Higher education regimes: an empirical classification of higher education systems and its relationship with student accessibility

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Abstract This article proposes a multidimensional empirical classification of higher education systems on the basis of several institutional characteristics, which are likely to affect student participation and social inequality (tracking, expenditures, structural differentiation, institutional autonomy and accountability, affordability for students, graduates' occupational returns). We develop a theoretical framework in which higher education systems are related to four main institutional domains: school system, State, labour market, students and their families. In the second part, an empirical analysis of the institutional profiles of higher education systems of 16 Oecd countries is performed. An empirical classification of higher education systems is elaborated applying hierarchical cluster analysis and multidimensional scaling on macro-indicators. The analyses identify four clusters, that have been labelled the Continental, Nordic, Anglo-Saxon and North-American regime. Fuzzy cluster analysis is used to assess the robustness of the results and to identify systems with an hybrid institutional configuration, which are difficult to classify. At the end, a detailed description of the four higher education regimes is provided and the relationship with student access is analysed.

1 Introduction

The impressive growth of participation rates at upper education levels contributed to a relevant shift in societies' expectations about the functions of higher education systems of most industrialized countries. At present higher education in the public discourse is considered both an important source of innovation and economic development and a way to enhance social cohesion. Among several issues, the 'international policy agenda' is focused on the

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expansion of access, in order to develop human capital of the nations, and on the increase in participation of students with a disadvantaged background, in order to reduce social inequality. Higher education systems face these goals with different institutional structures and policy instruments. Comparative analyses show that there is great variation in the institutional arrangements of tertiary education. In particular, differences can be recognized in the diversification and selectivity of institutions, level of privatization, course structure, public investment, financing instruments, type and extent of public support to students (Eurydice 2007; Teichler 2007). Several attempts have been done to classify tertiary education systems according to specific criteria, for example, the relationship between universities and the government, the basic course structure or the student support system. Nevertheless, less effort has been devoted to systematize knowledge in this field, trying to elaborate a multidimensional classification of higher education systems. Hence, the main objectives of the present work are as follows: (1) to identify the main dimensions and indicators which define the institutional profiles of higher education systems; (2) to classify higher education systems in a small number of groups with a relatively similar institutional configuration; (3) to relate this typology of higher education systems with participation and social inequality in student access.

The focus of this work is exclusively on those institutional characteristics which, according to the literature, are likely to affect students' results and social inequality in access and degree completion. Therefore, variables related to expenditure in research and development, innovation or internationalization are deliberately not included.

2 Theoretical framework

Previous studies in this field of inquiry elaborated theoretical typologies and identified a number of higher education ideal-types looking at specific institutional characteristics. For instance, Clarke's (1983) coordination triangle classified countries on the basis of the role of several actors in the dynamics of university control, while Neave (2002) relies on the relationships between universities and external partners to develop higher education ideal-types. Meek et al. (1996) instead looked at structural characteristics, classifying higher education systems on the basis of their degree of institutional differentiation, whereas Daniel et al. (1999) developed a typology of higher education systems based on the way the student and her role are conceived in relation with the educational welfare system.

The plan of this work is to expand this literature elaborating a multi-dimensional clusterization of higher education systems, which takes into consideration several features that define their institutional profiles and are likely to affect student participation and social inequality. In order to do so, we conceive higher education as embedded in a complex institutional environment, where it develops relationships with four main institutional domains: school system, State, labour market, students (and their families). We now briefly outline the main links between tertiary education and each domain, discussing their potential effects on student access to higher learning opportunities.

First of all, schools contribute to the instruction and previous selection of pupils, whose motivations, aspirations and level of skills partially depend on the way in which secondary education is organized and structured. In particular, tracking of secondary education can have a prominent role in this respect. Tracking refers to the assignment of pupils to different school types or curricula, characterized by different learning contexts that can be hierarchically ordered by students' performance (Woessmann 2009). The level of tracking is high when the age of first selection occurs earlier, the proportion of students in vocational courses is high, transfers from one track to another are difficult, and when the type of education

attended strongly affects the probability of transition to tertiary level (Allmendinger 1989). Existing empirical evidence indicates that systems with a strong tracking in secondary education have a higher level of inequality in student performance in standardized tests and a lower participation rate in tertiary education, because students who attained a vocational qualification are more likely to directly enter into the labour market (Hanushek and Woessmann 2006; Brunello and Checchi 2007).

The second relevant actor for the functioning of higher education system is the State, which in most of the countries has the responsibility of setting the overall legal framework in which institutions operate and the degree of centralization and standardization. These traits, in turn, shape the degree of institutions' autonomy in several areas, but—especially relevant for this work— in the definition of admission criteria for students and educational offer autonomous institutions can use their own entry tests to select students, establish closed numbers in special programmes and set course contents, in order to adapt their educational supply to the student demand. It is not completely clear whether and to what extent these aspects affect students participation in tertiary education, but some findings seem to suggest that countries with a greater institutional autonomy have also higher access and graduation rates (Boarini and Oliveira 2008; Triventi 2012).

Another important institutional feature for student access and outcomes is the differentiation of educational offer. With the aim of facing challenges posed by the increased diversity of students and the demand from the labour market, many countries have differentiated their higher education system, creating non-university sectors, short and vocational programmes, or increased the number of private institutions (Teichler 1988; Teixeira 2004). Existing works suggest that at the macro level the degree of privatization is associated with larger participation rates in higher education, because private institutions compete to attract students, and this in turn could boost enrolment of high school leavers who otherwise would directly enter in the labour market (Shavit et al. 2007). Moreover, it has been suggested that highly stratified systems, with their provision of vocational and short programmes, enhance participation of those students who would not enrol in a traditional university system (Dougherty 1994). Nevertheless, a differentiated system could also contribute to the reproduction of inequalities if lower class students are channelled into the least prestigious and remunerative courses (Brint and Karabel 1989).

In several countries the State is also the major responsible for financing universities and other institutions. The overall level of investment in higher education depends on the national economic development and fiscal constraints (Johnstone 2006), but also from the government's priorities of expenditure among different social policy sectors and educational levels (Heidenheimer 1981; Pechar and Andres 2011). Furthermore, in several countries a relevant part of the resources that finance institutions' activities of research and teaching come from two external actors: (1) firms and private investors, who can make donations or invest in specific research projects; (2) students and their families, who pay for tuition and mandatory fees. Looking at the family and students side, these costs are important in determining the overall level of financial affordability of higher education studies. Following Usher and Cervenan (2005), affordability can be defined as the out-of-pocket costs of attending a higher education course; this is the difference between education and living costs, from one side, and the amount of grants, loans and tax assistance, on the other side. Grants and scholarships are often provided by the State, but can also be supplied by regional or local institutions, non-government foundations, or private firms. Empirical studies indicate that at the macro level the overall demand of higher education is not strictly linked to the level of economic affordability, but this is indeed related with the degree of social inequality in access to higher education (Usher and Cervenan 2005). Direct costs of higher education could represent a

barrier to the enrolment of students from low income families, especially if these expenses are not counterbalanced by an effective system of public financial support. Furthermore, according to the rational choice theory, students' demand of higher education will not only depend on educational costs, but also on the future benefits of graduation, like employability, wage and career prospects. This means that, all else being equal, upper secondary school leavers should be more likely to enter and to complete tertiary education if higher degrees convey sensible advantages in the labour market, compared to lower degrees. This hypothesis is corroborated by a comparative study of Boarini and Oliveira (2008) on 19 Oecd countries, which shows that larger private returns to tertiary education are related to higher participation rates, especially if combined with an extensive system of student support.

3 Hypotheses

According to previous works in sociology and political science, the heterogeneity of the institutional features of education systems is connected to more general institutional, socio-economic and political differences among developed countries (Heidenheimer 1981; Hokenmaier 1998; Hega and Hokenmaier 2002; Pechar and Andres 2011). This occurs for at least two reasons: (1) the institutional profiles of educational systems are the product of historical processes, cultural characteristics and ideological perspectives that are not confined into the educational domain and within the national boundaries, but regard the society as a whole and could be shared by different countries; (2) education policy is one component of a nation's total public policy package and it is not independent from the other sectors of public expenditure.

Within this framework, Hega and Hokenmaier (2002) find evidence of a 'trade-off' between educational policies and social programmes: certain types of welfare regimes exhibit a tendency to choose between educational opportunities or social insurance programmes as alternative policy strategies. Pechar and Andres (2011) show that higher education systems have to deal with different goals at the same time and the way they respond to these challenges largely depends on the welfare regimes and the political traditions within which they are embedded and upon which they rely. At the empirical level, these authors used ranking of countries on several indicators to explore similarities and differences in the higher education policies of a number of developed countries. They found that higher education policies resemble the main characteristics of the three welfare regimes identified by Esping-Andersen (1990), the socialdemocratic, conservative and liberal regime.

This finding seems coherent with some results found by the works that elaborated specific typologies of higher education systems. According to these typologies, there is a clear difference between European and Anglo-Saxon systems on several institutional characteristics, like the degree of centralization of higher education and the relationship between universities and external actors, the degree of institutional differentiation and privatization, and the costs of attendance of university programmes. Moreover, it has been shown that, looking at specific features, it is possible to recognize a further differentiation within Europe, between Nordic and Continental countries: for example, the former are characterized by a lower level of tracking in secondary education (Brunello and Checchi 2007) and a more comprehensive student support system (Daniel et al. 1999). Thus, following these considerations, we expect to find a clusterization of higher education systems in three main groups: Continental Europe, Northern Europe and Anglo-Saxon countries. In analogy with the welfare systems literature, we propose to call these groups 'higher education regimes'.

The second part of the analysis is devoted to assess whether higher education regimes differ in their level of student participation and social inequality. It is possible to formulate some hypotheses looking at the prevailing conceptions of social justice and their related policy instruments across welfare regimes. According to Esping-Andersen (1990), the main aim of the institutional settings and policies of the conservative regime is to preserve the established social hierarchies with a relatively strong State intervention. Moreover, in these countries social welfare policies trying to ensure 'equality of condition' prevailed over educational policies oriented to promote 'equality of educational opportunities' (Castles 1989). For this reason, we expect the lowest participation rates and the highest level of social inequality in student access to tertiary education in this regime. On the contrary, in the liberal regime the State provides a residual function, the market has a strong role both in the production of welfare and education, and there is a strong ethic based on self-realization through individual ability and effort. Although liberal countries exhibit more inequality in status and earnings distributions, a strong emphasis is placed on education as a way to promote individual chances of social mobility. Thus we expect that higher education systems in the liberal countries are characterized by an overall high level of student access and completion and a medium level of inequality. At the end, the social-democratic regime is characterized by the promotion of equality and universalism, trying to guarantee acceptable living standards to all citizens independently from their participation in the labour market, but without discouraging individuals' private socio-economic achievement. Thus we expect for this regime both high levels of student participation and a relatively low degree of social inequality in student access to higher learning opportunities.

4 Research design and data

The main aim of the empirical analysis is to provide an empirical clusterization of higher education systems, taking into account several characteristics that constitute their institutional profile. Compared to existing works we consider in the analysis more countries, we include additional indicators previously overlooked (institutional autonomy and accountability, occupational returns to tertiary degrees), we use several multivariate techniques in order to assess the robustness of the findings, and we relate our empirical groups with several outcomes of higher education systems which can be affected by their institutional features, such as student access and social inequality. The analysis is based on macro data collected by international organizations in order to monitor the functioning and changes of higher education systems across the world. Sixteen countries have been included in the analysis: Australia (AU), Austria (AT), Belgium (BE), Canada (CA), Finland (FI), France (FR), Germany (DE), Ireland (IE), Italy (IT), Japan (JP), Netherlands (NL), Norway (NO), New Zealand (NZ), Sweden (SE), United Kingdom (UK), United States (US). The choice of these systems followed a twofold criterion. The first one is pragmatic: since we use a considerable number of indicators to capture higher education institutional profiles, only countries with no or a limited number of missing values have been selected.[1] Secondly, our choice is also justifiable from a theoretical point of view: this set of cases guarantees the coverage of different institutional contexts, but it includes countries sharing the basic principles of socio-economic and political organization, and this helps to avoid the presence of outliers.

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[1] Variables that measure institutional characteristics present no missing values, while some missing values are present in two outcomes indicators: the educational equity index and the expected years in tertiary education. See Appendix table with descriptive statistics according to country.

The main data sources are: Oecd (2006), Brunello and Checchi (2007), Oliveira Martins et al. (2007), Usher and Cervenan (2005) and the OECD Online Database on Education data (www.oecd.stat), which have been supplemented by additional publications to gather data to fill missing values on specific combinations of indicators and countries (Robinson 2006; Usher and Medow 2010). Most indicators refer to a period between 2000 and 2006.[2] Nineteen indicators of institutional characteristics are included in the analysis; they have been chosen on the basis of the theoretical discussion in the third section about the relationships between higher education and the four institutional domains. The variables belong to the following conceptual dimensions: tracking in secondary education, expenditures in tertiary education, institutional autonomy and accountability, structural differentiation, affordability of tertiary education studies, occupational returns of higher education degrees. Since the small number of cases does not allow to perform formal procedures of data reduction as factor analysis or principal components (Nardo et al. 2005), the attribution of variables to the different institutional dimensions is made on theoretical grounds alone and it does not affect the results. We also consider several tertiary education systems' outcomes, which measure student participation, graduation rates, and social inequality in participation. Tables 1 and 2 report the name, description and the source of each variable employed in the analysis. The distribution of all indicators according to country is provided in the Appendix.

5 Methods

In the first part crisp cluster analysis (CCA) is used to group higher education systems into homogeneous clusters on the basis of their similarity on the indicators representing the institutional characteristics under scrutiny. After considering the pros and cons of different options,[3] the widely used sequential agglomerative hierarchical non-overlapping method has been chosen (Sneath and Sokal 1973). This procedure begins considering each observation as a separate group (N groups each of size 1); then the closest two groups are combined (N−1 groups, one of size 2 and the others of size 1), and this process continues until all observations are clustered in the same group. It is called hierarchical because does not produce a unique solution, but a hierarchy of clusters. We applied an agglomerative method with weighted average-linkage clustering, which computes an average of the similarity of the cases under consideration with all observations in the existing cluster and, subsequently, joins the case to that cluster if a given level of similarity is achieved using this average value (Aldenderfer and Blashfield 1984).[4]

Since cluster analysis is not based on a formal statistical model, it is useful to compare its results with those obtained with other techniques. First, a multidimensional scaling analysis (MDS, hereafter) has been performed. This is a dimension-reduction and visualization technique, in which dissimilarities between cases in a high-dimensional space are represented in a low-dimensional space, often constituted by two dimensions. Additional information and a detailed description of this technique can be found in Cox and Cox (2001). To compute the degree of dissimilarity between cases in both CCA and MDS the widely used Euclidean

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[2] Indicators on investments and differentiation refer to the year 2003, those on autonomy and accountability to the year 2005 and indicators of affordability refer to years between 2000 and 2005, with the exception of Norway. Variables on tracking instead refer to the 1990s, because it is likely that those who entered in the higher education system in the 2000s attended secondary school in that period.

[3] For a review see Sneath and Sokal (1973), Aldenderfer and Blashfield (1984), and Everitt et al. (2001).

[4] Weighted-average linkage clustering is similar to average-linkage clustering, except that it gives each group of observations equal weight.

Table 1 Variables of institutional characteristics included in the cluster analysis

Dimension/ variable	Description	Source
Tracking		
TRACK_AGE	Age of first selection	Brunello and Checchi (2007)
TRACK_LS	% of time in primary and secondary school spent in a tracking regime. This variable is constructed as the ratio of $(t - s)$, where t is the age at the end of upper secondary education and s is the age of first selection, to $(t-p)$, where p is the age when primary education starts.	Brunello and Checchi (2007)
TRACK_US	% of students in vocational tracks in upper secondary education	Brunello and Checchi (2007)
Resources		
EXPTERT_EDU	% of expenditure for tertiary education on total expenditure in education	Oecd (2006)
EXPTERT_GDP	% of expenditure for tertiary education on GDP	Oecd (2006)
STUDPROF[a]	Student–teacher ratio	Oecd (2006)
Autonomy and accountability		
SELECTION	Autonomy in the selection of students at entrance	Oliveira Martins et al. (2007)
OUTPUTFLEX	Autonomy in the setting of educational offer	Oliveira Martins et al. (2007)
EVAL	Degree of evaluation of institutions	Oliveira Martins et al. (2007)
FUNDRULE	Degree of output-oriented funding mechanisms	Oliveira Martins et al. (2007)
Differentiation		
NONPUB_STUD	% of students enrolled in non public institutions	www.oecd.stat
PRIV_EXPTOT	% of private resources on the total investment intertiary education	Oecd (2006)
TERTB_ENROL	% of students enrolled in Isced 5B programmes	www.oecd.stat
Affordability[b]		
EDUCOST_GDP	Educational costs as a % of GDP per capita. Educational costs include tuition fees, mandatory ancillary fees as well as the cost of books and study materials.	Usher and Cervenan (2005)
NCATE_GDP	Total costs as a % of GDP per capita. Educational and living costs net of grants as a % of GDP per capita.	Usher and Cervenan (2005)
OOPCATE_GDP	Out-of-pocket costs as a % of GDP per capita. Total costs net of grants, loans, tax allowances as a % of GDP per capita.	Usher and Cervenan (2005)
Occupational returns		
WAGE_REL	Relative wage of Isced 5A graduates compared to Isced 3A graduates (25–64 years old population)	Oecd (2008)

Table 1 continued

Dimension/ variable	Description	Source
	It assumes value equals to 100 when graduates' and high school leavers' outcomes are equal; values greater than 100 indicates an advantage for tertiary graduates.	
EMP_REL	Relative % of employed among Isced 5A graduates compared to Isced 3A graduates (25–64 years old population)	Oecd (2008)
	It assumes value equals to 100 when graduates' and high school leavers' outcomes are equal; values greater than 100 indicates an advantage for tertiary graduates.	
EMP_ABS	% of employed among Isced 5A graduates (25–64 years old population)	Oecd (2008)

[a] The student–teacher ratio for Canada is derived from Robinson (2006)
[b] Data for Norway are derived from Usher and Medow (2010)

Table 2 Outcomes indicators

Variable	Description	Source
GRAD_TOT	% of graduates in total tertiary education	Oecd (2006)
GRAD_A	% of graduates in Isced 5A programmes	Oecd (2006)
EXP_YEARS	Expected years in tertiary education	Oecd (2006)
EEI	Education equity index	Usher and Cervenan (2005), Usher and Medow (2010)
	It is calculated as the ratio between the % of all males 45–65 with higher education degrees and the % of all students whose fathers have higher education degrees, multiplied by 100	

distance between the attributes has been employed.[5] As a second check, the results from the CCA have been compared with those produced by a fuzzy cluster analysis (FCA, hereafter). The CCA has the main advantage to produce a well clear-cut result where each observation belongs to only one group. However, at the same time this could be a limitation, especially when the cases are not so actually distinct each other. In this situation the results of the CCA seem too restrictive because they excessively force the memberships of the observations to be equal to one for one cluster and zero for the others. On the contrary, in FCA each observation is 'spread out' over the various clusters. Each case does no longer belong to only one group, but it has a degree of membership to each cluster identified by the solution, with their sum that equals 100 (if memberships are expressed in percentages). We employed the so-called *c-means* algorithm (Dimitriadou et al. 2006), which uses either a fixed-point for minimizing the objective function specifying:

$$\sum_i \sum_j w_i u_{ij}^m d_{ij}$$

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[5] These analyses have been performed using the commands *cluster* and *mds* in the statistical software Stata 11 (StataCorp 2009).
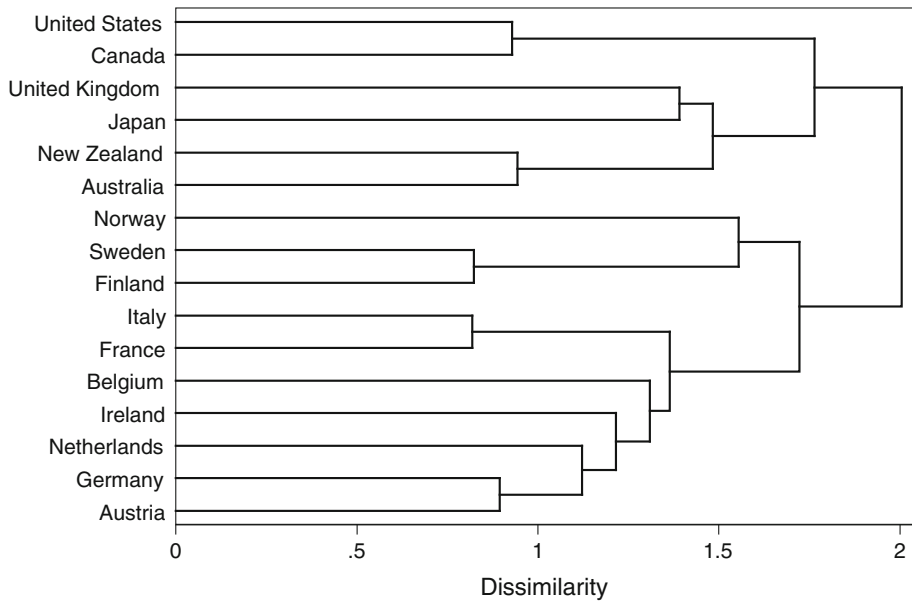
Fig. 1 Dendrogram from the sequential agglomerative hierarchical non-overlapping cluster analysis

where w_i is the weight of observation i, u_{ij} is the membership of observation i in cluster j, and d_{ij} is the distance (dissimilarity) between observation i and center j. The dissimilarities used are the Euclidean distances and the degree of fuzzyfication has been set at $m =1.75$.[6] All analyses have been elaborated on normalized variables, in order to reduce their differences due to different scale measures.

6 Empirical results

6.1 Grouping higher education systems

The first step of the analysis consists in grouping higher education systems on the basis of their institutional profiles using CCA. The results are plotted using a 'dendrogram' (also known as cluster tree), which graphically shows the information concerning which cases are grouped together at various levels of dissimilarity (Fig. 1). This graph is compared with the configuration derived from the MDS (Fig. 2), in order to derive a plausible classification of higher education systems.

The CCA shows that the most similar couples of systems are respectively Sweden and Finland, Italy and France, United States and Canada. Several possible groupings of countries are suggested by the hierarchical cluster analysis. The simplest one identifies two groups: on one side there are European countries and on the other side Anglo-American countries

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[6] The parameter m is defined for real values greater than 1 and the bigger it is the more fuzzy the membership values of the clustered data points are. The user-written routine cmeans within the R environment (version 2.13.2) has been used to perform the fuzzy cluster analysis. We also used the fanny algorithm (Maechler 2008), a generalization of c-means, to check the sensitivity of the results, and the main findings are substantially equivalent.

Fig. 2 Multidimensional scaling configuration. *Note* different *dots* represent the groups identified by the cluster analysis
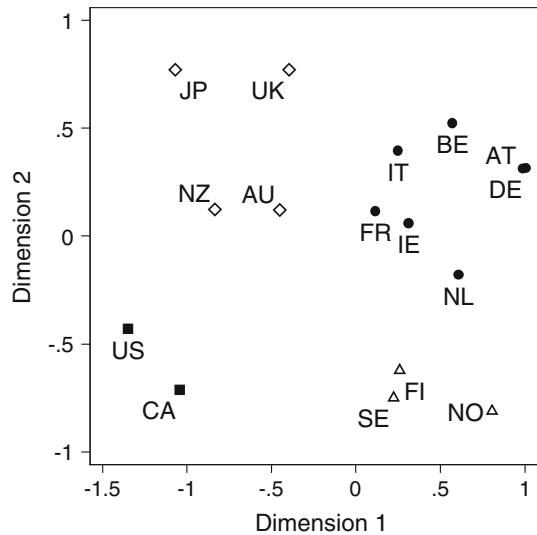
and Japan. The 3-clusters solution is nested in the previous one but does not fully conform to our expectation: instead of finding the distinction between social-democratic, liberal and conservative regimes, we identify European systems as the first group, Anglo-Saxon countries as the second one, while North-American systems form a separate cluster.

Looking both at the CCA dendrogram and the MDS configuration, the most plausible solution appears to be the one formed by four higher education regimes, that we have labelled: 'North American', 'Anglo-Saxon', 'Nordic' and 'Continental'. Looking at Fig. 2, in fact, we find on the right-top side the Continental regime, constituted by France, Belgium, Italy, Austria, Germany, the Netherlands and also Ireland; on the right-bottom side, instead, there are Finland, Sweden and Norway, forming the Nordic regime. The remaining countries are placed in the left side of the graph, but while the Anglo-Saxon countries (United Kingdom, Australia, New Zealand) and Japan are in the top part, Canada and United States are placed in the bottom part, signalling that these two countries have some peculiar traits that make them different from the others.

To assess the goodness of fit of the MDS, two statistics are considered. The first one is the squared eigenvalue of the double-centered distance matrix and can be interpreted as the extent to which the selected dimensions account for dissimilarity between the higher education systems (Mardia et al. 1979). According to this measure the two selected dimensions account for about 84 % of the dissimilarity; this is an acceptable, even if not optimal, result. The second measure is the Kruskal's stress-1, which measures the degree of correspondence between the distances among points implied by the MDS map and the matrix input (Kruskal 1964). This statistics varies between 0 (perfect fit) and 1 (complete lack of fit); our MDS obtains a Kruskal's stress-1 value of 0.16, signalling an acceptable, even if not excellent, fit, in agreement with the previous statistics.

As a third step of the empirical analysis, we are interested in relaxing the assumption of non-overlapping groups at the basis of the CCA. Therefore we perform a FCA, which has the nice property of computing the degree of membership of each observation (higher education system) to each cluster (higher education regime). In order to compare the results from the two types of cluster analysis, it is possible to derive a sort of crisp solution from the FCA attributing each country to the cluster on which it shows the highest membership (Table 3).

Table 3 Fuzzy-cluster analysis: degree of membership to each group (%)

	Continental	Nordic	Anglo-Saxon	North-American
Austria	**86**	9	3	1
Australia	10	14	**65**	11
Belgium	**56**	20	18	6
Canada	2	4	5	**89**
Germany	**69**	17	8	5
Finland	10	**81**	6	4
France	**39**	26	25	10
Ireland	**47**	30	14	8
Italy	**45**	22	24	10
Japan	13	12	**52**	23
Netherlands	**48**	39	9	4
Norway	28	**48**	14	10
New Zealand	6	9	**74**	10
Sweden	10	**76**	9	5
United Kingdom	14	14	**63**	9
United States	2	2	4	**92**

Note for each country numbers in bold represent the highest value of membership

Following this principle, we see that there is a perfect correspondence between the results from these two techniques, because in the FCA each case is attributed to the same regime identified by the CCA. Furthermore, the fuzzy analysis indicates that Austria has the highest membership to the Continental regime (more than 80 %), while France has the lowest value (39 %). The inspection of the degrees of membership, indeed, suggests that the French system is a mixed case with an hybrid institutional configuration. Overall, there is a considerable variation in the institutional features within the Continental regime because countries such as Italy, Ireland and the Netherlands have a degree of membership to this group slightly lower than 50 %. Sweden and Finland have a high level of membership to the Nordic regime (more than 75 %), whereas Norway has a lower value (48 %), in agreement with its location in the MDS configuration. All countries belonging to the Anglo-Saxon regime have a degree of membership that exceeds 60 %, with the exception of Japan. At the end, the North-American regime is rather 'compact', because both United States and Canada have a degree of membership to this group around 90 %.

6.2 Higher education regimes: profiles and outcomes

The second part of the analysis consists in the description of the institutional profiles of higher education regimes, looking at the mean values of the indicators used in the analysis (Table 4).[7] The Continental regime has the highest level of tracking in secondary education, because a large proportion of students is enrolled in the vocational track and the age of first selection is around 12–13 years. The level of financial and human resources invested in tertiary education is relatively low, especially if compared with that of North-American and Nordic systems. European countries have been characterized for long time by a standardized, homogeneous

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[7] The values of the original variables are reported, in order to facilitate the interpretation.

Table 4 The institutional profiles of higher education regimes: mean values of the variables used in the classification

	Continental	Nordic	Anglo-Saxon	North-American
Tracking				
TRACK_AGE	12.3	16.0	16.3	18.0
TRACK_LS	47.8	24.4	14.3	0.0
TRACK_US	62.6	54.1	47.1	0.0
Resources				
EXPTERT_EDU	22.7	26.0	23.5	39.0
EXPTERT_GDP	1.2	1.7	1.4	2.7
STUDPROF	16.2	11.1	14.9	18.0
Autonomy and accountability				
SELECTION	30.6	55.3	63.3	68.0
OUTPUTFLEX	60.4	48.2	84.3	73.0
EVAL	62.9	37.0	69.5	65.5
FUNDRULE	56.1	37.5	60.8	41.5
Differentiation				
NONPUBSTUD	16.1	11.1	49.1	13.1
PRIV_TOTEXP	16.8	6.0	45.2	50.4
TERTB_ENR	20.0	2.4	25.3	23.9
Affordability				
EDUCOST_GDP	5.8	1.8	17.5	19.7
NCATE_GDP	16.0	12.5	41.8	26.1
OOPCATE_GDP	15.5	5.5	30.9	17.2
Occupational returns				
WAGE_REL	155.0	136.3	142.3	157.0
EMP_REL	1.2	1.1	1.1	1.1
EMP_ABS	85.0	88.0	86.5	83.0

and centralized system of governance of education. This is testified by the relatively low level of institutions' autonomy in the selection of students and in the educational provision, which differentiate these systems from the Anglo-American ones. Some reforms have been implemented in recent years in order to increase the accountability of institutions, with the introduction of evaluation procedures and the gradual transformation of funding rules towards an output-oriented model, as showed by the indicators of accountability. Looking at the structural differentiation, the Continental regime has a medium-high degree of stratification: there is a relevant proportion of students enrolled in the lower-tier track (Isced 5B), who often attended the vocational track in secondary schools, and most of the systems have a binary structure (Italy is an exception). The level of privatization, especially in terms of expenditure, is remarkably lower than in Anglo-Saxon systems. Hence, most of the funding still comes from the State and public universities dominate the higher education landscape. The costs of tertiary education as a percentage of the GDP are rather modest (5 %), because in most of the countries there is a low level of tuition fees. However, the out-of-pocket costs are far from negligible, because the system of economic support to students does not cover much of living and educational costs. As suggested by Daniel et al. (1999), in these countries the

public support system assumes that students are financially supported by their parents and, thus, they provide financial help to a minority of beneficiaries. Looking at the occupational returns, in the Continental regime tertiary graduates have remarkable advantages over upper secondary school leavers both in terms of employability and wage.

The Nordic regime has a peculiar institutional profile, that makes it clearly different from the Continental one. First of all, the level of tracking in secondary education is lower: even if the proportion of students in a non-academic track in secondary school exceeds 50%, the age of selection occurs later than in other European countries, around 16-years-old. There is a higher level of investment, both in terms of economic and human resources and the institutions have the autonomy of selecting students with their criteria and tests. Nevertheless, the State partially maintains the control over the educational offer and the institutions are less accountable than in other countries. A distinctive feature of its institutional structure is the very low level of privatization, confirming the prominent role of the State, not only in the welfare provision, but also in educational policies. Nordic countries, in line with their universalistic welfare system, try to guarantee equality of opportunity making the attendance of university courses affordable to all students. The educational costs are negligible because in most of these countries there are no tuition fees and there is an extensive mixed system of public support—constituted by grants, loans and subsidized accommodations. Therefore students are able to cover not only educational costs, but also most of the living costs, and this fosters their independence from their parents. Notwithstanding, the redistributive policies of income promoted by social-democratic parties and the high proportion of graduates in the labour market make the occupational benefits of attaining a tertiary degree lower than in other economies.

The Anglo-Saxon regime is characterized by an intermediate level of tracking in secondary schools and expenditure in tertiary education. Institutions have a great flexibility in the selection of students, autonomy in setting the educational offer, accountability to external actors and an output-oriented funding system. There is also a high level of differentiation and privatization: one quarter of students is enrolled in Isced 5B programmes and around 50% of students attend a private institution. The level of private expenditure in the financing of tertiary education is more than seven times that of Nordic countries and around two times and a half that of the Continental regime. The educational costs of attending tertiary education are rather high and these systems have the lowest level of affordability, because educational costs are not adequately compensated by the public educational welfare system. Even considering loans, grants and tax allowance, the average annual expenditure for attending an higher education course is around 30% of the GDP per capita. Tertiary graduates have better outcomes in the labour market compared to lower-educated individuals, but the advantages in terms of employability and wage are lower than in the Continental and North-American regimes.

At the end, it is interesting to understand the institutional profile of the North-American regime, because from the analyses it emerges as a separate group. This regime is characterized by the lowest level of tracking in secondary education: there are no vocational tracks in secondary school and the first selection of students in different pathways occur at 18-years-old. In the North-American regime there is the highest level of expenditure in tertiary education, universities and colleges have the autonomy of selecting students' on the basis of their own criteria, establishing programmes' content and they are also highly accountable to external actors. Looking at privatization, this regime has a mixed position: it is ranked at the top as far as private expenditures in tertiary education are concerned, while the proportion of enrolments in private institutions is low, only moderately higher than in European countries. This is due to two reasons: first of all, in Canada public institutions are dominant; (2) in

Table 5 Variation of various indicators of student accessibility across higher education regimes: mean values

	% of graduates total tertiary	% of graduates Isced 5A	Expected years in tertiary education	Education equity index
Continental	24.9	15.9	2.7	50.0
Nordic	36.7	22.7	4.0	58.0
Anglo-Saxon	32.8	21.5	3.5	61.5
North-American	43.0	26.5	3.5	60.0

the United States, there is a large number of private colleges, but they usually are smaller than public universities. Another attention-grabbing feature of the North-American system is found looking at the affordability indicators: while educational costs are remarkably larger than in the other regimes, the out-of-pocket costs of education are lower than those of the Anglo-Saxon regime and not much distant from those of the Continental regime. This means that the system of financial support based on grants and increasingly on loans is able to alleviate the immediate students' liquidity constraints, but implies that graduates exit colleges with a not negligible debt they have to repair. The indicators used in this work signal that there is a remarkable average wage premium over high school leavers in these countries. Notwithstanding, from other studies we also know that there is great variability both in the extent of the debt and in the occupational returns among American graduates, depending on the institution, field and programme attended.

Looking at Table 5, we find that higher education regimes have different levels of participation, graduation and equity in student access to tertiary studies. The North-American regime has the highest graduation rates while the Nordic regime has the largest participation, measured by expected years of tertiary education. The Anglo-Saxon countries are in a middle position, whereas the Continental regime has the lowest level of participation and graduation. Looking at the equity index, there is only one major division: from one side, we find the Continental regime with a relatively low level of equity in student access, while on the other side we find the other three regimes, with a remarkably higher degree of equity. This finding will be discussed more in depth in the last section. We anticipate here that the result found for the Anglo-Saxon regime should be taken with caution, because New Zealand and Japan have missing values on the education equity index.

7 Discussion and conclusions

The purpose of this article was to explore the institutional configurations of higher education systems in a comparative perspective. Previous works identified several ideal-types or models looking at specific institutional features, while in this work an empirical classification of higher education systems has been developed on the basis of a multidimensional definition of their institutional profiles. From the studies on the relationship between education, public policies and overall institutional arrangements we expected a clusterization of countries in three main groups: the liberal, social-democratic and conservative regimes. Our findings, derived from several multivariate techniques applied on a larger set of institutional dimensions, corroborate only partially this expectation. In particular, four clusters (an not three) have been identified, which have been labelled the Continental, Nordic, Anglo-Saxon and North-American regimes.

The main divergence with our starting hypothesis is the empirical identification of a specific cluster formed by North-American systems, that are separated from the other Anglo-Saxon countries. While these two regimes have a similar level of institutional autonomy, private expenditure in higher education and students enrolled in short and vocational programmes at the tertiary level, they differ in other aspects like tracking in secondary school, overall level of expenditure in tertiary education, affordability to students and the graduation wage premium. The other clusters approximately resemble our general expectations, because a Continental, Nordic and Anglo-Saxon regime have been identified. Notwithstanding, our countries' grouping does not fully conform to Esping-Andersen's typology, but instead is more similar to that elaborated by Kangas (1994), since Austria, Belgium and the Netherlands are included in the Continental regime and not in the social-democratic one.

In the last part of the paper we have also shown that different regimes are characterized by heterogeneous levels of participation and social inequality in student access. Results partially corroborate our expectations, but with some peculiarities. As expected, in line with its focus on the maintenance of established social hierarchies and the relative rigidity of its organization of education supply, the Continental regime exhibits the lowest level of student participation and the highest level of social inequality in student participation. On the other side, the North-American and Nordic regime are characterized, as expected, by high levels of participation and graduation. However, Nordic countries are characterized by a degree of social inequality that is lower than the one found in Continental Europe, but is not inferior to that of North-American and Anglo-Saxon countries. Therefore, countries in these three regimes—those sharing a high level of participation—seem able to provide access to tertiary education also to part of lower class children. Nevertheless, social inequalities in these systems could be reproduced horizontally within higher education, in the choice of those institutions, courses and fields that lead to better occupational outcomes. In order to test this hypothesis, additional indicators of social inequality in higher education and more detailed analyses on micro-data are needed.

To conclude, this work can be conceived as a first attempt to systematically study institutional profiles of higher education systems, looking at their main structural and organizational characteristics. What is of major interest is that higher education systems can be grouped in relatively homogeneous clusters and these groups seem to reflect broader institutional, cultural and socio-economic similarities between advanced industrial countries. However, several transformations are characterizing higher education systems and it is likely they will affect their institutional arrangements in the future years. In particular, there is a growth in the reliance on cost-sharing for financing higher education, an increase in the level of institutional autonomy, changes in the student support systems with an increasing provision of loans rather than grants, and mixed trends in stratification of educational offer. Therefore, future studies should address these important issues: how do these tendencies change the similarities and differences between higher education systems? Are specific countries moving towards another model of higher education?

Appendix

See Table 6.

Table 6 Descriptive statistics according to country: outcomes and institutional variables

	AT	AU	BE	CA	DE	FI	FR	IE	IT	JP	NL	NO	NZ	SE	UK	US
Outcomes																
GRAD_TOT	20	31	32	47	27	40	24	29	12	45	30	34	26	36	29	39
GRAD_A	11	22	15	23	15	18	13	18	12	25	27	32	19	18	20	30
EXP_YEARS	2.3	3.6	3.0	2.9	2.3	4.5	2.8	2.9	2.9	m	2.7	3.6	4.2	3.8	2.8	4.1
EEI	38	59	37	63	43	61	55	63	47	m	67	58	m	55	64	57
Institutional characteritics																
TRACK_AGE	10	16	12	18	10	16	15	12	14	15	13	16	18	16	16	18
TRACK_LS	68.0	16.7	50.0	0.0	69.2	25.0	25.0	47.8	38.5	25.0	36.0	23.1	0.0	25.0	15.4	0.0
TRACK_US	77.4	64.8	67.6	0.0	76.5	52.2	53.4	20.8	72.4	27.7	70.4	54.2	38.0	56.0	57.9	0.0
EXPTERT_EDU	21	27	21	39	23	29	22	26	21	26	25	23	22	26	19	39
EXPTERT_GDP	1.1	1.5	1.3	2.4	1.1	1.8	1.4	1.2	0.9	1.3	1.3	1.5	1.5	1.8	1.1	2.9
STUDPROF	14.8	15.5	19.4	15.0	12.7	12.4	17.8	13.7	21.6	11.0	13.6	12.0	15.2	9.0	17.8	15.8
SELECTION	28	55	25	75	28	71	28	55	37	66	13	6	65	89	67	61
OUTPUTFLEX	66	73	74	76	30	84	64	66	64	91	59	6	91	55	82	70
EVAL	51	79	54	65	69	40	56	67	68	62	75	6	60	65	77	66
FUNDRULE	55	86	58	47	52	62	66	59	52	39	51	5	63	46	55	36
NONPUBSTUD	15.9	5.0	56.9	0.0	9.8	10.7	18.1	4.7	7.0	79.2	0.0	14.0	12.1	8.6	100.0	26.1
PRIV_TOTEXP	7.3	52.0	13.3	43.6	12.9	3.6	18.7	16.2	27.9	60.3	21.4	3.3	38.5	11.0	29.8	57.2

Table 6 continued

	AT	AU	BE	CA	DE	FI	FR	IE	IT	JP	NL	NO	NZ	SE	UK	US
TERTB_ENR	11.4	17.8	51.5	24.5	15.2	0.2	24.0	35.7	1.1	24.5	1.3	3.4	26.0	3.5	32.7	23.3
EDUCOST_GDP	4.9	13.1	2.9	13.6	7.5	1.0	6.4	4.3	7.9	29.3	6.8	1.3	15.7	3.2	12.0	25.7
NCATE_GDP	15.1	31.4	14.5	22.0	15.3	10.8	18.9	14.8	23.3	49.9	10.0	13.6	45.6	13.2	40.2	30.2
OOPCATE_GDP	15.1	21.9	14.5	17.2	14.2	8.4	18.9	14.8	23.3	43.6	7.8	6.5	33.4	1.6	24.5	17.2
WAGE_REL	157	131	133	138	164	149	149	169	165	164	148	134	115	126	159	176
EMP_REL	1.2	1.1	1.2	1.1	1.4	1.2	1.1	1.2	1.1	1.2	1.1	1.1	1.0	1.1	1.1	1.1
EMP_ABS	87.0	85.0	86.0	83.0	85.0	87.0	81.0	88.0	81.0	86.0	87.0	89.0	86.0	88.0	89.0	83.0

m Missing value

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