of Belgium, Montenegro, Romania) or very limited data (Albania, Denmark, Iceland, North Macedonia, Turkey) is available.

What is the rationale for ETER?

Reliable information on higher education systems is key for the modernization of European higher education, as it lays the groundwork for evidence-based policies. Reliable information at the institutional level is important for HEIs and stakeholders to make informed choices, for example on potential cooperation partners, subjects offered, the quality of education, employability, and research quality.

ETER contributes to these goals in two main ways. First, it provides a reference list of HEIs in the European higher education area, including descriptive and geographical information, which can be used to describe the system and allow matching ETER with other data sources. Second, it provides a core set of statistical data on these HEIs, which are sufficiently comparable between European countries.

Which is the coverage of ETER

In terms of HEI coverage, ETER provides a broad coverage of institutions in the tertiary sector delivering at least a diploma at the bachelor level (level 6 of the International Standard Classification of Educational degrees, ISCED¹). ETER mainly excludes institutions delivering only short diplomas (ISCED 5). In terms of number of tertiary education students, coverage is above 85% for most European countries, as compared with EUROSTAT national data.

ETER HEIs can be divided in two groups: a) the institutions delivering degrees up to the doctoral level (ISCED 8), broadly labelled as 'universities' and b) the 'non-university HEIs' delivering degrees up to the bachelor (ISCED 6) or the master (ISCED 7) level. While universities are somewhat structurally similar across countries, in the sense that they pursue jointly education (up to the doctoral degree) and research, non-university institutions comprise very different types and groups of institutions, including colleges, artistic schools, educational schools etc.; non-university HEIs tend to be smaller, more specialised and, in most cases, with a limited or no research activity.

What are ETER's uses?

ETER is a general public resource, which can be accessed free of charge and combined with other sources. The potential uses therefore cover different scholarly and policy domains, like analysing the structure of European higher education, studying the impact of HEIs in regions and cities, analysing the efficiency of HEIs and the 'best' size to inform national consolidation policies. Most ETER data are freely accessible on-line at the public ETER website (www.eter-project.com). Part of the data is available upon registration and for research purposes only.

¹ [https://ec.europa.eu/eurostat/statistics-explained/index.php/International_Standard_Classification_of_Education_\(ISCED\)](https://ec.europa.eu/eurostat/statistics-explained/index.php/International_Standard_Classification_of_Education_(ISCED))

Who is leading ETER?

ETER is a project funded by the European Commission's Directorate General for Education Youth, Sport and Culture (contracts EAC-2013-0308 and EAC-2015-280) and the Joint Research Centre (contract 934533-2017 A08-CH). It is a joint undertaking of five partners - USI, Università della Svizzera Italiana, Lugano, JOANNEUM RESEARCH, POLICIES, Graz, NIFU – Nordic Institute for Studies in Innovation, Research and Education, Oslo, University of Rome La Sapienza and University of Pisa – in close collaboration with EUROSTAT, with a network of national experts and with the National Statistical Authorities of the participating countries.

How is ETER related to EUROSTAT educational statistics

ETER is a voluntary data collection promoted by the European Commission and is not part of the European Statistical Infrastructure. However, to a very large extent, ETER follows the UOE manual definitions and practices, particularly for students and graduates. Most data sources are the same as collected for EUROSTAT by National Statistical Authorities, which deliver them in disaggregated form to ETER.

The main difference with UOE data collection is that the reference unit is the higher education institution (HEIs) rather than a higher education system/country. Furthermore, ETER provides additional institutional-level data including HEI characteristics, financial and academic staff data obtained mostly from National Statistical Authorities.

2. Dual vs. unitary systems - State of the debate

Until the 1960s, most European higher education systems have been classified as university-dominated, consisting mainly of universities and university-level specialized colleges. Vocational short-cycle programmes, often focusing on nursing, teaching and engineering, were settled outside the university sector and not considered as higher education. Driven by a strong growth in student numbers as well as increasing needs of professional qualifications, institutions with characteristics of universities of applied sciences have been created starting in the 1960s. The main purpose of these institutions was to provide vocational education and training aligned to the needs of regional labour markets. These new institution types were in many cases created by an upgrade and transformation of already existing institutions into the higher education sector. The following section provides an overview on the historical evolution of UAS-like higher education institutions.

Starting with the British *Polytechnics*, and the French *Instituts universitaires de technologie* in the 1960s, and also the German *Fachhochschulen* in the 1970s, a multi-type structure of higher education systems has been established within Europe. This development was driven by a strong growth in student numbers as well as increasing needs of professional qualifications, which led to the main purpose of universities of applied sciences, namely vocational education and training aligned to the needs of regional labour markets. Many Western European countries established the binary system, although the development process differed. In Belgium (Flanders), Norway and the Netherlands for example, non-higher education institutions already existed since the 1960s, while many of those institutions were merged in the 1990s. Universities of applied sciences in Austria were established in the 1990s, which was also the time when universities of applied sciences in Finland were created. The non-university sector in Ireland was the result of a restructuring process in the 1990s, which produced Institutes of Technology and other institutional types. Polytechnic institutes in Portugal were already established in the 1970s, but they started to evolve strongly not before the 1980s and 1990s. In Spain, a different approach was used in order to upgrade vocational education. Teacher training, nursing,

engineering etc. was integrated into universities already in the 1970s, thus creating the first unified system in Europe. The second unified system in Europe was created in the United Kingdom, where universities and polytechnics were in a strongly competitive relationship, especially after the establishment of master and doctoral programmes in polytechnics. Hence, both types of institutions became more similar to each other and in 1992 a unified system was created by upgrading polytechnics and several colleges of higher education to universities. Iceland took the same approach and transformed into a unified system several years after UK. In Eastern and Central Europe, countries started to create dual or binary systems in the 1990s, for example by upgrading vocational education (Kyvik and Lepori, 2010; Kyvik, 2004; Teichler, 2008a; Jónasson, 2004; Verhoeven, 2008; Välimaa and Neuvonen-Rauhala, 2008; Huisman, 2008; Kyvik, 2008; Ferreira, Machado and Santiago, 2008).

The categorization of national higher education systems has been done for many years and is still an ongoing task, due to a variety of small differences between countries, but also due to changes in national systems. Based on Scott (1995), Kyvik (2004) developed a typology of four typical models² that could be found to a different degree in European countries. These four models can be distinguished based on two dimensions, i.e. a) the role of universities in higher education and b) the extent to which vocational education is integrated within higher education (see Figure 1 for a graphical overview):

Unitary systems:

- **University-Dominated Systems:** Universities and university-level specialized colleges are the only higher education provider. Only a small share of students is enrolled in university-level colleges. Short-cycle vocational education in fields such as nursing, teacher training or engineering are typically provided in specialized non-academic institutions that are not part of higher education.

- **Unified Systems:** Universities are the sole education providers incorporating both, higher education as well as vocational oriented programs. This typically arises from mergers or the

² The stratified model with a hierarchical organisation of institutions, placing universities on the top and community colleges on the base of the academic qualification ladder, is a specific feature of the US-American system.

integration of different types of education providers into universities.

Dual systems:

- **Dual Systems:** Universities and other non-university higher education institutions provide higher education programmes independently from each other. Non-university higher education providers are typically specialized into certain subjects, with e.g. nursing or teacher education being academic educations. This is a major difference in order to distinguish the dual system from the university-dominated system, where short-cycle vocational programmes are not part of higher education. Each type of non-university institution is under specific regulations and follows different organisational models (academies of arts, schools for teacher education etc.) The vast majority of students are educated at universities.

- **Binary Systems:** Higher education is provided by universities and non-university institutions, with the latter being typically organized according to common organizational principles (e.g. UAS for engineering, management etc.). Non-university institutions typically have strong regional ties regarding the provision of specifically required information. A considerable share of students is educated outside the university sector.

Kyvik (2004) provided a mapping of national systems following the models above, although it has to be pointed out at this stage that the borders of these models are fluid (although rather specific characteristics are more or less pronounced in individual countries). The mapping included 15 European countries, where 11³ of them have been identified as binary systems. These systems were the result of a shift from dual models, which most European countries adopted for some time, to binary systems, when non-university higher education institutions were able to attract more and more students and started to enrol a significant share on all students within a country. Austria was the only country classified as dual higher education system by Kyvik, although this is a question of taste, since the country took several steps into the direction of a binary system (e.g. the establishment of universities of applied sciences in the mid-nineties). With the development of pe-

dagogical academies into university colleges of teacher education in 2007, Austria took a further step in the transition to a binary system. Italy was categorized as university-dominated system, since although there exist a considerable number of university-level academies and conservatories, only a few percent of enrolled students can be found outside universities. Spain and the United Kingdom have both been assigned to unified systems. In these, the majority of higher education, traditional academic studies as well as vocational programmes, are offered within universities. France is an exception in Western Europe, since it cannot be placed within any of the five models above. In former works, the French system has been described as “fragmented” (Jallade, 1992), “stratified” (Scott, 1995), or “multi-type” (Teichler, 1998). Higher education is offered in different types of institutions (Huisman and Kaiser, 2001), whereby two are at an elevated level: *grandes écoles*, which have a relatively small proportion of the total number of students, and universities, which are the most important institutions in France in terms of student numbers. *Grandes écoles* essentially provide education for engineers and managers and are the prestige establishments within the French educational system, although they are not considered part of the university system. A few *grandes écoles* are located within universities (Kyvik, 2004).

As Kyvik (2004) points out, “*a precise comparison of countries is difficult to achieve, as reliable international statistics are a scarce commodity*”. While it is true that the classification is difficult since differences between countries are in many cases marginal, reliable international statistics on this topic are now available. The ETER project offers detailed data on higher education institutions in Europe. In the chapter on empirical evidence from ETER, these data will be used, inter alia, in order to validate and extend the mapping of higher education systems to the 37 European countries covered by the *European Tertiary Education Register*.

2.1. Diversity and differentiation in European higher education

As already outlined above, non-university higher education institutions, often focusing on vocational and professional education, started to emerge in the 1960s in Europe. In order to handle increasing student numbers and increasing

³ Netherlands, Germany, Belgium, Sweden, Norway, Ireland, Greece, Portugal, Denmark, Finland, Switzerland.

demand of professional qualifications, different policy options were considered. One was the foundation of new universities, which seemed to be too expensive. Keeping the status quo and letting existing universities take up the challenge to handle growing student numbers, on the other hand, seemed to be dangerous because a decline of quality within universities was feared. Therefore, diversification of the higher education system through an upgrade of vocational institutions was the choice in many countries in order to handle growing student numbers and the increasing needs for professional qualification (Seeber, 2016; Teichler, 2008b).

The newly established type of higher education institutions is today known under different names throughout Europe, e.g. *Fachhochschulen*, *Polytechnics*, *Hogescholen*, *University colleges*, *Universities of applied sciences*, *Institutes of technology* etc. (throughout this report the terms “universities of applied sciences” or “UAS” will be used for these type of institutions). The university and non-university sectors can differ in several respects, depending heavily on country differences. In general, universities of applied sciences have a stronger vocational and professional orientation than universities, most UAS have no right of awarding doctoral degrees⁴ and research activities are not a necessary condition, but may be present. Additionally, there may be differences also in the entry requirements of institutions, the characteristics and lengths of the study programmes, career tracks, salaries, status of academic staff, public funding and the possibility for students of moving from non-university HEIs to universities. The differentiation between universities and UAS within countries is handled in various ways. In Switzerland for example, the distinction is very clear and universities and UAS are subjected to different laws and ministries, have distinct funding and different career systems. In Norway on the other hand, university colleges have a specific mission, but are regulated by the same act, are the subject of the same funding system and can ask for the right to award doctoral degrees (Seeber 2016; Teichler, 1998; Teichler, 2008b; Lepori, 2007). The following sections will provide more details on diversity and differentiation between universities and universities of applied sciences.

With the growing number of higher education in-

⁴ Exceptions are some universities of applied sciences in Germany, Institutes of Technology in Ireland, university colleges in Norway and institutions in Slovenia and Slovakia.

stitutions in many European countries starting in the mid of the 20th century, also the diversity of institutions increased. Daraio et al. (2010) differentiate this development between two phenomena, horizontal and vertical diversification. Horizontal diversity in this respect refers to the specialisation of disciplines and research subjects within institutions, whereas vertical diversification means the distribution of different academic tasks and duties among institutions of different nature. As Teichler (2008b) and Huisman et al. (2015) pointed out, diversification in the higher education sector can be manifold. Related topics analysed in higher education research have been the subject addressed (i.e. academic disciplines), the processes for generation, preservation and dissemination of higher education (i.e. teaching, learning and research), organisational issues (both at the system level as well as on the level of higher education institutions) and also quantitative-structural differences, e.g. shape and size of the system (Daraio et al., 2010; Huisman et al., 2015; Teichler, 2008b). This report focuses on vertical differentiation which could be measured using the ETER data, i.e. education, research and also structural differences between different types of institutions. In detail, different patterns of national higher education systems will be analysed, e.g. types of HEIs, level of programmes, disciplines etc.

Education and Research

Universities of applied sciences emerged, inter alia, in order to satisfy increasing needs for professional qualifications, in many cases at the bachelor level (e.g. nursing, teaching or engineering). The focus of these new institutions was, at least initially, on education, while research was not (high) on the political agenda in the earlier years. Universities on the other hand were characterized by serving research and teaching (including the right to award doctoral degrees, which was not foreseen for UAS), including a broad range of disciplines, having a strong theoretical orientation and being highly autonomous with a significant degree of academic freedom (Teichler, 2008a). Although the differences seemed to be clear, the policy target of creating HEIs for the single purpose of professional education was not successful (OECD, 1998). Binary sectors in Europe developed and the roles of universities of applied sciences within countries started to change. This development was visible in the educational sector,

where the borders between academic and vocational education became more fluid, as well in the research sector, where most universities of applied sciences started to evolve research activities. The initiators of the evolution of research activities in UAS were different between countries. While in some countries, the development was stimulated by the institutions themselves, UAS in Finland, Switzerland and Norway received a specific research mandate from the state (Lepori, 2007).

The development of research within the UAS sector was in general the result of mutually reinforcing processes, initiated by different stakeholders. For example, the state defined the research conditions of HEIs, but internal developments within UAS and their claims affected state policies (e.g. funding structures rewarding research will most probably encourage research within UAS). Additionally, stakeholders like industry in many cases claimed strong commitment of universities of applied sciences in regional development, while at the same time UAS demanded joint research efforts from the industry. Also, there is a strong connection to universities, which in most cases qualify future UAS staff and collaborate with universities of applied sciences. This clearly affects research activities in UAS and their level of differentiation compared to universities. In general, two main objectives have been formulated for research activities in UAS: the research should be relevant for regional development and it should aim to improve education and professional practice. Four arguments have been used in order to introduce research in vocational programmes: 1) research improves the teaching competences of staff; 2) students learn more when they come into contact with research; 3) professional practice improves with training on research-based knowledge; and 4) professional programmes have a liability to improve the knowledge basis of professional work through research (Kyvik and Lepori, 2010).

Decreasing differences

Initially, universities of applied sciences had a clearly differentiated mission compared to universities, which was to provide vocational education, mainly on the bachelor level. However, it has been observed that differences between universities and UAS are decreasing. Universities of applied sciences for example started to imitate universities with respect to

their research activities ("academic drift"). But also universities started to take-over characteristics from UAS and became more similar to them. Johnstone (2010) differentiated between an "upward drift" to research functions from education institutions positioned below and a "downward drift" of research universities to larger and more heterogeneous teaching and service missions. Complementary to the "academic drift", the Bologna process is argued to be responsible for further decreasing differentiation between universities and universities of applied sciences by increasing permeability between curricula between these institutions (Seber, 2016; Johnstone, 2010; Antonowicz et al., 2018; Witte et al., 2008). Machado et al. (2008) note that universities of applied sciences are getting more similar to universities regarding the legal framework, the duration of study programmes, the qualifications of academic staff and the development of their research.

Diversity between universities and universities of applied sciences is not only decreasing, but developing contradictory in recent years. UAS were clearly different in terms of education and research in the early years of their existence. Over time, universities of applied sciences started to develop research activities, which even increased diversity to universities (e.g. by a mandate for applied research). As Lepori (2007) pointed out, this worked very well in Switzerland for technical disciplines, where UAS were able to develop distinct profiles. In other disciplines, the distinction between basic and applied research is less clear, which leads to stronger competition with regional universities. In these cases, the research activities of UAS lead to a decreasing differentiation of UAS compared to universities. Following Lepori (2007), this development cannot be fully classified as "academic drift" (i.e. institutions and also staff want to raise their status and improve working conditions by doing research), but is the result of dynamics of specialization and differentiation concerning research (Lepori, 2007).

Policy issues regarding diversity and differentiation

When following the aforementioned literature of the development of different types and systems in the higher education sector in Europe, it becomes clear that the future development of HE systems is not straightforward. Several challenges for the diversity within higher educa-

tion systems and the future development of diversity arise, or in other words, will diversity increase or will systems converge? Diversity was among the key characteristics of many higher education systems in Europe and many countries (e.g. UK, France, Germany, Norway etc.) moved towards two- or multi-type structures of higher education systems. It was considered as a way to improve the choices of students, democratise access, better serve students' needs and allow institutions to better define their missions and strategies. Then on the other hand, the end of multi-type systems was predicted, when universities and non-university institutions started to converge ("academic drift") and the HE system in UK transformed into a unified system. Upgrading non-university institutions to universities was then thought to be the future of higher education systems. However, some countries followed the British approach and several others (e.g. Austria, Switzerland and also Finland) transformed into two-type structures in the following years and neither system has turned out to be the one solution. The Bologna process followed, which advanced growing harmonization between national systems of higher education. Besides the "academic drift" and the Bologna process, stratification was named as another major challenge for two- or multi-type systems. The success of research in the US shaped the view that increasing stratification in resource allocation for research may be bene-

ficial for the research quality within a country. A concentration of resources for research was thought to increase research quality (Machado et al., 2008; Teichler, 2008a).

Antonowicz et al. (2018) pointed out that two-type systems developed differently within countries in the last 25 years: They are stable in countries with strong knowledge-intensive manufacturing sectors (e.g. Germany, Austria and Switzerland) and have dissolved or are fragmenting in other countries like UK, Ireland, Denmark and Norway. This view is supported by data on demographic events of the last decade. In Norway many university colleges have been taken-over by or merged into universities in the last decade. A similar development could be observed in Denmark, where several colleges, business schools etc. were taken-over by universities, and Ireland, where take-over from and merger into universities could also be seen (OrgReg, 2019). Thus, some developments suggest that – at least formal – diversity in some national systems is decreasing, while two-type systems in other countries seem to be rather stable.

Before presenting the data, the following chapter will highlight, to what extent ETER classifications and assumptions will be able to capture aspects of the aforementioned dimensions and issues.

3. ETER data: Definitions and limitations

ETER offers a rich set of data on the European higher education sector at the level of institutions, which enables a detailed look on patterns of different higher education systems in Europe using data on students in different ISCED levels and academic personnel. Data for the academic year 2016/2017 have been used for this analysis for most countries. Some countries did not deliver data for 2016/2017, but in previous years. In such cases, students and staff data from previous years have been merged to the 2016/2017 data. This includes France (data for 2014/2015 are available), Denmark (2013/2014), Iceland (2013/2014) and Luxembourg (2014/2015). For Montenegro and Romania no data are available.

A starting point for this analysis is the differentiation of institutions in three categories: universities, universities of applied sciences and other institutions. This differentiation is relevant in order to provide comparative analysis of higher education systems and analyse subgroups of institutions and systems. The following definitions⁵ of institution categories are used in the ETER dataset:

- **University:** Universities have a largely academic orientation (without excluding some focus on applied research), they have the right to award the doctorate and can bear the full name of “University” (including variants like technological university, etc.). In general, awarding doctorates should be the main criterion to classify HEIs in this category, even if a few doctoral-awarding HEIs might be included in the two following categories.

- **Universities of applied sciences (UAS):** These institutions are officially recognized as a part of higher education, though not as universities. Commonly these institutions have a focus on professional education and do not have the right to award doctoral degrees. In some countries, such as Norway, colleges can be accredited with the right of awarding a PhD (or even upgraded to universities), while there is an open debate in other countries, such as Germany and Switzerland, on whether UAS should be allowed to award PhD degrees. UAS are also known as e.g. *Fachhochschulen* (Austria, Germany), *Hoge-*

scholen (Netherlands), University colleges (Norway) or Polytechnics (Portugal). In most cases, such institutions constitute a second sector of higher education with a distinct mission.

- **Other:** All institutions that do not fit the description of universities or universities of applied science are categorized as “other”. This may apply to institutions like art academies, military schools, but also technological and professional schools in countries without a binary system (like the UK or France).

The classification of HEIs providing vocational education into UAS or “other” institutions depends on the higher education system within a country. In countries, where the UAS system has been implemented, vocational education is usually provided within universities of applied sciences. In countries without binary systems, institutions providing vocational education are often assigned to the category “other”.

After identifying national higher education systems and differentiating higher education institutions into institution categories, further analysis has been done on additional characteristics. The data have for example been analysed in order to identify regional patterns. The ETER data have been grouped into country groups (Southern, Eastern, Northern and Western Europe)⁶. This was done in order to find similar developments in larger areas.

Besides basic characteristics, geographical information and variables from secondary statistics, the ETER dataset also includes a set of indicators calculated from the ETER data. For

⁶ According to the definition of the United Nations (United Nations 2019), the following geographic regions have been defined:

- Western Europe: Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Netherlands, Switzerland.
- Northern Europe: Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, United Kingdom.
- Eastern Europe: Bulgaria, Czech Republic, Hungary, Poland, Slovakia.
- Southern Europe: Albania, Croatia, Cyprus*, Greece, Italy, Malta, Montenegro, North Macedonia, Portugal, Romania, Serbia, Slovenia, Spain, Turkey*.

* Both Cyprus and Turkey have been assigned to Western Asia by the UN. In order to take them into account for this analysis, they have been assigned to Southern Europe by the Authors.

⁵ See also the ETER handbook for a complete overview on definitions used in ETER (Lepori et al., 2018).

this analysis, the Herfindahl index⁷ has been used in order to examine patterns regarding institution categories between specialized and non-specialized higher education institutions. The institutions have been characterized the following way:

- Generalist institutions: These institutions offer education in a wide range of fields at the same time and have a Herfindahl index below 0.3.
- Focused institutions: In focused higher education institutions, at least half of the students are enrolled in just one field, but there are also significant numbers of students in other fields. The Herfindahl index of focused institutions is between 0.3 and 0.7.
- Specialized institutions: in specialized institutions, most of the students are enrolled in one field of education (Herfindahl index larger than 0.7). Most specialized institutions are mono-sectoral institutions, offering only one subject.

After the identification of specialized institutions, the ETER data were used to identify the main subjects of these institutions. This can be done by using the breakdown of students, graduates and academic staff into ISCED 2013 Fields of Education and Training (ISCED-F). In ETER, the broadest classification has been used (no subfields):

- 00: General programmes and qualifications
- 01: Education
- 02: Humanities and arts
- 03: Social sciences
- 04: Business and law
- 05: Natural sciences, mathematics and statistics
- 06: Information and communication technologies
- 07: Engineering, manufacturing and construction
- 08: Agriculture, forestry, fisheries and veterinary

⁷ The Herfindahl index can be used to measure the degree of specialization of institutions. It is an index between 0 and 1. 1 indicates that all students study in the same field, while an index near 0 indicates a more equal distribution of different fields of study. See more information on the Herfindahl index in the ETER brief No. 1 on subject specialization (<https://www.eter-project.com/#/analytical-reports>).

- 09: Health and welfare
- 10: Services

ETER also provides a description of the perimeter adopted for the ETER data collection including the entire tertiary education system in every country⁸. It informs on the types of HEIs included and excluded, of the coverage in terms of curricula as compare with the UNESCO ISCED mappings⁹ and lists specific exclusion cases and their reason. Figures of coverage in terms of numbers of students are only illustrative, for exact data by year the reader should use the ETER database. The current version of the mapping files refers to the academic year 2014/2015. Parts of these data have been included in the overview on different systems in European higher education (in Table 4 and Table 5 the annex).

3.1. Limitations of the ETER data

One limitation of the ETER data is the degree of completeness in a few variables. E.g. data on academic staff (measured in FTE) is not (or nearly not) available in 12 countries, data on expenditures and revenues are not available in 17 countries covered by ETER. Also, the distinction may not always be fully comparable. An example is France, where the ETER perimeter does not reflect the full diversity of the higher education system.

A further limitation of the ETER data is the missing differentiation between academic and professional institutions. There are approximations as types of institutions (e.g. universities of applied sciences are considered to offer mostly professional education), a research activity dummy, doctorate awarding or not, etc., but a clear differentiation is not possible. Also, non-university professional education is not covered by ETER. This type of education is not well specified and treated completely different between countries. Examples of institutions delivering professional degrees but not covered in ETER are *Fachschulen* or *Berufsakademien* in Austria, Germany and Switzerland, high level technical institutes in Italy or institutions delivering Higher Technical Diploma (BTS) in France (Kane and Rouse, 1999; McCormick and Borden, 2019). The ETER database additional-

⁸ <https://www.eter-project.com/#/info/coverage>

⁹ <http://www.uis.unesco.org/Education/ISCEDMappings/Pages/default.aspx>

ly includes country mappings, where providers and programmes of higher professional education are collected. This information is not complete for all countries and therefore the analysis of higher professional education using this resource is limited until now, but it allows a first glimpse on the tertiary education sector not covered in ETER.

4. Main findings

This chapter focuses on the new possibilities the ETER database offers in order to analyse the higher education landscape with respect to different national higher education systems. First, an update and extension of the mapping provided by Kyvik (2004) is done in order to classify the national HE systems of the 37 ETER countries into dual, binary, university-dominated and unified systems. Such a large-scale mapping over the European higher education sector is a new opportunity given the availability of ETER and thus the provision of data on the level of higher education institutions over all Europe. After the mapping, the European higher education landscape is analysed regarding differences in the distribution, distinction, historical development, diversity and differentiation of different types of higher education institutions.

4.1. A new mapping of national higher education systems

The ETER database allows an extension of the mapping provided by Kyvik (2004) by using data about institutional types and students distribution between them. For this exercise, two tables have been created where countries and their higher education structure are shown by types of institutions. Table 4 in the annex includes all countries, which have implemented institutions classified as universities of applied sciences in the ETER data. These countries are in the following classified as dual systems. On the other hand, Table 5 in the annex shows all countries which have not implemented UAS or similar types of HEIs. Besides shares of institutions and students (ISCED 5-8) by institution category, the tables include country specific characteristics. These characteristics come partly from the microdata, partly from the country mappings available on the ETER web interface.

The first table reveals the heterogeneity within countries with dual or binary systems, i.e. countries which have implemented universities of applied sciences or similar types of institutions. Bulgaria for example, has implemented higher education institutions classified as UAS, but higher education takes place almost exclusively in the university sector (85% of institutions are universities, 97% of all students are enrolled in universities). The higher education system will therefore be classified as dual system in this

report. The other extreme can be found in the Netherlands, where 34% of HEIs are universities and they enrol about 39% of all students in the country. The Netherlands have on the other hand a high share of higher education concentrated in universities of applied sciences (66% of all institutions, 61% of all students), which deliver professional education. Latvia, as another example, has the highest concentration in other institutions (48% of institutions, 34% of students), which includes academies and private, specialized higher education institutions. Other examples are countries, where a low number of universities enrol large number of students (e.g. Cyprus, Estonia, Croatia and Slovenia), while a large number of UAS in the same countries enrol only small shares of students.

Following the models of higher education systems from Kyvik (2004), all European countries included in the ETER dataset have been assigned to one of these models for this report, as can be seen in the following figure. Bulgaria, Slovenia and Slovakia have been assigned to dual higher education systems, since the vast majority of students in these countries is enrolled in the university sector (Bulgaria: 97,2%, Slovenia: 87,2%, Slovakia: 93,2%) despite the existence of a sector classified as UAS. All other countries having the UAS system can be characterized as binary systems, where universities of applied sciences or similar institutions enrol an important share of students. In the following, all countries assigned to dual and binary systems will be summarized under dual systems.

The same analysis has been done for countries which do not have universities of applied sciences or different types of HEIs in their higher education systems (see Table 5 in the annex). These countries are dominated by universities in the sense that universities enrol more than 80% of all students in the respective countries. These countries can be assigned either to unitary or dual systems. Even though these countries have in common that most students are enrolled in the university sector, there are also significant differences.

Unified systems cover, inter alia, all countries, where no other types of institutions are included in the higher education sector. The list of institutions includes small countries like Liechtenstein, Luxembourg, Iceland or North Macedonia, but also Spain, which has integrated all higher education programmes into universities. In Tur-

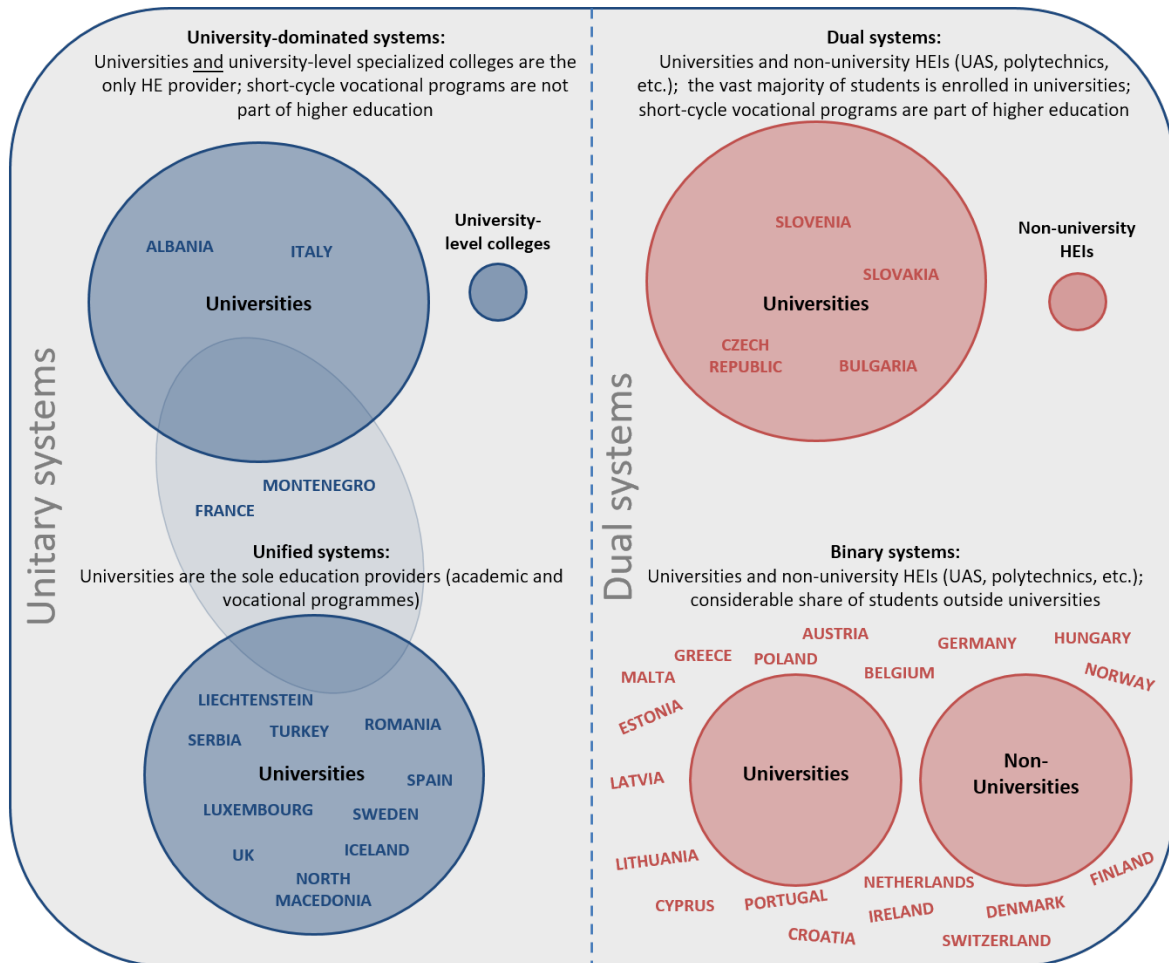
key, vocational schools are also assigned to the higher education sector, but since these are delivering ISCED 5 degrees solely, the system has been classified as unified. Sweden was assigned to binary systems by Kyvik (2004), while more recent literature indicates that the system tends towards a unified system (Jóhannsdóttir and Jónasson, 2013; Sadurskis et al., 2018). Several mergers and take-overs have taken place in recent years which support this thesis. Examples are the take-over of Gotland University College by Uppsala University, the merger of University of Dance and Circus, Stockholm Academy of Dramatic Arts and University College of Opera into Stockholm University of the Arts or also the merger of Växjö University and Kalmar University College into Linnaeus University (OrgReg, 2019). Another country classified as unified system is UK, where many of the institutions assigned to other institutions have been progressively integrated into the university system. Italy on the other hand, which has a very similar distribution of institutions by type and students as UK, is classified as university-dominated system, since universities enrol 96.5% of all students, but there also exists a distinct sector of higher education institutions with university-level education (i.e. academies of fine arts, music conservatories). For Albania, data on students for ISCED classes are not available. Since most HEIs the non-university sector in the country offer master programmes, Albania is also classified as university-dominated system.

Then there is a group of countries, which have

not implemented the type of UAS or similar institutions according to the ETER data and have a high share (around 80% and more) of enrolled students within the university sector, but are nonetheless similar to countries with dual systems. These countries are the Czech Republic, Poland, Hungary and Malta. Since in Poland (21.6%), Hungary (19.6%) and Malta (17.3%), a considerable share of students is enrolled outside the university sector and these institutions in many cases offer bachelor degrees as highest degree, the national HE systems are classified in this analysis as binary systems. In the Czech Republic, 90.5% of students are enrolled in universities and 82.2% of all students within other HEIs are enrolled in bachelor programmes. Therefore, the Czech national HE system is assigned to dual systems in this report. As already outlined in the previous chapter, the French higher education system cannot easily be assigned to one of the two university-dominated systems. The same is true for Montenegro, where different types of institutions exist, but information on the distribution of students by degrees is missing in ETER.

The exercise above leads to the following picture (see Figure 1), which will be used throughout this report when national higher education systems are classified either as unitary or dual systems. At this point, there is again the need to emphasize that the classification of several countries is based on slight differences and that a discussion on the evolvement and classification of national systems is highly appreciated.

Figure 1. Classification of national higher education systems



Source: ETER (2019), extension of the mapping provided by Kyvik (2004).

NOTE: The size of the bubbles illustrates the distribution of students between institution types, e.g. in university-dominated systems, universities enrol most students and only a small share is enrolled in university-level colleges. In binary systems on the other hand, there is also a considerable share of students outside universities.

Besides the heterogeneity of national systems, the ETER data also allow an illustration of the heterogeneous nature of other higher education institutions between European countries (see Table 1). For example, in Austria and Switzerland, it consists mostly of universities and colleges for (teacher) education, while in Belgium

and Italy, many other institutions are specialized in arts and music. Germany, France, Poland and UK on the other hand each have a very large number of other institutions covering different fields of education and types of schools (colleges, academies, vocational and professional schools etc.).

Table 1. Common types of other institutions in the ETER countries

Country	Common types of other institutions
Albania	university colleges, academies
Austria	universities, university colleges for education
Belgium	higher schools of arts, music conservatories
Bulgaria	only 1, no common type
Switzerland	universities for teacher education
Cyprus	only 3, no common type
Czech Republic	large (38 other institutions in 2016/2017) and very heterogeneous sector, includes e.g. colleges, institutes, academies, business schools etc.
Germany	large (87 other institutions in 2016/2017) and very heterogeneous sector, includes e.g. universities of education, faculties of theology, academies of fine arts, universities of music etc.
Denmark	only 1, no common type
Estonia	no other institutions
Spain	no other institutions
Finland	no other institutions
France	very large sector (239 other institutions in 2016/2017) and very heterogeneous sector, includes e.g. ESPE de l'académie, École nationale supérieure, etc.
Greece	merchant marine academies, higher ecclesiastic academies
Croatia	only 1, no common type
Hungary	heterogeneous sector, including colleges, academies, business schools etc.
Ireland	colleges
Iceland	no other institutions
Italy	very large sector (119 other institutions in 2016/2017), divided between academies of fine arts and music conservatories/institutes
Liechtenstein	no other institutions
Lithuania	no other institutions
Luxembourg	no other institutions
Latvia	mostly academies of different subjects
Montenegro	faculties of different subjects
North Macedonia	no other institutions
Malta	only 1, no common type
Netherlands	no other institutions
Norway	university colleges, academies of arts
Poland	very large (163 other institutions in 2016/2017) and very heterogeneous sector, including higher schools for different subjects, higher vocational schools, colleges, etc.
Portugal	military academies and higher institute of police sciences
Romania	no other institutions
Serbia	no other institutions

Country	Common types of other institutions
Sweden	small sector (only 7 institutions in 2016/2017), 4 of them specialized on arts and/or music
Slovenia	no other institutions
Slovakia	only 6, no common type
Turkey	small sector (only 9 institutions in 2016/2017), 5 of them professional and vocational institutions
UK	very large (132 other institutions in 2016/2017) and very heterogeneous sector, including many colleges, academies for arts, music or theatre, etc.

Source: ETER (2019).

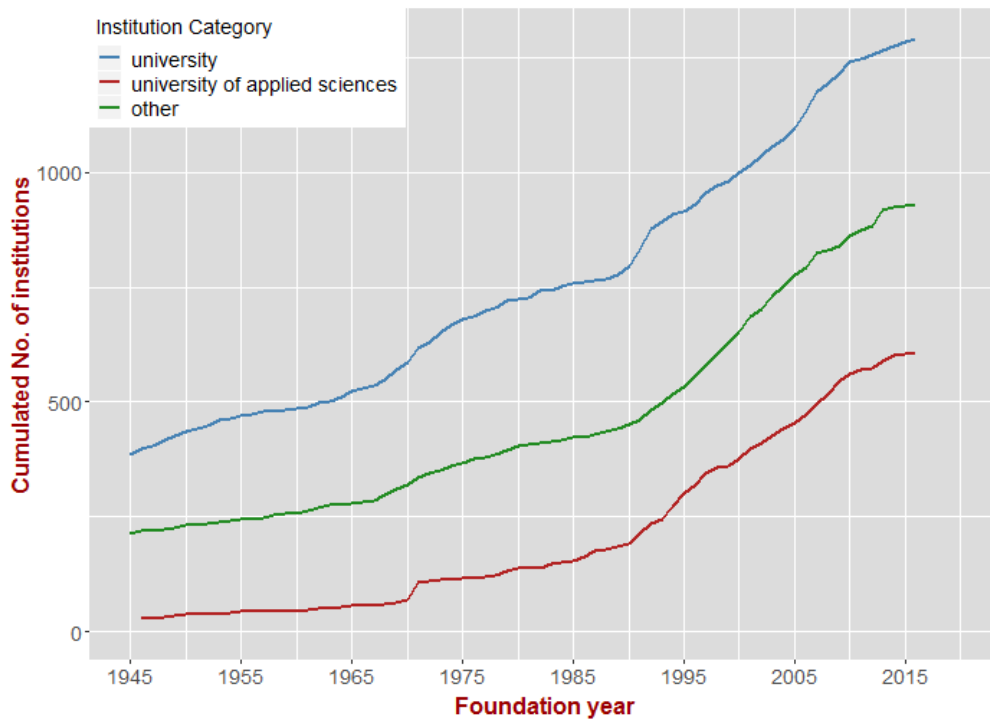
4.2. Historical development

The development of the non-university higher education sector in Europe has already been discussed in this report in an anecdotal way. As often the case in former studies, the evolution of higher education students was described for a group of countries, for which information was available, but not for whole Europe. The ETER data allow an extension of this development and show how the structure of higher education institutions in Europe has evolved. The development of higher education institutions started with the foundation of the University of Bologna in 1088, followed by a slow increase in the number of universities over the next centuries. Higher education institutions classified as “other”

first emerged in the 16th century in France, Italy and Hungary, while the first predecessors of UAS started to emerge in the 18th century in Austria, Germany and Belgium (see Figure 11 in the annex for the historical development since the 11th century).

It was not before the 20th century, when higher education institutions started to emerge rapidly, a process that was accelerated after 1950 (see Figure 2). 81% of all universities and 84% of all other institutions in ETER were founded after 1900. Universities of applied sciences are comparably young institutions. 89% of all UAS were founded after 1970, while a considerable share of 30% of all UAS in the ETER dataset was founded within one decade in the 1990s.

Figure 2. Historical development of higher education institutions since 1945 by institution category



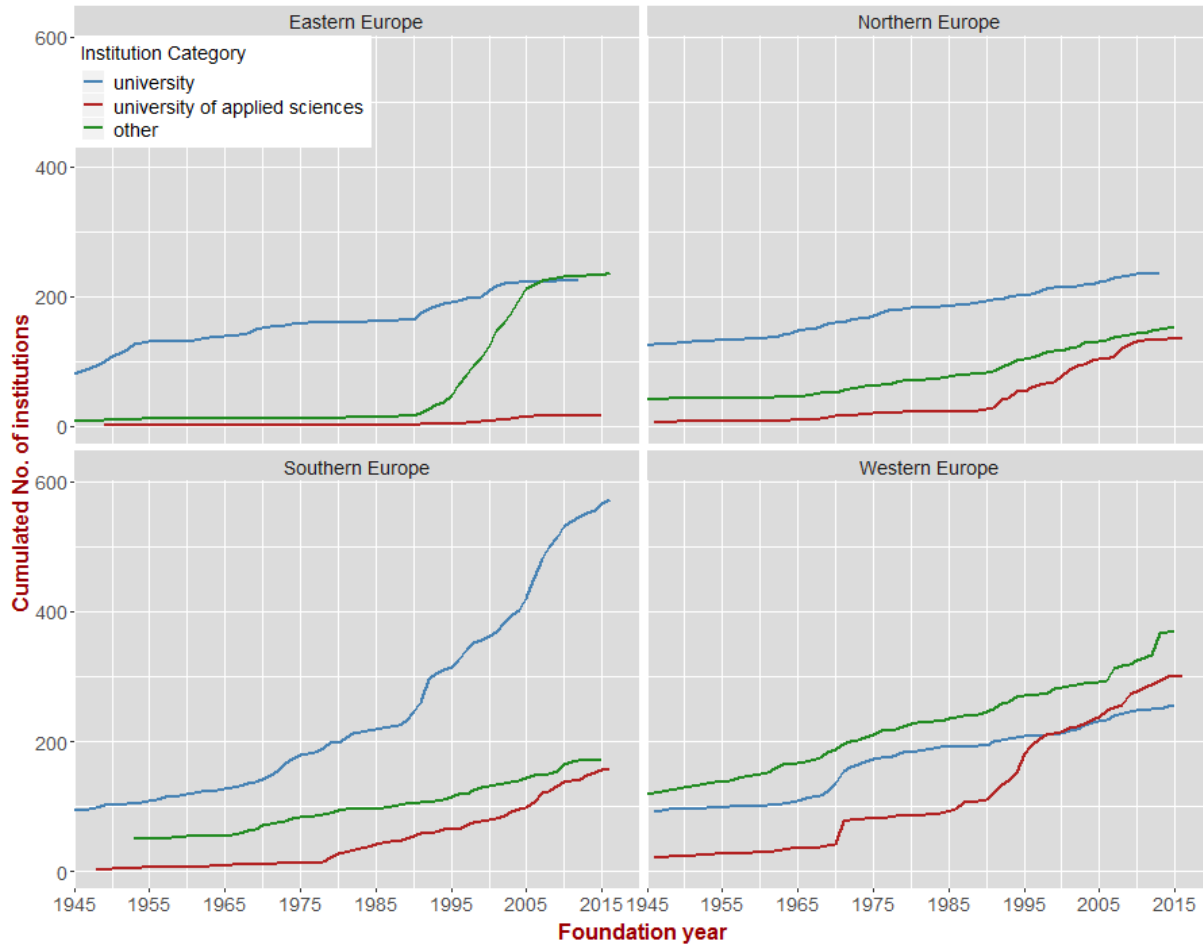
Source: ETER (2019).

The regional development of higher education institutions differs strongly. In Eastern Europe for example, the number of founded higher education institutions per year started to increase strongly after 1990, where many other institutions have been founded. Especially in Poland (24 universities and 152 other HEIs from 1990 to 2005) and the Czech Republic (11 universities and 28 other higher education institutions in the same period) were responsible for this development. In Northern European countries, the development of HEIs started to get more dynamic already after 1960. Beginning with the 1990s, also universities of applied sciences and other institutions were established in a larger number. In Southern Europe, where universities play a major role in the higher education sector, many of them were established after 1990. This development was mainly driven by Turkey (72 new universities between 2005 and 2010), but also by Italy (11 new universities) and Romania (10).

In the early 1970s, many HEIs have been established in Western Europe. This was driven especially by developments in France (27 universities and 16 other institutions between 1970 and 1975) and Germany (15 universities, 42 UAS

and 9 other institutions in the same period). Also, there is a wave of relatively young institutions in Western Europe starting from 2010. This development is mainly driven by the emergence of many other institutions in France (41 institutions from 2010 to 2016) and universities of applied sciences in Germany (17 institutions in the same period).

Figure 3. Historical development of HEIs starting since 1945 by institution category and region



Source: ETER (2019).

The emergence of universities of applied sciences, which were often upgrades and transformations of already existing institutions into the higher education sector, was different among countries. In Germany, for example, the development already started in the 1970s, before the number of UAS was doubled in the 1990s and further expanded after 2000. Also in Ireland, *Institutes of Technology* (classified as UAS) were already founded in the 1970s. Both countries faced a transition from university-dominated systems into binary systems by the creation of new types of institutions, namely *Fachhochschulen* in Germany and “regional technical colleges” in Ireland. There are several countries, where UAS were founded mainly in the mid-1990s, e.g. Austria, Belgium, Switzerland, Estonia, Portugal and Finland. This development was due to several factors, which are for example increased labour market orientation of study programmes, higher

autonomy and flexibility in programme design and also greater efficiency in the provision of services (e.g. better student/teacher-ratios, reduced and more focused number of programme etc.). Universities of Applied Science were already established in the Netherlands (*Hogeschool*) for several decades, before there was a strong increase in the number of students in the 1990s, which was even stronger than in traditional universities. In contrary, the current size of Dutch universities was often achieved through the merger of already existing universities of applied science. In Denmark the non-university sector traditionally played an important role in tertiary education compared to other European countries. Following a reform process initiated in 2007, eight new university colleges were established following a re-organisation of former educational structure. These colleges are mostly specialized in the Educational Sciences, He-

alth Sciences, Social Sciences and Communication Sciences. On the other hand, countries like Bulgaria (UAS founded around 2000), Croatia (20 UAS founded after 2000), Lithuania (18 UAS founded around 2000), Latvia, Slovenia (26 UAS founded in the last 10 years) and also Slovakia have a younger core of universities of applied sciences (Kyvik, 2004; Melin et al., 2015; Polt et al., 2015).

4.3. Distribution and distinction

The ETER dataset enables, among other things, a differentiation of higher education institutions by their institution category (i.e. universities, universities of applied sciences and other institutions). The 2016 version of the ETER dataset (i.e. the academic year 2016/2017) includes 2,970 higher education institutions. From all HEIs assigned an institution category, 1,292 institutions are classified as universities, 608 as universities of applied sciences and 959 as other institutions (see also Table 1). Thus, nearly one half of the institutions included in ETER are universities (45%), one fifth (21%) are universities of applied sciences and about one third of them are other institutions (34%). The data also show that universities of applied sciences are especially relevant for education at the bachelor level. 15% of all bachelor students are enrolled in these types of institutions. At the master (89%) and especially at the PhD level (98.5%), universities absorb the vast majority of

students in Europe. Measured in academic staff (FTE), 13.2% are found in the sector of UAS, while 83.4% are working in universities. Universities of applied sciences, for example, play a minor role in Eastern European countries. Only 15 (7 in Bulgaria, 8 in Slovakia) out of 477 institutions in this region have been classified as UAS (3% of all HEIs in this geographical area). On the contrary, 236 institutions (49.5%) have been classified as other and 226 as universities (47.5%). Other institutions in Eastern European countries enrol 20% of bachelor and 14% of master students, which assigns them an important role in the educational sector.

Universities of applied sciences also account for a smaller share in Southern European countries, where 157 out of 904 HEIs are classified as UAS (17%). For this region, there are no institutions classified as UAS in Albania, Italy, Malta, Montenegro, North Macedonia, Romania, Serbia, Spain and Turkey. Instead, the higher education sector in Southern European countries is dominated by universities, which account for 573 of 904 institutions (63%). Taking into consideration student numbers, it is obvious that the role of UAS and other institutions in this region is very small. 95% of bachelor, 96% of master and 98% of doctoral students are enrolled in universities in Southern European countries. Compared to these numbers, the share of academic staff is relatively high for universities of applied sciences (10.6%).

Table 2. Number and shares of higher education institutions, students and staff by categories and regions

	No. of institutions by category	Share of institutions (%)	Share of bachelor students (%)	Share of master students (%)	Share of doctoral students (%)	Share of academic staff (%)
Total						
university	1292	45.19	80.76	88.74	98.46	83.36
university of applied sciences	608	21.27	15.26	7.36	1.06	13.20
other	959	33.54	3.98	3.90	0.48	3.44
Eastern Europe						
university	226	47.38	79.36	85.46	98.90	90.39
university of applied sciences	15	3.14	0.65	0.41	0.19	0.48
other	236	49.48	19.99	14.13	0.91	9.12
Northern Europe						
university	237	43.17	79.63	92.01	98.08	90.43
university of applied sciences	135	24.59	15.29	4.40	1.05	7.23
other	177	32.24	5.08	3.58	0.86	2.33
Southern Europe						
university	573	63.38	94.64	96.18	98.15	89.01
university of applied sciences	157	17.37	4.67	2.74	1.83	10.57
other	174	19.25	0.69	1.08	0.02	0.43
Western Europe						
university	256	27.56	44.51	75.31	99.11	72.41
university of applied sciences	301	32.40	52.53	22.74	0.33	24.51
other	372	40.04	2.96	1.96	0.56	3.08

Source: ETER (2019).

In Western European countries, universities cover a smaller part of higher education institutions compared to the rest of Europe. 256 of 929 (27.6%) institutions were classified as universities, 372 (40%) as other institutions and 301 (32.4%) as universities of applied sciences. The role of universities of applied sciences seems to be more distinct in Western European countries compared to the other regions. 52.5% of all bachelor students in this region are enrolled in UAS, which also seem to be larger than in other European areas. The share of students in universities of applied sciences in Western Europe decreases with higher levels of degrees. While 22.7% of all master students are enrolled in UAS, nearly all doctoral students are enrolled in universities. In the comparison of regions, universities of applied in Western European countries have by far the largest share of academic staff (24.5%). In Northern European countries, universities of applied sciences are also primarily focused on education on the bachelor level. 24.6% of institutions are classified as UAS and they enrol 15.3% of bachelor students. The share of students in UAS is strongly decreasing in higher degree levels, where universities enrol

the vast majority of students (master students: 92%; doctoral students: 98%).

Table 3 below shows the distribution of students by different levels within types of higher education institutions. The results emphasize the mission of universities of applied sciences as provider of education on the bachelor level. Over whole Europe, 89.5% of all enrolled students in UAS are enrolled at the bachelor and 10.2% are enrolled at the master level. Doctoral students in universities of applied sciences are very rare. The distinction of UAS is slightly stronger in Northern European countries, where 92% of all students in this institutional type have been found. Compared to other regions, universities in Western European countries have a strong focus on the master and doctoral levels. Only 61.3% of students enrolled in universities in these countries are doing their bachelor degrees, while 30% are enrolled in master and 8.7% are enrolled in doctoral programmes. The differentiation of other institutions seems to be similar across Europe, since the distribution of students does not differ much between regions.

Table 3. Shares of students within types of higher education institutions, students by regions

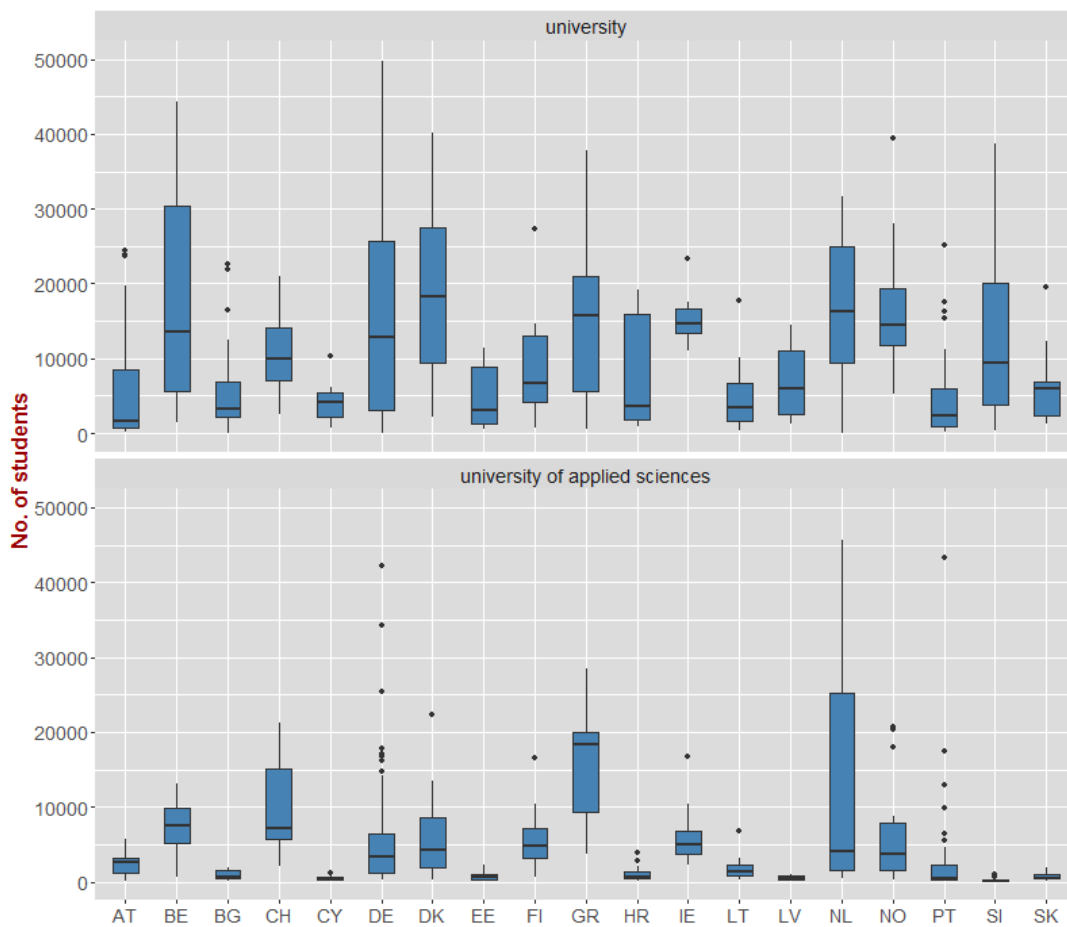
	Share of bachelor students (%)	Share of master students (%)	Share of doctoral students (%)
Total			
university	75.79	19.76	4.45
university of applied sciences	89.46	10.24	0.30
other	80.76	18.77	0.47
Eastern Europe			
university	69.15	26.29	4.56
university of applied sciences	80.94	17.83	1.23
other	79.87	19.94	0.19
Northern Europe			
university	70.78	23.21	6.01
university of applied sciences	92.04	7.53	0.44
other	82.51	16.52	0.97
Southern Europe			
university	82.22	14.87	2.91
university of applied sciences	89.46	9.35	1.19
other	78.19	21.72	0.09
Western Europe			
university	61.25	30.04	8.71
university of applied sciences	88.82	11.14	0.04
other	83.05	15.95	1.01

Source: ETER (2019).

Another criterion for the distinction of universities and universities of applied sciences is size. Universities are in general larger than universities of applied sciences, since they are usually targeting a special target group. As can be seen in Figure 4, there are some exceptions. In Greece and the Netherlands, for example, several large universities of applied sciences exist. 10 of 14 UAS in Greece enrolled more than 10,000 ISCED 5-7 students in the academic year 2016/2017. In the Netherlands, student numbers in UAS are even higher. 11 universities of applied sciences in the Netherlands enrol more than 20,000

ISCED 5-7 students. Among them are also the two largest UAS in Europe, measured in student numbers: the *Amsterdam University of Applied Sciences* and the *Fontys University of Applied Sciences* with both more than 40,000 students. Other UAS in Europe with more than 30,000 students are the *FOM University of Applied Sciences* and the *Baden-Wuerttemberg Cooperative State University* in Germany and the *Rotterdam University of Applied Sciences*, the *University of Applied Sciences Utrecht* and the *HAN University of Applied Sciences* in the Netherlands.

Figure 4. Size of HEIs by institution category (in countries with UAS)*



Source: ETER (2019).

* For better readability, the y-axis has been limited to 50,000 students.

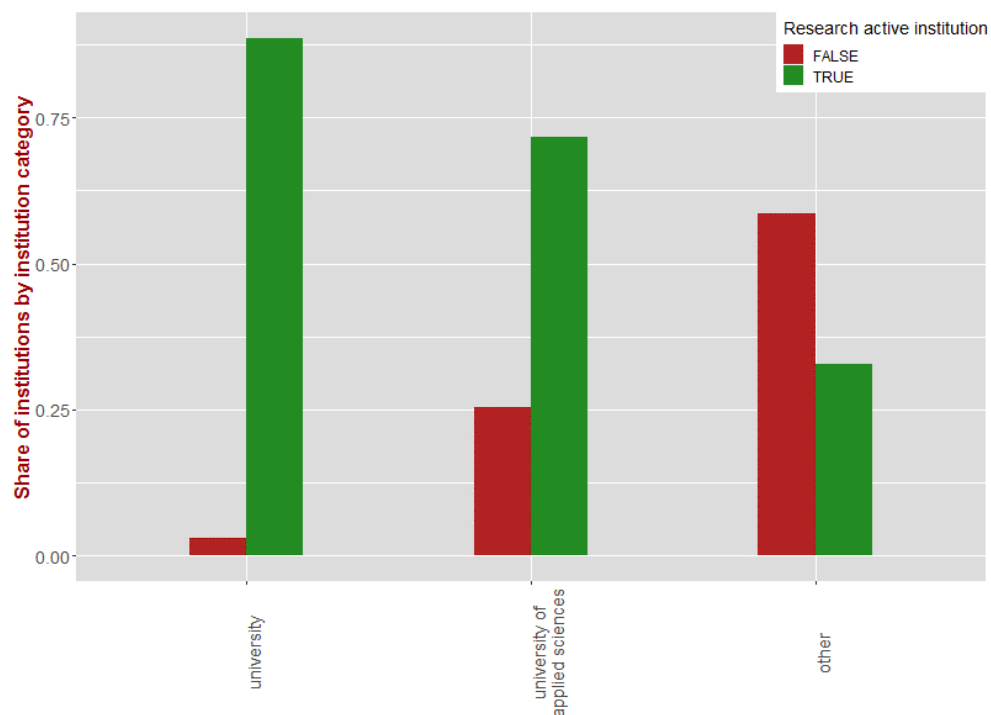
4.4. Diversity and differentiation

The following chapter uses the ETER data in order to investigate patterns in the diversity and differentiation between universities, universities of applied sciences and other institutions. In detail, differences in research, education and the role of higher education institutions in different countries will be examined.

Research

While universities of applied sciences and other institutions often have a focus on delivering higher professional education, a core characteristic of universities is performing research. The ETER data clearly support this thesis, as is shown in the following figure. Nearly all universities in the ETER dataset are research active, while this is true also for 72% of all UAS and 33% of other institutions in the ETER data.

Figure 5. Share of research active HEIs by institution category

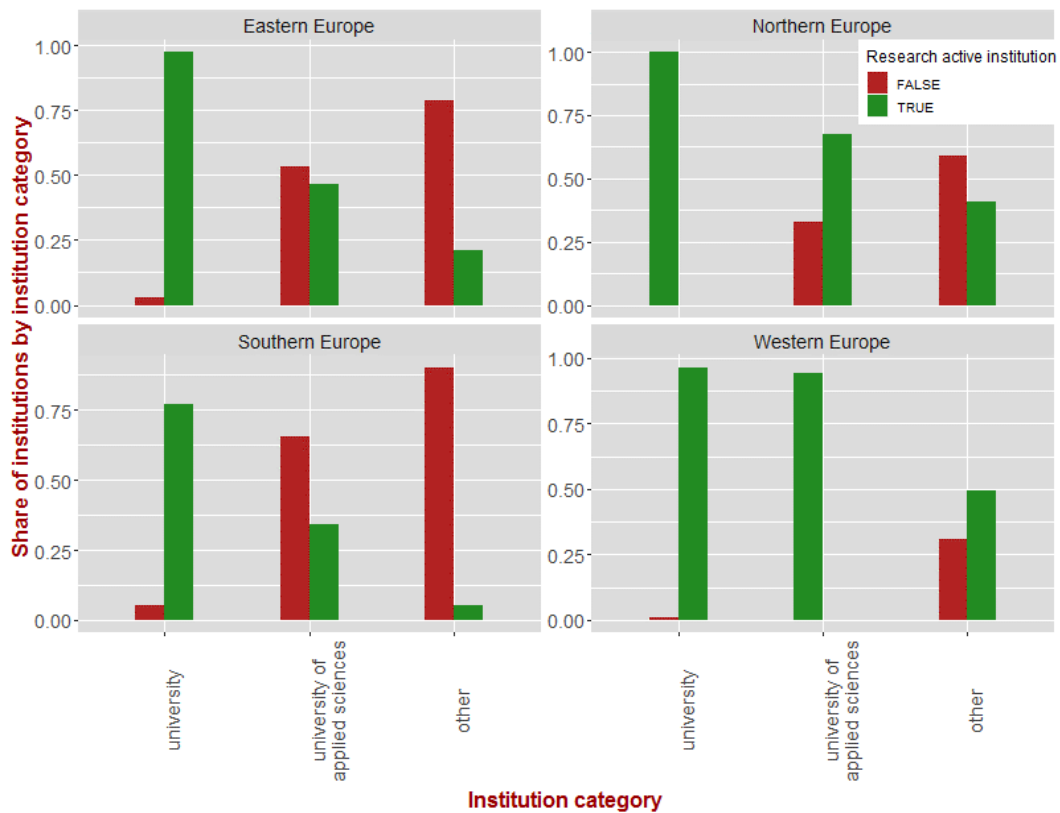


Source: ETER (2019).

There are also clear differences by regions. As can be seen in the following figure, universities outside Southern Europe are mostly research active, while this is only true for about 75% of universities in Southern European countries. At the same time, nearly 100% of universities of applied sciences in Western European countries have a research mandate. This is also true for more than 70% of UAS in Northern European countries, while less than 50% of UAS in Eastern and Southern European countries are engaged in research activities. This shows that

universities in Northern and Western European countries have a higher focus on research activities than Eastern and Southern European countries. This has already been indicated by Jongbloed (2010) in a study on universities of applied sciences in eight European countries, but has not been confirmed by a large-scale study over all Europe. Other institutions in Western and Northern European countries are way more likely to do research than in Eastern or Southern European countries.

Figure 6. Share of research active HEIs by institution category



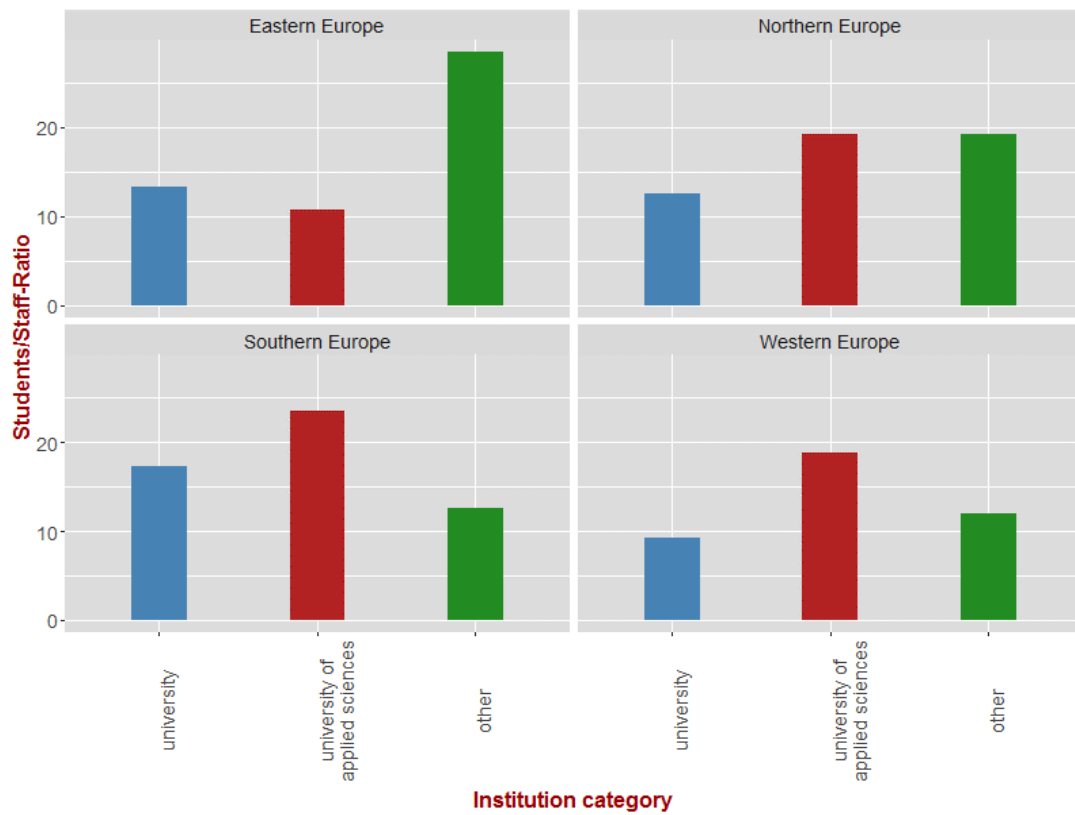
Source: ETER (2019).

Education

The fact that research is the main mission of universities, while UAS and other institutions focus more on teaching is also displayed in the students/staff-ratio. While the students/staff-ratio in universities of applied sciences and other institutions is around 20, the ratio for universities is much lower (12.5). In a regional perspective, universities have a very low students/staff-ratio (9.3) in Western Europe-

an countries, while the same ratio in Southern European countries is 17.3 (see also Figure 7). Southern European countries have the highest student per staff ratio in universities of applied sciences (23.5), whereas Eastern European countries, where UAS play a minor role, have a very low ratio (10.7). In this region, other institutions are well equipped with personal resources (28.4), especially compared to Southern and Western Europe (12.6 respectively 12).

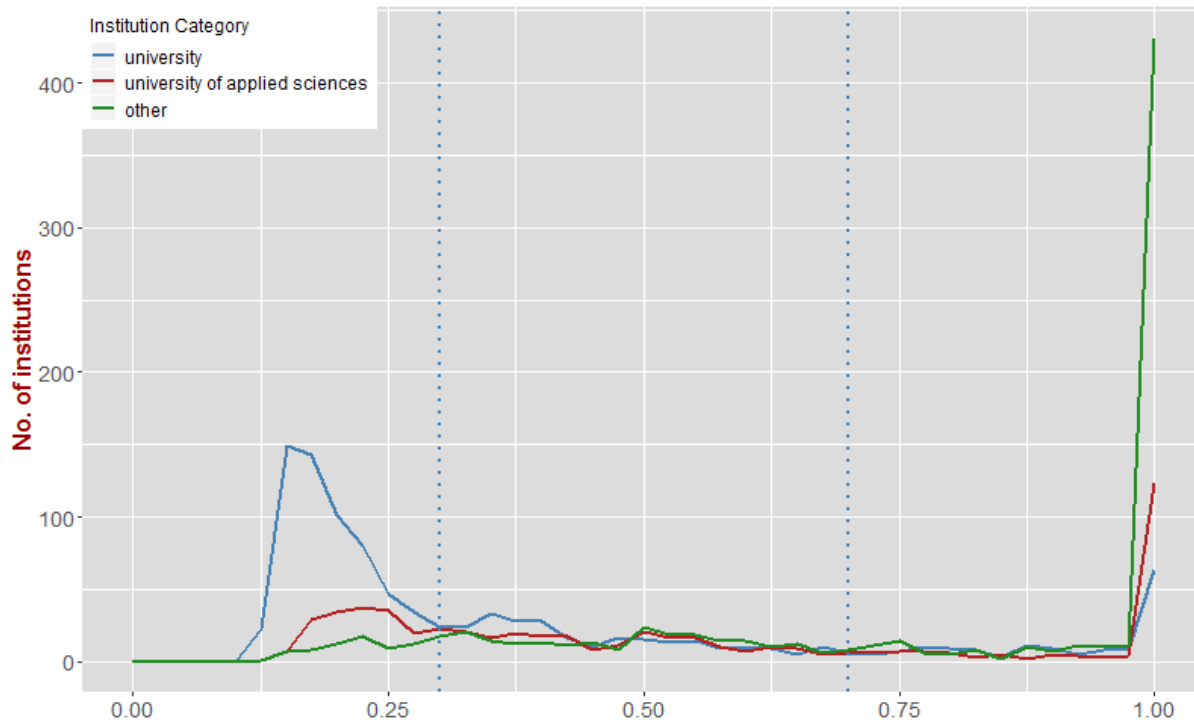
Figure 7. Students/staff-ratio by country groups and institution categories



Source: ETER (2019).

In general, many universities offer a broad range of fields of education (so called generalist institutions with a Herfindahl index below 0.3), whereas other institutions and universities of applied sciences are more likely to be specialized (i.e. have a Herfindahl index larger than 0.7), as can be seen in Figure 8.

Figure 8. Distribution of HEIs by institution category and degree of specialization



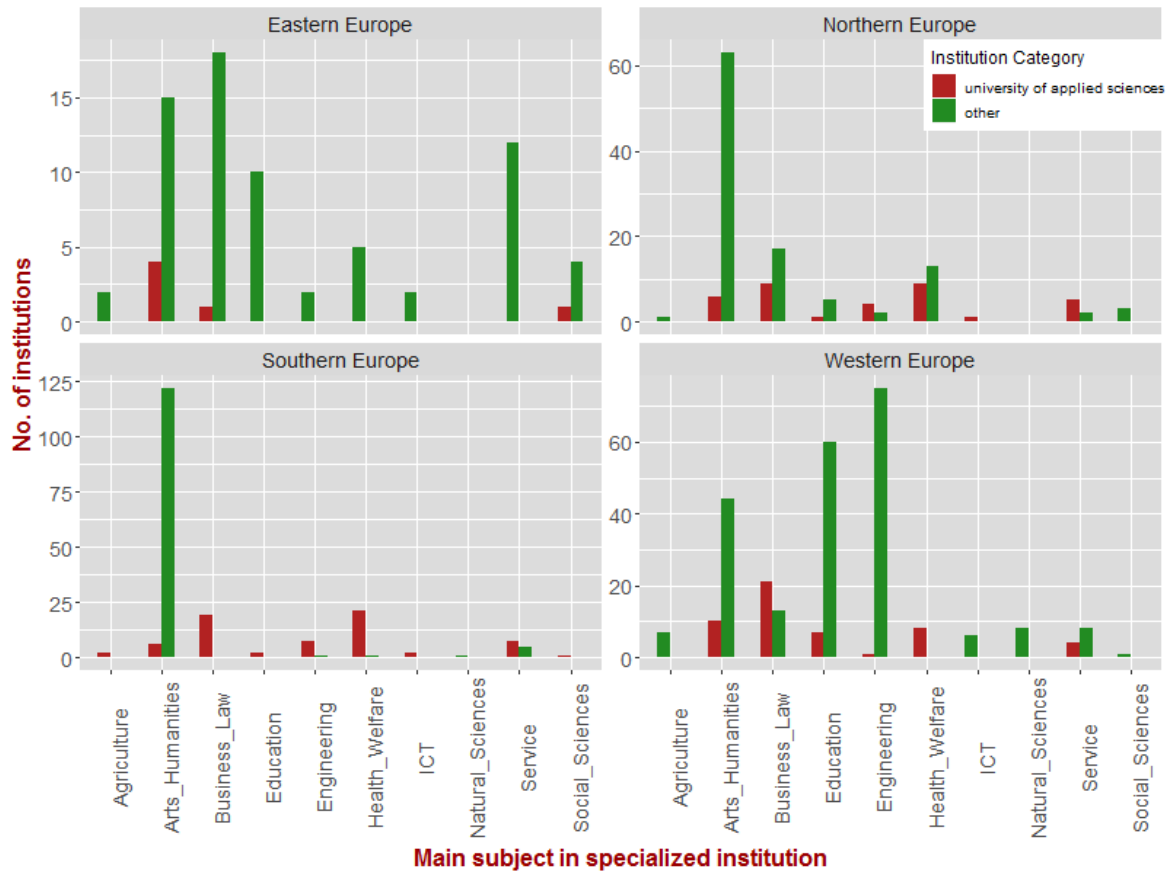
Source: ETER (2019).

The analysis of main subjects in specialized institution shows that there is a difference in covered subjects between institutional types and regions (see Figure 9). In Eastern European countries, where universities of applied sciences play a minor role, specialized other institutions offer in most cases education in Business and Law (driven by the Czech Republic with 13 other institutions offering Business and Law as main and in most cases only subject) and Arts and Humanities. In Northern European countries, the number of specialized other institutions is mainly driven by the United Kingdom, which accounts for most other specialized institutions in Arts and Humanities as well as Business and Law.

In Southern European countries, there is nearly no specialized education in other institutions except in Italy, which has 117 other institutions specialized on Arts and humanities (nearly all

of them academies of fine arts or music conservatories). On the contrary, there are several countries in this geographical area where specialized universities of applied sciences cover the fields of Business and law (Cyprus with 10 institutions; Croatia with 5 institutions) as well as Health and welfare (Portugal with 15 UAS and Slovenia with 5 UAS). In Western European countries, there are large groups of specialized other institutions in Engineering (75 institutions, all of them in France), Education (32 *École Supérieure du Professorat et de l'Éducation* in France, 14 institutions in both Switzerland and Austria) as well as Arts and humanities (42 institutions in Germany). Specialized UAS in Western European countries often focus on the subjects Business and law (17 specialized UAS in Germany), Arts and humanities, Health and welfare and Education.

Figure 9. Main subjects of specialized UAS and other institutions by region



Source: ETER (2019).

The role of HEIs in national systems

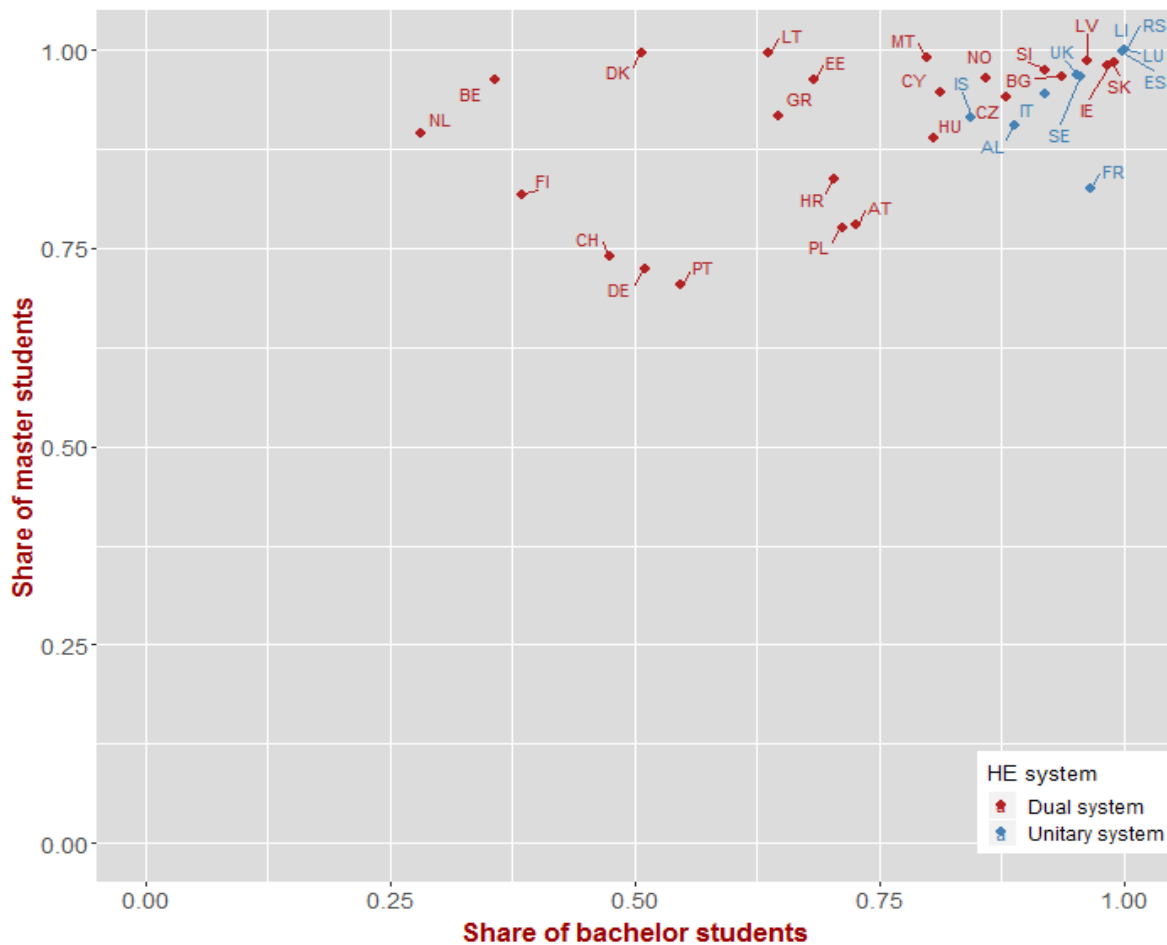
The specific role of different types of higher education institutions within a country depends on national systems. Systems which are classified as dual systems have in general a different distribution of students than unified systems, as can be seen in the following figure. Figure 10 shows the share of bachelor students in doctorate awarding institutions (compared to all bachelor students in a country) plotted on the x-axis and the share of master students in doctorate awarding institutions (again compared to all master students in a country) on the y-axis. Countries with a dual system have in general a smaller share of especially bachelor, but also master students enrolled in doctorate awarding institutions (i.e. in most cases universities). Countries like the Netherlands, Belgium, Denmark, Finland, Switzerland Portugal and Germany have an essential share of bachelor students enrolled outside doctoral awarding in-

stitutions. Some countries also have less than 75% of master students enrolled in doctorate awarding institutions (i.e. Switzerland, Germany and Portugal). All these countries have in common that a large share of undergraduate students is enrolled in universities of applied sciences or similar types of institutions (in the Netherlands 62%, Finland 51%, Germany 36%, Switzerland 38% and Portugal 47%). Since universities of applied sciences focus in general on vocational programmes rather than traditional academic ones, the differences in the distribution between the two systems are not surprising. In countries with unitary systems large shares of all bachelor and master students are correspondingly enrolled in universities (over 80% of bachelor and master students for all countries except Poland). The figure below to a large extent corresponds to the mapping exercise done in the beginning of this chapter. However, Slovakia, Latvia, Ireland, Slovenia and Bulgaria can be found in the upper right corner of uni-

versity-dominated countries, which is common for unitary systems. For Slovakia, Slovenia and Bulgaria, this should be expected, since their system is classified as dual, where universities enrol the vast majority of students. Ireland can be found in this group since many of its *institutions of technology* have the right to award doc-

toral degrees. Latvia again is a special case, since many of its other institutions, in most cases academies, have the right to award doctoral degrees. This explains the high shares of bachelor and master students in doctoral awarding HEIs despite the existence of a considerably large non-university sector.

Figure 10. Share of bachelor and master students in doctorate awarding HEIs by national HE systems*



Source: ETER (2019).

* The French system is very differentiated and not fully covered in ETER.

5. Conclusions

This report analysed the European higher education sector with respect to different higher education systems. The focus of the report was to examine patterns of diversity and differentiation between unitary higher education systems (i.e. unified and university-dominated systems) and dual respectively binary systems. The ETER database for the first time enables a large-scale analysis on national HE systems in Europe by using micro-data on the level of higher education institutions. This goes beyond former studies, which often focused on a small group of countries due to limitations in the availability of detailed statistics.

The ETER data have been used to map national higher education systems by extending and updating the work of Kyvik (2004), who noted that *"a precise comparison of countries is difficult to achieve, as reliable international statistics are a scarce commodity"*. This activity showed the large heterogeneity with national HE systems in Europe. Even though systems might have similarities, e.g. the existence of an UAS sector, the role of institutions within countries can vary strongly. For example, Slovakia, Ireland, Latvia, Bulgaria and Slovenia have all implemented the system of universities of applied sciences. Nonetheless, at least more than 95% of bachelor and also master students in the country are enrolled in doctorate awarding higher education institutions, which is a common behaviour in unitary systems. The reasons for this seemingly odd classification are country specific. Slovakia, Slovenia and Bulgaria should be expected in this group, since they have dual systems and universities enrol the vast majority of students. In Ireland, *institutions of technology* have the right to award doctoral degrees, which is also true for institutions classified as other in Latvia (in most cases academies). This explains the high shares of bachelor and master students in doctoral awarding HEIs.

Besides an extension of the mapping of higher education systems, the ETER data also allow a detailed look at the historical development of higher education institutions. While this type of consideration was limited to a certain group of countries in former studies (mostly Western and Northern European countries), this report also sheds light on the development in Southern and Eastern European countries, which differs significantly from other regions.

The data also showed that universities of applied sciences play a minor role in Eastern European and Southern European countries. In Eastern Europe, the type of UAS is nearly not existent (3.14% of all HEIs). In Southern Europe on the contrary, 17.4% of all institutions are universities of applied sciences, but they only enrol 4.7% of all bachelor students and 2.7% of all master students in these countries. In Western Europe, the distinction of the UAS sector matches closely the expectations from the literature. 52.5% of all bachelor students in Western European countries are enrolled in universities of applied sciences, which are expected to deliver vocational education, especially on the bachelor level.

The ETER data have also been used in order to examine diversity and differentiation between different types of institutions. While nearly all universities in the ETER countries perform research, this is only true for universities of applied sciences in Western European countries. UAS in other regions are less research active, especially in Southern (about 35% of all universities of applied sciences in these countries also perform research) and Eastern European countries (nearly 50%). Universities in Western and Northern European countries differentiate themselves stronger from UAS than in other European regions. This is visible for example in the students/staff-ratio, which is around 20 for UAS and 9.3 for universities in Western European countries and around 20 for UAS and 12.5 in Northern European countries. Differentiation has been observed in this report also with respect to the degree of specialization. Universities are in many cases generalist institutions, while universities of applied sciences and other institutions are often specialized. Main subjects in specialized institutions differ not only strongly between types of institutions, but also between countries, as is shown in the preceding chapter. Exceptions are the subjects Arts and Humanities, which are popular main subjects over all Europe. Specialized other institutions in Eastern European countries also often have a focus on Business and Law as well as Services. On the contrary, Engineering and Education are popular main subjects in specialized institutions in Western European countries.

The present report is only a first step in the analysis on the heterogeneity of national higher education systems. It was shown that ETER can be a valuable contribution in this task. Further

analysis in this direction could use ETER as basis for characterization and systemization of higher education and go beyond it by using additional sources. Possible research topics could be a further elaboration of the changing nature of higher education (e.g. through the Bologna reform, the distribution of research activities or also the convergence of institutional missions) or a detailed analysis of different structural context in European countries, taking into account the structure of (especially vocational) secondary education.

6. References

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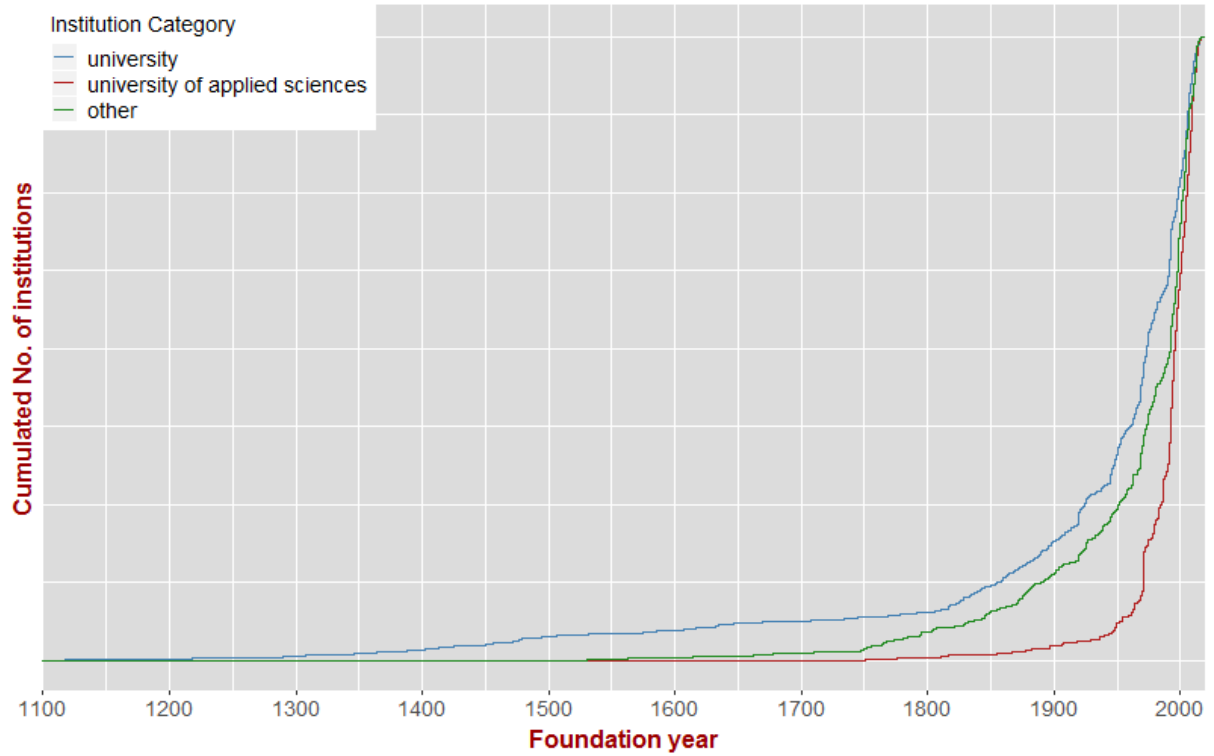
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7. Annex

Figure 11. Historical development of higher education institutions by institution category



Source: ETER (2019).

Table 4. Shares of HEIs and Students (ISCED 5-8) by categories in countries including UAS

Country	Universities		Universities of applied sciences		Other institutions		Total	Country characteristics
	HEIs	Stud.	HEIs	Stud.	HEIs	Stud.	No.	
Austria	49.3%	79.8%	30.4%	14.2%	20.3%	6.0%	69	higher education, measured in students, takes place to a large share in the university sector; many vocational programmes at the tertiary level not included in higher education
Belgium (Flanders part)	19.4%	51.2%	54.8%	48.8%	24.2%	0.0%	62	higher education is shared equally between few universities and many UAS; vocational education at intermediary level between secondary and bachelor offered outside the higher education sector
Bulgaria	84.6%	97.2%	13.5%	2.5%	1.9%	0.3%	52	nearly complete higher education in universities; UAS sector consists of independent colleges
Switzerland	34.3%	60.3%	22.9%	33.8%	42.9%	5.9%	35	universities enrol large share of all students, but also one third of students in UAS; higher vocational education and technical schools outside the higher education sector
Cyprus	30.8%	81.4%	57.7%	18.4%	11.5%	0.2%	26	higher education, measured in students, takes place to a large share in the university sector
Germany	25.8%	61.9%	50.9%	34.6%	22.5%	3.4%	395	universities enrol large share of all students, but also about one third of students in UAS; vocational academies, which deliver ISCED 5 and 6 as well as other advanced vocational programmes (master craftsmen, trade and technical schools etc.) are not covered by higher education sector
Denmark	30.3%	60.0%	66.7%	39.9%	3.0%	0.1%	33	universities enrol large share of all students, but also 40% of students in UAS
Estonia	31.8%	79.0%	68.2%	21.0%	0.0%	0.0%	22	higher education, measured in students, takes place to a large share in the university sector; UAS consists of specialized colleges and academies
Finland	36.6%	52.4%	63.4%	47.6%	0.0%	0.0%	41	higher education is shared equally between few universities and many UAS; UAS sector consists of polytechnics
Greece	46.8%	68.8%	29.8%	30.2%	23.4%	1.0%	47	universities enrol large share of all students, but also nearly one third of students in UAS
Croatia	27.0%	82.9%	70.3%	16.8%	2.7%	0.3%	37	higher education, measured in students, takes place to a large share in the university sector; UAS sector consists of polytechnics, which deliver professional education
Ireland	28.0%	55.5%	56.0%	40.0%	16.0%	4.5%	25	universities enrol large share of all students, but also 40% of students in UAS
Lithuania	46.5%	72.6%	53.5%	27.4%	0.0%	0.0%	43	number of HEIs in university and UAS sector similar, but most students enrolled in universities; UAS sector consists of colleges which deliver professional bachelor degrees
Latvia	13.6%	54.5%	38.6%	11.3%	47.7%	34.2%	44	large sector of other institutions, including academies and private, specialized higher education institutions
Netherlands	33.9%	38.7%	66.1%	61.3%	0.0%	0.0%	56	low share of higher education concentrated in universities compared to other countries; large share of education concentrated in UAS sector, which delivers professional higher education
Norway	21.6%	53.7%	48.6%	40.3%	29.7%	6.0%	37	universities enrol large share of all students, but also 40% of students in UAS; vocational schools delivering higher vocational diploma are not included (between secondary and tertiary education)

Country	Universities		Universities of applied sciences		Other institutions		Total	Country characteristics
	HEIs	Stud.	HEIs	Stud.	HEIs	Stud.	No.	
Portugal	38.5%	53.8%	57.3%	45.9%	4.2%	0.3%	96	higher education is shared equally between universities and UAS; UAS are polytechnics
Slovenia	9.6%	87.2%	90.4%	12.8%	0.0%	0.0%	52	few universities enrol 87% of students, many UAS enrol only 13%; short-cycle vocational higher education in higher vocational colleges
Slovakia	56.3%	93.2%	25.0%	5.2%	18.8%	1.7%	32	higher education, measured in students, takes mostly place in the university sector; higher professional education provided by upper secondary vocational schools outside the higher education sector

Source: ETER (2019).

Table 5. Shares of HEIs and Students (ISCED 5-8) by categories in countries without UAS

Country	Universities		Other institutions		Total	Country characteristics
	HEIs	Stud.	HEIs	Stud.		
Albania	53.7%	95.8%	46.3%	4.2%	41	higher education heavily concentrated on the university sector, half of all institutions (universities) enrol nearly all students
Czech Republic	41.8%	90.5%	56.7%	8.3%	67	higher education heavily concentrated on the university sector, 42% of all institutions (universities) enrol about 90% nearly all students; higher technical schools and Conservatoire are not covered
Spain	100.0%	100.0%	0.0%	0.0%	82	higher education takes place only in universities; vocational education can be studied in the secondary schools, in national reference centers and integrated vocational training centers and is not included in higher education
France*	19.6%	80.1%	63.4%	19.9%	377	data incomplete: institution category for 64 HEIs is missing, students data are from 2014/2015 where business schools were not included (they are already included in the institution shares); Higher professional schools, incl Arts and culture related schools as well as professional tertiary education for civil servants and teachers in private schools not included in ETER
Hungary	47.2%	80.4%	52.8%	19.6%	53	higher education, measured in students, takes place to a large share in the university sector; secondary schools which deliver ISCED 5 programmes are not included
Iceland*	100.0%	100.0%	0.0%	0.0%	7	higher education takes place only in universities
Italy	44.9%	96.5%	55.1%	3.5%	216	nearly complete higher education in universities, although 55% of institutions are outside the university sector(academies of fine arts or music conservatories); higher level technical education is not covered in the higher education sector
Liechtenstein	100.0%	100.0%	0.0%	0.0%	1	higher education takes place only in universities
Luxembourg	100.0%	100.0%	0.0%	0.0%	2	higher education takes place only in universities; 20 secondary schools (lyceum) offer tertiary education professional diplomas (ISCED 5), but are excluded from higher education sector
Montenegro	30.0%	NA	70.0%	NA	10	30% of institutions universities, no students data known
North Macedonia	81.3%	98.1%	0.0%	0.0%	16	higher education takes place (nearly) only in universities; higher vocational schools are not included in ETER
Malta	50.0%	82.7%	50.0%	17.3%	2	higher education takes place mostly in the University of Malta
Poland	40.5%	78.4%	59.5%	21.6%	274	higher education, measured in students, takes place to a large share in the university sector; secondary schools which deliver ISCED 5 programmes are not included
Romania	90.4%	NA	0.0%	NA	94	data incomplete, all institutions with assigned institution type are universities
Serbia	34.8%	86.4%	0.0%	0.0%	46	higher education, measured in students, takes place to a large share in the university sector; 30 colleges of applied sciences / colleges of academic studies are not assigned an institution category
Sweden	78.4%	96.5%	21.6%	3.5%	37	nearly complete higher education in universities, although 22% of institutions are classified as other institutions
Turkey	95.0%	99.7%	5.0%	0.3%	181	nearly complete higher education takes place in universities
UK	49.2%	94.3%	50.8%	5.7%	260	nearly complete higher education in universities, although half of institutions are outside the university sector (mostly colleges)

Source: ETER (2019).

* For France and Iceland, student data are from the academic year 2014/2015, while the distribution of HEIs comes from the year 2016/2017. This distorts the result for France, since in the year 2016/2017 business schools were added to the perimeter, but their student numbers have not been included yet.

The opinion expressed in this brief reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



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