

The State of University Policy for Progress in Europe

Technical report

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Foreword by the Empower European Universities board

European higher education could contribute much more to European societies. This feeling, based on ample evidence, was expressed by the signatories of the Manifesto Empower European Universities in June 2010, of which we – all former Ministers for (Higher) Education (and Science) - were part. It has energized us to do something about it and to found the NGO Empower European Universities. The main thrust of this NGO is to raise the stakes for higher education in Europe by publishing an assessment in the form of scores on university policy in European states. The “scoring” has its roots in the degrees and forms of empowerment of universities which are needed to achieve the best possible social and economic goals through university education and research.

The assessment compares Government policies in higher education in order to better serve their people. We hope that it will give rise to discussions in European countries on their university policies, much like “the ease of doing business” on the conditions to conduct business in countries published by the World Bank, see: www.worldbank.org) or the assessment of countries on corruption, published by transparency international <http://www.transparency.org>). Such discussions should lead to either revealing other motives that Governments might have for maintaining existing policies or to changes which might help countries develop their talents better.

We fully realize that the exercise is not “rocket science”. The parameters are sometimes of an ordinal scale. Relations between different parameters seldom or never show the strong interactions which we find in the laws of physics. Yet, in this report we have brought together the best evidence we could to establish the statistical strengths of the relations between on the one hand Government policy and on the other the performance of the economy, through the performance of universities. The data are publicly available.

University education and research have increasingly become the driving forces of progress in countries. We believe that the present report is timely in calling on Governments to recognize this and use universities more to their advantage. It is also meant as a challenge to universities to organize themselves better and claim their place – as competing institutions - under the European states’ suns. Correspondingly, the EU needs to provide a better playing field for the European universities of the member states.

Most of the work was done in Maastricht by the team led by Dr. Cécile Hoareau, supported by the Chair of the Board as well as Emilio Cheung, Sean Claessens, Saul Garcia, Teodora Gereanu, Martina Kopacz, Gabriele Marconi, Eric Nsiah-Boteng, Paulina Pankowska, Katrin Pietschmann and Dorothy Tublu.

Yet, without the active involvement of the corresponding members the report would never have had the same consistency with the awareness in the member countries on university policy and its consequences.

We are most appreciative to Dr. Cécile Hoareau and her team as well as to the Corresponding members for their hard work.

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December 2012, The Board, Jo Ritzen, Chair, Tessa Blackstone, Secretary, Bàlint Magyar, Treasurer, Eduardo Grilo, Member.

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1. Introduction

This technical report presents an assessment of the quality of national higher education policies in Europe. In a *Chance for European Universities* (2010), Ritzen showed that there was plenty of room for European Universities to contribute more to socio-economic development in Member States. In the Manifesto “Empower European Universities” (June 2010, attached as Appendix 1) a group of some 20 top level European thinkers on higher education took this up and expressed their intention to do everything possible to contribute to a Europe with a vibrant university system. Such a system should fully embody the lessons to be learned from a comparison of the impact of university policies in European countries on their socio-economic development. It was also envisioned that Europe should create a level playing field for the kind of competition in higher education and research which brings Europe to the top in learning and research. Subsequently a small number of the signatories established the NGO Empower European Universities (as a Foundation under Dutch law). The main purpose of this NGO is to bi-annually publish a report on the State of University Policy for Progress in the EU. The State of University Policy for Progress in the EU is an assessment of the quality of higher education (that we also refer to as university) policies in European countries viewed through the lens of the contribution of policies set by the national government to university performance (in research and education) and to socio-economic development in the country. The quality of the policy is a function of the contribution of the policy to university performance and to socio-economic development. In our use of the word empowerment, a high policy quality implies “empowered universities”.

Policy includes the combination of all institutional arrangements, means in the form of funding or otherwise and incentives,, with a significant impact on performance, where actors within institutions are enabled to do whatever is necessary to reach the goals set out in their mission and with directions or incentives which are “fit for purpose”. This assessment contains lessons on what works and what could be improved.

This is the first report of what we hope will be a series, in which every subsequent report deals both with changes as they are taking place and through further analysis with a deepening of the understanding of the relations between Government policy and socio-economic outcomes.

The present economic crisis in Europe makes the analysis more relevant than ever. Our analysis shows that there is still substantial room for improvement in Government policy if considered through the lens of socio-economic development. In this respect, our approach fits into the political context in Europe of the first decade of this century. The Lisbon strategy and the Bologna agreement were advanced from the notion of the promotion of socio-economic development through knowledge policies. The current financial and economic crisis moves a knowledge strategy for Europe to center stage: the only viable growth strategy is through innovation for which universities fulfill a major role through the quality and quantity of their graduates and through their research, accompanied by greater equality of access. The limited success (perhaps even outright failure) of the Lisbon strategy should not lead to resignation, but rather to renewed energy, as we see that the European environment needs to be engaged in increasing its competitiveness through knowledge and innovation to emerge from the crisis.

In the US, President Barack Obama laid a similar stress on the role of (higher) education in innovation. In a meeting with the Presidents of the 60 leading universities in the US on December 5th, 2011 he called on the US universities to do better and if possible cheaper. Subsequently he raised the same point in his State of the Union address of January 24th, 2012.

As Table 1.1 shows the US has reason for concern, since its spending per student (in relation to GDP) has already been decreasing substantially (even though the overall spending on higher education of the US

in relation to GDP doubles that of Europe, because the US enrolls many more students, while we shall later show how important funding is

In contrast, Table 1.1 shows that the emerging global competition for Europe as a knowledge continent (here exemplified with Japan, China, Korea and the United Arab Emirates) is quickly upping its knowledge game.

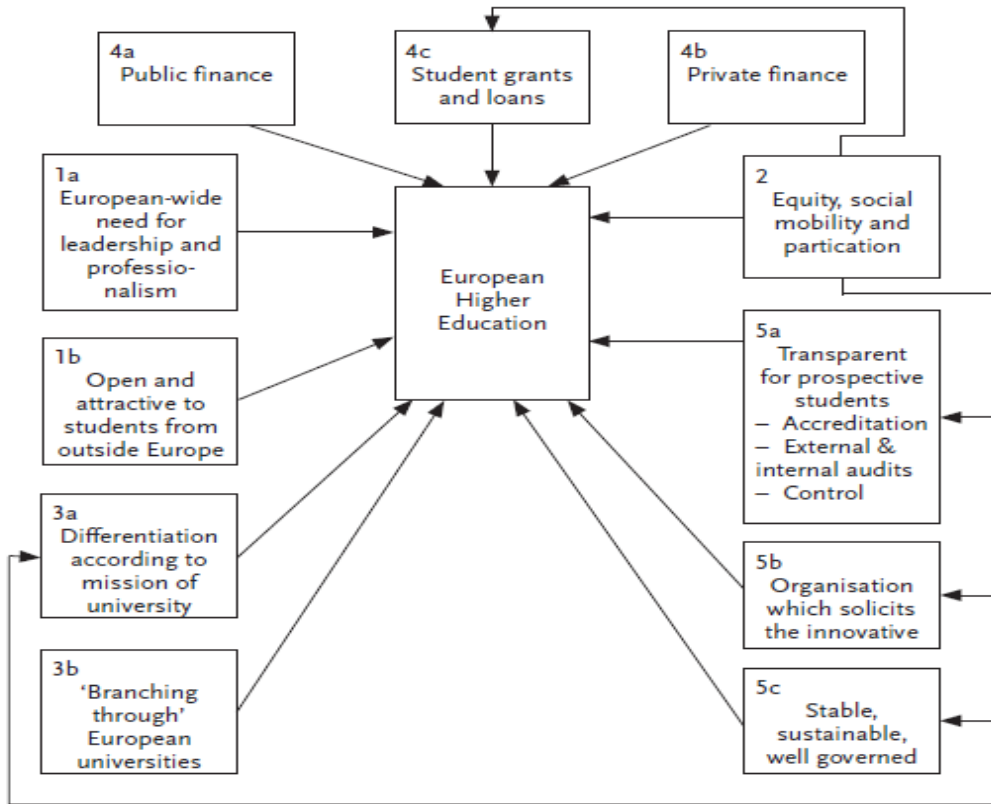
Table 1-1: Evolution of higher education funding per student as a percentage of GDP per capita, international comparisons (2002-2009)

Country Name	Rate of change	
	2009-2010	(2002-2009)
European Union	28.44	0.96
Japan	25.26	45.42
Korea, Rep.	13.05	171.84
United Arab Emirates	19.87	12.45
United States	19.45	-23.07
Note: 2010 value for Japan only		

A growing body of literature shows that higher education is becoming increasingly significant for economic growth as countries are more developed. Higher education research has become the driving forces of economic growth (as will be more at length discussed in Chapter 2). The connection between higher education and economic growth relies on many “connectors”. The most important connector are the values added (through university education) of talents which raise the productivity level of all social and economic activities in which graduates are involved. A second connector is the capacity of universities to produce research, which is relevant in a global society. Both connectors tie in to a broad-ranging debate regarding the quality of education, and the role of universities in innovation. The EU lags behind the US in the creation of the so-called “yollies” (. young leading innovators) (Gill and Raiser, 2012), Europe being particularly strong in the medium technology sector (think of Volkswagen), but weak in the ICT sector (think of Apple). This could be viewed as insufficient attention in Europe for the kinds of qualities of graduates which lead to successful entrepreneurship in these advanced sectors.

This assessment of European university policies, performance and output, is inspired by the framework outlined in Ritzen (2010) and presented in Figure 1.1.

Figure 1-1: Building blocks of a view on European universities.



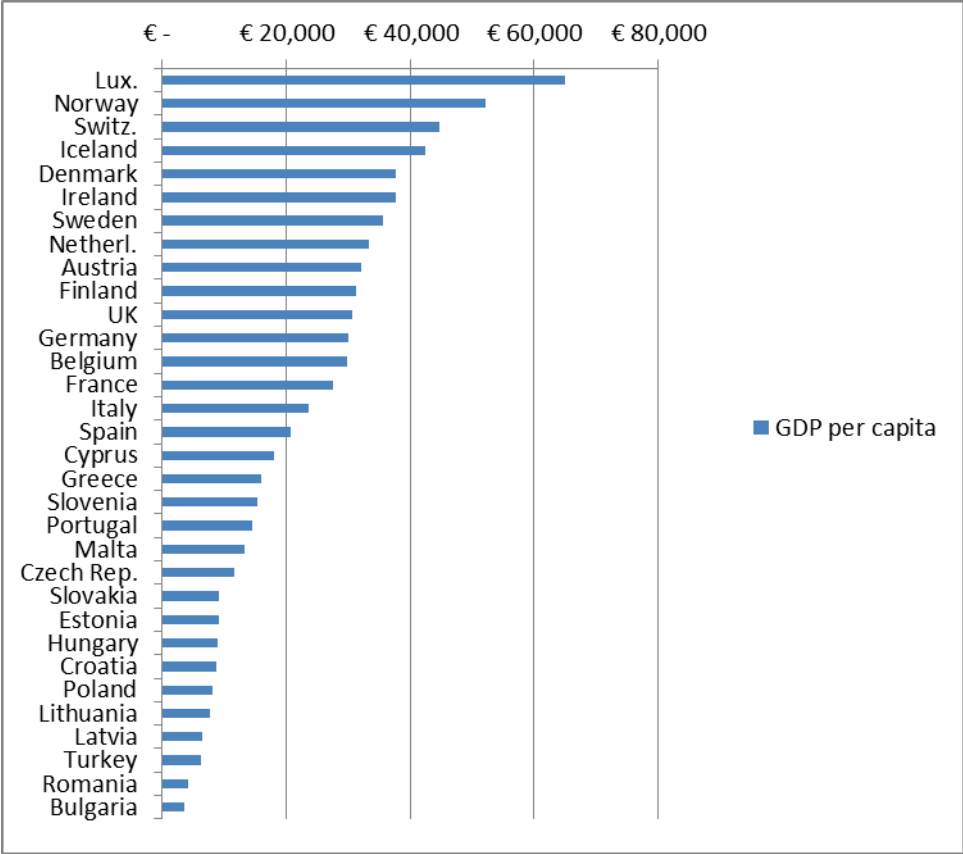
1.1 Assessing university policies.

Most comparable quantitative exercises in the university domain lack an epistemological framework. They assume ex ante weights for the different factors which are used to grade. This applies to the lead tables and rankings of universities, but also to the ranking of university systems (such as Universitas21, 2012). Our assessment has turned the corner and uses an empirical analysis of the relations among higher education policy, performance and output. This is also not a ranking, but an effort to provide an overall assessment of the quality of higher education policy, relying on the extent to which these national policies foster the performance and economic output of institutions, and with an effort to group countries with comparable performance levels.

We covered 32 European countries in this assessment, namely: the EU-27; five neighboring associated countries of the European Research Area, including an acceding EU country – Croatia; two candidate countries for which data is relatively widely accessible, Iceland and Turkey; and also European Economic Area members, Switzerland and Norway. We control for population size in order to compare “small” and “bigger countries”. We grade university policies based on their significance for socio-economic development, measured through “precursors” of economic growth, namely labour productivity and “knowledge” employment. These are considered as proxies of innovation. We have not used the economic growth rate seeing as this is the result of investments made over a (very) long period. The relationships we establish for our assessment call for a cautious interpretation: we do not aim to establish a full framework for economic growth, but only concentrate on the relation between higher education and economic growth. Also we have only considered causality by including ex ante defined time lags.

We compare the policies of these 32 countries, well realizing the substantial differences in GDP per capita between the member states of the EU, as presented in Figure 1.2 below.

Figure 1-2: GDP per capita European countries (real), 2011 in Euros.



Source: Eurostat, 2011

These differences translate in at least two directions into our analysis:
 With the same effort in terms of making GDP available for higher education and research, less economically developed countries will still proportionally have a lower expenditure on higher education and on research, while the “prices” for education (for good professors and good researchers) of “top” or semi-top universities which can attract international students are more or less international. This makes it more difficult for less economically developed countries to catch up in terms of innovation and global competitiveness.
 In contrast, less economically developed countries have an easier time to catch up because of lower wage costs and their consequent advantages.

We consider university policy through the lens of its contribution to the economic growth potential of a country society. We also believe that achieving equity⁵, be it in access or attainment, is an important measure of the impact of higher education on society. We have compared various indicators of equity, including Jan Koucky's inequality index (2010) or the results of the survey conducted by Eurostudent (2011). Yet it turned out that this indicator had a large number of missing data and/or were based on composite indicators, the use of which we were trying to limit. We will explore the extent the equity of European higher education systems during our upcoming conference in Aarhus on the 31st January/01st of February 2013.

We distinguish three groups of indicators, namely policy, performance, and outcome indicators. The indicators used for the scoring process are presented in Table 1.3. They are a selection out of 94 indicators for which we collected information. The selection criterion was the consistency of the indicator with the explanation of the relationship among higher education policy, performance and socio- economic output. We explore this relationship statistically through the selected indicators as well as in terms of policy trends. The policy trends have been assessed through country reports.

The basis for the selection of the policy indicators was laid at the EEU meetings of November 2011 and June 2012. The selection of indicators is presented in Table 1.2.

⁵ We use the term equity, loosely defined as the degree of fairness, purposefully to avoid the political and normative connotations of the term "equality", which implies a notion of uniformity (Koucky, 2010: 9).

Table 1-2: Description of indicators by dimension.

		Indicator	Year	Source	Missing data
Policy	Autonomy	Organizational Autonomy	2008	CHEPS	Slovenia
		Policy Autonomy	2008	CHEPS	x
		Financial Autonomy	2008	CHEPS	x
	Funding	Expenditure per student relative to GDP per capita (tertiary)	2008	OECD and World Bank	Bulgaria, Cyprus, Denmark, Latvia, Lithuania, Malta, Romania, Croatia, Iceland, Switzerland, Turkey
Expenditure on financial aid as a percentage of total public expenditure on education, at tertiary level of education (ISCED 5-6)		2006 - 2008	Eurostat	Greece, Luxembourg, Malta, Romania	
		Role of formulas and contracts in funding mechanism*	2008	CHEPS	x
Performance	Research productivity and attractiveness	Scientific publications within the 10% most cited scientific publications worldwide as a percentage of total scientific publications per country	2007	European Commission Innovation Union	x

	<p>Number of universities in the top 500 ARWU ranking per million inhabitants</p> <p>Number of incoming Marie Curie fellows per million inhabitants in the host country per year</p> <p>Number of European Research Council Starting grant wins per million inhabitants per year</p> <p>Public-private co-publications per million inhabitants</p>	<p>2011</p> <p>2008-2009</p> <p>2011</p> <p>2008</p>	<p>ARWU</p> <p>European Commission Innovation Union (2011)</p> <p>European Research Council</p> <p>Pro Inno Innovation Union scoreboard</p>	<p>x</p> <p>x</p> <p></p> <p>Turkey</p>
Graduate employment and graduation	<p>Employment rates of 18-34 years old, 3 years or less after leaving formal education (ISCED 5 and 6)</p> <p>Graduates in ISCED 5 and 6 all gender all ages / enrollment</p>	<p>2010</p> <p>2010</p>	<p>Eurostat</p> <p>Eurostat</p>	<p>Croatia</p> <p>France</p>
Size of the student body	<p>Transition: students entering higher education through an alternative route (vocational training, accreditation of prior learning, aptitude/entrance examination, post-secondary non-tertiary) (%)</p> <p>Students (ISCED 5-6) aged 20 - as % of population of corresponding population</p>	<p>2008-2011</p> <p>2010</p>	<p>Eurostudent</p> <p>Eurostat</p>	<p>Belgium, Bulgaria, Cyprus, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Romania, Slovakia, Slovenia, Croatia, Iceland, Turkey</p> <p>x</p>

Econ. output	Innovation	Students from abroad: Inward mobile students as percentage of student population in the host country (%)*	2009	Eurostat	France, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Poland, Turkey
		Employment in Knowledge Intensive Activities as a percentage of total employment	2009	European Commission Innovation Union	x
		GDP per hour worked in PPS€	2009-2010	European Commission Innovation Union	Croatia, Iceland, Turkey.

Note = PPS stands for Purchasing Power Standard, see OECD (2002) for more information

Note2= The indicators marked with an asterisk are the ones we present in our descriptive statistics but did not use during our final assessment because they did not pass the threshold of the factor loadings.

Indicators for policy include the autonomy of universities, funding (measured in terms of expenditure on tertiary education per student, relative to GDP per capita) as well as the incentives provided to institutions, measured by the role of performance indicators, contracts and formulas in funding allocation. To measure the performance of higher education, we used indicators targeted to research outputs as well as teaching and learning outputs/education. Education outputs include a measure for the size of the student body, including the participation rate, the percentage of students having transitioned to university from a non-traditional education background as well as the percentage of inward mobile students. The graduation rate and employment rate three years after graduation provide measures of the quality of education. Research outputs include the ability of universities to deliver top scientific publications, and to be well ranked internationally (this data is used as an indication of international visibility of a higher education system as a whole rather than of a particular university as such). We also believe that successful higher education policies lead to systems which foster and attract talents and are open to collaboration. Hence, we also use the number of incoming Marie Curie fellows per year and million inhabitants, the number of annual ERC wins (starting grants) per million inhabitants as well as the number of public-private co-publications. We have included labour productivity and the percentage of the workforce in knowledge-intensive industry. The data for these indicators were derived from major databases and secondary sources (OECD, Eurostat, the European Commission publications and CHEPS). In the subsequent chapters we justify our choice of indicators further and describe the variables more in detail.

With these indicators we build the following model:

Policy > Performance > Socio-economic development.

The statistical strengths of these relations as observed in the 32 European countries serve as the weights for the assessment of university policy in an individual country.

1.2 Lagged variables and imputed values.

The above model is extremely crude – even though in general well-based on insights from the existing literature (discussed in the following chapter) - and- estimated from linear relations, well realizing that non-linearities are likely. Some correction for time lags has been introduced in the analysis preceding the assessment.

Missing data was imputed for some of our indicators, using proxies from other sources. We explain the imputation process in the chapters corresponding to each indicator.

Our model uses macro data. Hence we do not capture some of the differences within different national systems, such as differences in higher education competencies according to regional or federal subsidiarity principles.

1.3 Outline of this report.

This report is divided into six chapters. After this introduction, Chapter 2 elaborates on the literature which shows that the more empowered universities are, the more they will be able to contribute maximally to socio-economic outcomes with the existing resources (efficiency notion) or even 'optimally' if resources can be extended (Ritzen, 2010: 7).

Chapter 3 then proceeds by looking at the degree of empowerment in the member countries of the EU, showing differences, especially between Western and Northern states, Southern and Eastern European ones. These differences partly reflect structural differences. For example, marked differences exist in terms of governance between the UK and the continent, while on the continent the universities of Western Europe differ from those in Central and Eastern Europe where the USSR domination until 1992 has forced countries to make a new start. Continental universities by and large have followed the model of a university developed by von Humboldt, while UK universities and some Irish ones were modeled to some extent after the thinking of Cardinal Newman.

Chapter 4 gives an overview of the data we have on the performance of universities, both in terms of the well-known types of indicators (which stress research performance) as well as in other performance standards which relate to education (like graduation and employment measures) and attractiveness-connection.

Chapter 5 gives a rapid overview of the economic outlook of European countries and outlines the different ways in which performance relates to innovation.

Chapters 3 to 5 present descriptive statistics, including values and correlations, backed by the assessments that our correspondents gave in their country profiles.

Chapter 6 presents our scoring method as well as the results. This chapter also presents by country the policy developments as perceived by the correspondents of EEU. The appendix includes some background information.

2. Higher education for socio-economic progress: literature.

This chapter gives a brief overview of the economic literature on the relevance for economic and social progress of both the investments in higher education as well as the institutional setting in which these investments are made, with some digressions into the political economy and sociological literature. It is an expansion of the earlier description in Ritzen (2010: 48-61).

Three strands of economic analysis come together in this overview: institutional economics, (the economics of) education as an investment, and labour economics. The political economy and sociological literature in policy and institutions are also relevant to our investigations.

2.1 The economics of higher education.

The notion according to which education and research were prominent in generating economic growth emerged in the late 1940s and early 1950s. Before that time, economists would say to each other: "it's all in Marshall (1890)" when debating a particular economic topic. Marshall (as Adam Smith, 1776) recognized the value of human capital human capital albeit finding the approach problematic.

Interestingly enough, from the vantage point of our study, Adam Smith did devote a full chapter on the organization of schools: an institutional aspect.

Education and research were not discovered in the late 1940s and 1950s as parameters which determined economic growth from straight forward deduction, but rather by induction: the inability to explain statistically economic growth from the traditional production factors which were capital and labour. It was "in Marshall" to look at economic growth as the result of more workers and more machines or buildings: more of these production factors would yield more production. Yet, the large residuals were a measure of ignorance about the sources of economic growth, as pointed out by Abramovitz(1955) and Schultz and Solow in the 1950s and 1960s. And growth economists like Denison (1985) were at a loss with this model, as they could only explain statistically a limited amount of economic growth in this way and felt ill at ease by just naming the rest "technological advancement" as something which came from outer space. They induced that education and research were the cause for this unexplained variance. There was not much further effort made to measure "education" or research and link these measurements to economic growth, other than by rough measures with little international comparability, like splitting up the labour force (the production factor labour) into "skilled" and "unskilled labour" along the lines of having completed certain education levels. Those were the statistics that were available: labour by level of education completed.

Much research was concentrated on the (changing) structure of production, in particular on the degree to which production factors (unskilled, skilled labour and capital) could be substituted for each other, if their relative prices would change. The interest in this analysis was derived from the practical observation of the increased role of mechanization in production (technology). This created the productivity boom of the 1950s and 1960s with concomitant higher wages. But higher wages also brought employers to mechanize further, as workers had become so much more expensive than machines and buildings. Skilled labour could be less readily substituted for machines, as they were often at the controlling end of the mechanization process or even were the inventors and developers of the new technology.

2.2 Institutional governance.

Institutional and policy research in education has a long tradition, also dating back at least to Adam Smith, who spent one chapter in his seminal work “The Wealth of Nations” on the organization of education from the perspectives of reaching the best outcomes. Since then numerous studies and international comparisons have been written both within and between countries on ways and means to regulate education in order to make it more “productive” for society. But these international comparisons lacked a clear measure of the output of education; hence the power of these studies remained limited and often speculative.

PISA data (available from 2000 onwards) provided, to a certain degree, such clarity for primary and secondary education. It showed that the often assumed trade-off between a “broad base” and “top-talent” did not exist. The countries that performed well on the right hand side of the PISA distribution (which means that they had relatively many 15 year-olds with a high performance) also did well on the left side (relatively few with low performance). Analyses of the PISA data showed the impact of the institutional arrangements (or the organization of the educational system) separately from funding (Schleicher, 2010). Sufficient funding appears to be a necessary condition for good performances of pupils. However, the institutional arrangements can increase the impact of funding on the performance levels of 15 year old pupils across countries. Conversely, this implies that low performance on PISA is due to insufficient funding or inadequate institutional factors (as is the case most notably in the US), where the regulation and organization of the educational system does not allow to obtain the best possible results.

Economists have been well aware of the fact that the organization of production (whether in the profit or the not-for-profit sector) matters, Marshall (1890). Being the first to stress the importance of market organization for economic development, where no limitation is considered (including regulatory ones) on the full utilization of the capacities of staff reduces production. We apply here a similar approach, which captures the institutional constraints of organizations, with the notion of empowerment.

The staff of an organization will have its best impact on production if they feel “empowered” to use their full capacity. The notion of autonomy plays an important role in capturing how such capacity is optimised. Autonomy in responsibility has often been the magic formula for organizations, which are partly funded by the Government. The dilemma lies in the way responsibility is translated into practice, i.e. elaborate inspection, rules and regulations on accountability, or even by imposing constraints on the process (undoing in part the autonomy). We categorise various types of autonomy to capture these dilemmas detailed in chapter 3.

Aghion et al. (2009), along the pathways of Volkwein (1986) and Volkwein and Malink (1997) achieved a breakthrough in the quantitative analysis of governance mechanisms on performance in higher education. They investigated how university governance affected research output using patenting and international research rankings. They found that university autonomy and competition were positively correlated with university outputs across the US and Europe. They also found a positive relationship between positive funding shocks and patent production when public universities are more autonomous and more competitive. It is important to mention that in this case this correlation does not imply causation between governance and performance in higher education.

2.3 Higher education, productivity and technology.

Aghion and Howitt (2006, 2006b) also brought the outputs of education, in particular of higher education, into economic growth theory. Supported by substantial empirical evidence they find that: investments in research-related education were more likely to pay off for areas which specialize in innovation and are close to the world technological frontier. On the other hand, investment in

vocational education would pay off in areas which are below the production frontier. This followed the recognition of the tremendous changes that are taking place on the labour market (Acemoglu, 2002), which go along with:

- The decrease in the half lifetime of a product.
- The decrease in lifetime jobs defined as a regular set of tasks.
- The absence of production without innovative entrepreneurship, and without the active participation of people who understand the complexities of societies.
- The role of well-trained labour in shaping technology and its applications in production.

The substantial increase in the supply of graduates in the period of the transition of elite to mass universities could easily be absorbed on the labour market, because these graduates became the drivers of production, while at the same time "labour saving" investments such as machines became more prominent (Ritzen, 2012). The transition from elite to mass higher education system made a positive contribution to a country's productivity performance (Mason and Finegold, 2002). Moreover, higher education yields important payoffs during periods of economic decline because it is counter-cyclical and contributes to relieving the pressure on the demand for employment on the labour market. Growth would also not be related to the inflow in a certain year of graduates into the work force, but to the total work force of which the inflow forms only a small part. Hence the impact of higher education on growth has to be measured over a longer time span, which falls outside the remit of this study.

The signs that education became prominent on the labour market were visible already in the 1970s. Tinbergen wrote about "the race between technology and education" in 1975. Technology was the race cart which since the industrial revolution has been what economist call: "labour saving", that is allowing for fewer hours of work of unskilled labour in the making of a product, by using the technological advances of production lines or nowadays robots. This technological progress has brought us productivity increases, which led to the possibility of higher wages and higher incomes. But technology is not a kind of black magic race cart that entered the world with its own speed and direction. Its speed and direction are highly determined by the well-trained staff that does fundamental research that brings about innovations, contribute to product development or absorb technological development from elsewhere to bring about new products. The use of technology in production is more than science. It is also social innovation in the organization of firms and production, as well as financial innovation creating value in firms and in countries, brought about by well-trained staff.

When sketching this development as a race between technology and education (as coined by Tinbergen, 1975, later copied by Goldin and Katz, 2008), one realizes that instead of two separate race carts, there is in fact only once race cart with higher education as the engine, with well-trained labour shaping technology and its applications. Acemoglu (2002) was the one who first suggested that the increase supply of graduates (by many in the EU considered as an oversupply) created the new room for technological advancement in the developed world and has been the engine of growth in the past decade. Expert thinking and complex communication are more and more demanded skills in a labour market that has been thoroughly changed by technology (Levy and Murnane, 2005).

The fact that universities could be the main engines of economic growth through the graduates they generate was therefore no longer a loose statement.

In summary, there is ample evidence from the literature that there is a connection between education policy, deciding on the institutional context of education, as well as the funding with the performance of schools that again transpires through learning on socio-economic outcomes.

3. University policy characterized.

In our approach to scoring national university policies, we look at policies as the combination of all institutional arrangements, means and incentives with a significant impact on the performance. In this approach, policies enable actors within institutions to fulfill their mission by being provided with the means to do whatever is necessary to reach the goals set out in the mission, and with directions or incentives to “fit for purpose”. We have broken down “policy” into two separate sets of policy directives: the legislative context which determines the room for maneuver of universities in their own management and funding including the incentives in the funding mechanisms.

3.1 Autonomy.

The concept of autonomy is concerned with the relationships of the university to the Government. This applies to public universities first and foremost. Yet Governments have also imposed general regulations on private universities in Europe, which tend to receive no funding whatsoever from the Government. Autonomy is understood very differently across European countries because of differences in the culture and history. These differences pertain in particular to the “Continental” university, inspired by von Humboldt (and to a degree also by the Napoleonic tradition), the Anglo-Saxon university, with the imprint of Cardinal Newman and the Central and Eastern European university which has recently emerged after the demise of the USSR. For example, in Germany and France, autonomy is traditionally concentrated on the notion of “academic freedom” understood to mean that the professors of the universities (the Senate) choose their own leadership and decide themselves on the design of the degree program and the research content, within location and staffing arrangements and funding decided by the Government, without much control in financing or staffing or physical investments. In the UK in contrast autonomy is the ability of institutions to function independently from the Government (in terms of raising and managing their own funds etc. and in terms of the freedom to choose the content of education and research), while the concept of academic freedom is no longer a matter of the interpretation of the Senate, but for the appointed leadership of the university. There are also differences between countries in terms of the number of places Government will finance in any university. In some countries this is decided by Government, in others this is decided by the number of students who apply and are admitted with exception of the studies which are subject to a numerous fixus imposed by Government.

A shift in the degree of autonomy does not automatically lead to a reduction in Government control. For example, the retreat of a priori command and control system in some continental countries (such as having the Government laying down the national-wide curricula) towards a more posteriori quality control mechanisms (based on an a posteriori evaluation of programmes), may imply a displacement of the relative role of the Government rather than a retreat. Autonomy may also be experienced differently at different levels within the university. Musselin (2004) shows for French institutions that more university autonomy from the Government may well imply that the university leadership decides on a strategy which limits the freedom of academics more than in the situation of more Government control. Van Vught and Neave (1991) describe the changing role of the relationship between universities and the Government as a move away from state control to state supervision.

The Center for Higher Education Policy Studies (CHEPS) distinguishes several dimensions of autonomy: organizational, financial, and policy autonomy. Together they measure the freedom that institutions and their staff have to make their own decisions and manage their own institutions (also reported by Ritzen, 2010). CHEPS et al. (2008) assessed these dimensions of autonomy through a questionnaire sent to and answered by national experts and interviews with relevant stakeholders.

Organizational autonomy measures the extent to which a university is allowed to decide on its own organizational structures, their own internal authority, responsibility and accountability structures, as well as their institutional leadership. In other words, organizational autonomy includes the notion of a supervisory board for the university which appoints the top leadership of the university (the president, board or rector), where the top leadership appoint the deans and the professors.

Policy autonomy includes the ability of universities to create academic communities through the selection of staff and students and to determine their teaching and research programs (it includes “staffing” and “academic autonomy”).

Financial autonomy is related to a university’s ability to attract income from additional funding sources, to be able to decide on the internal allocation of funds, to build reserves and to borrow funds on the capital market. University systems in which Governments allocate funds by line items or where unused funding has to be returned at the end of the year, or where universities cannot borrow money or develop alternative funding sources are considered not to be financially autonomous.

CHEPS et al. (2008) coded the extent to which autonomy has been achieved in these dimensions as low to high, that we coded on an ordinal scale from 1 to 5 (for organizational autonomy) and 1 to 3 policy and financial autonomy, in such a way that higher score mean more autonomy. The scores are for a country as a whole. The scores only reflect a comparative picture at a general national level. It ignores possible further differences within the country and as a result does not capture regional, federal or institutional differences within countries. This indicator also does not capture differences that may exist in levels of autonomy across levels of degrees, for example in the selectivity of undergraduate versus postgraduate degrees. We only had one missing value (for Slovenia) in these autonomy scores. This was imputed according to the technique suggested by the OECD handbook (2010) using the fitted values from a regression with an indicator which does not appear in our dataset (namely interventional autonomy).

Table 3.1 presents the scores for the different dimensions of autonomy.

The values for the autonomy indicators have been acquired by CHEPS et al (2008) through a careful process in which experts in countries have expressed their assessments. They remain however fuzzy as even among experts there is often confusion on how to rate a degree of –for example- organizational or of academic or staffing autonomy. The degree of financial autonomy is probably the most accurately assessed. The fuzziness of the autonomy measures becomes clearly visible when comparing the CHEPS et al assessments with those of the European University Association (EUA). The EUA (2009) asked the rectors conference in different countries to assess autonomy dimensions according to an elaborate list of questions with weights attached to each of the replies. It appears that the correspondence between the EUA scores and the CHEPS et al scores is weak. We have chosen to use the CHEPS et al scores as it contains all countries in our sample while the EUA has only data on a limited number of countries. Another reason for fuzziness is the difference between de jure and de facto autonomy. Both experts at rectors’ conferences responded to the de jure autonomy, while for the impact of autonomy on university performance de facto autonomy counts.

Table 3-1: Organizational, financial and policy autonomy scores.

COUNTRY	Org. aut.	COUNTRY	Org. aut.	COUNTRY	Fin. aut.	COUNTRY	Fin. Aut.	COUNTRY	Pol. Aut.	COUNTRY	Pol. Aut
Austria	3	Croatia	5	Austria	3	Austria	3	Austria	2	Czech Rep.	3
Belgium	3	Germany	4	Belgium	3	Belgium	3	Belgium	2	Estonia	3
Bulgaria	1	Greece	4	Bulgaria	3	Bulgaria	3	Bulgaria	2	Finland	3
Cyprus	1	Italy	4	Cyprus	1	Czech Rep.	3	Cyprus	2	Malta	3
Czech Rep.	1	Norway	4	Czech Rep.	3	Estonia	3	Czech Rep	3	Poland	3
Denmark	2	Austria	3	Denmark	2	Ireland	3	Denmark	2	Sweden	3
Estonia	3	Belgium	3	Estonia	3	Italy	3	Estonia	3	UK	3
Finland	3	Estonia	3	Finland	2	Netherl.	3	Finland	3	Croatia	3
France	2	Finland	3	France	2	Slovenia	3	France	1	Norway	3
Germany	4	Hungary	3	Germany	2	Spain	3	Germany	1	Austria	2
Greece	4	Ireland	3	Greece	1	UK	3	Greece	2	Belgium	2
Hungary	3	Lithuania	3	Hungary	2	Croatia	3	Hungary	1	Bulgaria	2
Ireland	3	Netherl.	3	Ireland	3	Iceland	3	Ireland	2	Cyprus	2
Italy	4	UK	3	Italy	3	Norway	3	Italy	2	Denmark	2
Latvia	2	Slovenia	3	Latvia	2	Denmark	2	Latvia	2	Greece	2
Lithuania	3	Denmark	2	Lithuania	1	Finland	2	Lithuania	2	Ireland	2
Lux.	1	France	2	Lux.	2	France	2	Lux.	2	Italy	2
Malta	1	Latvia	2	Malta	2	Germany	2	Malta	3	Latvia	2
Netherl.	3	Poland	2	Netherl.	3	Hungary	2	Netherl.	2	Lithuania	2
Poland	2	Portugal	2	Poland	2	Latvia	2	Poland	3	Lux.	2
Portugal	2	Spain	2	Portugal	2	Lux.	2	Portugal	2	Portugal	2
Romania	1	Sweden	2	Romania	2	Malta	2	Romania	2	Romania	2
Slovakia	1	Iceland	2	Slovakia	2	Poland	2	Slovakia	2	Slovakia	2
Slovenia	3	Switz.	2	Slovenia	3	Portugal	2	Slovenia	2	Spain	2
Spain	2	Bulgaria	1	Spain	3	Romania	2	Spain	1	Sweden	3
Sweden	2	Cyprus	1	Sweden	2	Slovakia	2	Sweden	3	UK	3
UK	3	Czech Rep.	1	UK	3	Sweden	2	UK	3	Croatia	3
Croatia	5	Lux.	1	Croatia	3	Switz.	2	Croatia	3	Iceland	2
Iceland	2	Malta	1	Iceland	3	Cyprus	1	Iceland	2	Turkey	2
Norway	4	Romania	1	Norway	3	Greece	1	Norway	3	France	1
Switz.	2	Slovakia	1	Switz.	2	Lithuania	1	Switz.	2	Germany	1
Turkey	1	Turkey	1	Turkey	1	Turkey	1	Turkey	2	Hungary	1
										Spain	1
Average	2	Average	2	Average	2	Average	2	Average	2	Average	2

Note: values in red are imputed

This table shows that there is a large variation between levels of autonomy per country. The following comments were made by our correspondents on the autonomy scores and the changes in these scores in the recent past:

Policy changes in several national HE systems have led to more difficulties in ensuring autonomy, including Ireland, Hungary and Cyprus (there is a combination of countries that traditionally have had significant institutional autonomy with others that were far more state interventionist. This means that we may be seeing conflicting trends). In nine countries –Denmark, Estonia, France, Greece, Latvia, Poland, Turkey, Sweden – autonomy increased due to legislative changes. In Italy, policy changes have not been fully translated into practice yet.

Some recent legislation has increased the state control of universities. In Hungary, the issue of a new Higher Education Law in late 2011 has led to decreased organizational, financial and academic

autonomy. Student selection of HE institutions used for instance to be the responsibility of the university and is now centrally controlled. Universities have lost financial autonomy and no longer enjoy the right to freely engage in market interactions and to buy or sell properties. Organizational autonomy has been further restricted by sending state treasury supervisors to universities, strongly controlling and limiting rector's budgeting decisions. State control is now the guiding principle and that autonomy mainly stands for academic freedom in Hungary.

In Lithuania, autonomy has been reduced with the introduction of a new Law on Higher Education and Research (2009). The internally elected Senate is no longer in charge of taking key decisions concerning the university; the external board has reduced the influence of the academic community on decision making. However, in December 2011, the Constitutional Court decided that these changes contradicted the principles of academic autonomy. Amendments to the Law will have to be made by the Parliament.

In Cyprus, a moratorium on staffing across the state-funded sector has been implemented by the Ministry of Finance in 2011 (lifted again in 2012). In response to the economic crisis, all public universities have committed to a ban on staff recruitment for two years (until 2013), a percentage reduction in salaries for both newly-appointed personnel and existing personnel and no wage increase for two years, thus limiting the universities' policy autonomy.

In Ireland, there were no restrictions regarding programme development and academic administration, although the Government has recently tightened financial and human resources through the Employment Control Framework, and the proposed 2012 Universities (Amendment) Bill 2012. Both of these will affect the overall autonomy of universities. The national strategy announced in 2011 will also dampen existing levels of autonomy; by stressing the capacity of the system rather than individual institutions. But de jure autonomy may not necessarily lead to de facto autonomy. For example the Greek law 4009/2011 stipulates higher levels of autonomy at the same time as it increases HE institutions' accountability. In the UK, reductions in direct Government funding announced in 2010 and the increase in reliance on student funding ought in theory to limit government intervention. It is likely that the government was going to exercise greater control than before over student recruitment and the fees universities charge through a cap on fees and student numbers.

Other recent national legislations are said to introduce some uncertainty regarding autonomy. In Portugal, autonomy has increased due a number of initiatives and reforms between 2005 and 2007. However, since 2008 the number of initiatives has diminished. Reform fatigue has come into play. This fatigue taken in combination the financial and economic crisis implies that the implementation of more autonomy is stagnating.

The recent abolishment of tuition fees in most German federal states is often compensated for by state budgets. This compensation is however linked with the reintroduction of earmarking, thus counterbalancing autonomy. In the Netherlands, the progress of the past 20 years is currently being reversed. Incentives are used as a tool to control the behaviour of universities.

Planned reforms are also on the way in several countries. In Estonia, the high autonomy might be changing in the near future due to some new reforms in higher education. A recent legislative proposal could change the funding system of higher education institutions from 2013 onwards. This policy change would probably affect the autonomy of universities (especially financial autonomy), as funding would come from three-year performance based contracts, that define certain qualitative and quantitative outcomes for each university. This new system might actually decrease the autonomy of universities in Estonia.

In Sweden, a promising proposal for far reaching university autonomy was not put into law by the Government in 2009. Only a fraction of the proposal, such as larger autonomy in choosing the members of the university board, remained. This increase in autonomy has had only a very limited impact on the everyday operations of Swedish universities.

University autonomy has however increased in other countries, even if implementation remains challenging.

The French act on the “freedom and responsibilities of universities” has increased autonomy. This act has given universities formal autonomy (in budget and finance) but centralized governance control remains strong. In Italy the 2010 reform law has enhanced institutional autonomy and accountability through the introduction of some degree of monitoring of performance and of linking rewards to performance. State funding now has a small albeit increasing performance-based element. The Italian reform law also provides for the separation of academic and administrative management of universities and attempts to improve academic hiring processes. However, the translation of this new legislation into operational rules and its effective implementation remains an issue in Italy. Any real progress also requires a long-term commitment to finance higher education on basis of clear criteria aligning needs, performances and resources in an objective and transparent manner.

In Poland, the Introduction of the National Qualification Framework in the Higher Education Act 2012 gave institutions more flexibility in establishing study programmes, thus generally increasing autonomy. In 2012, the participatory democracy of Danish universities was strengthened by establishing University council at some universities and stronger Academic Councils.

In Latvia, management reforms of university administration were continued in 2009 shifting from “strong ruling” to “soft steering” and allowing universities to manage their assets more freely, thus strengthening autonomy.

3.2 Funding.

The performance of universities is not only be affected by the degree of autonomy which universities enjoy (as was confirmed by Aghion et al, 2008), but also by the degree of “enabling” performance, i.e. funding (section 3.2.1). We consider funding for equality of opportunity separately (section 3.2.2). And because we know that besides funding also the incentives inherent in funding can be decisive in accomplishing the mission of universities, we take these into account as well (section 3.2.3).

3.2.1 Funding student’s education.

Our indicator for funding is related to the effort countries make, rather than to the resulting expenditure per student. It is annual expenditure per student by institution for all services related to tertiary education relative to GDP per capita in 2008. This measure includes expenses on all services for all higher education institutions⁶ (OECD, 2011: 221). Controlling for GDP per capita gives an idea of how much is spent on higher education proportionally to country’s income and population size. The services mentioned include core services such as teachers; school buildings, teaching materials and school administration. They also include ancillary services. Measuring the full-cost of higher education institutions remains a challenge in several member states, because of the different funding streams related to a university entity, either for research or for education purposes (Estermann et al., 2008). R&D expenditures include all expenditure on university research, including those financed through private and public sponsors and separate grants. This is an average measure for the whole country.

⁶ This data includes public and private institutions. But some expenditure data for students in private institutions is not available for certain countries and some countries provide incomplete information Where this is the case, only expenditure on public and government dependent private institutions has been taken into account according to the OECD (2011: 216). We have also used World Bank data, which includes private and public institutions, with fitted values to smooth out differences for missing data.

Underneath are substantial differences between types of higher education institutions, for example, in France between universities and “grandes écoles”. In order to compensate for missing data, we have imputed missing values using similar World Bank indicators for 2008, as well as 2006 when 2008 data was unavailable (as was the case only for Turkey). Table 3.2 shows the results, both by countries in alphabetical order as in order of the magnitude of funding.

Table 3-2: Expenditure on higher education, percentage of public expenditure tertiary education and importance of formulas and contracts in funding allocation.

COUNTRY	Exp/student	COUNTRY	Exp/student	COUNTRY	Fin. aid	COUNTRY	Fin. aid	COUNTRY	Fund. Alloc.	COUNTRY	Fund. Alloc.
Austria	37.8%	Sweden	50.9%	Austria	17.4%	Cyprus	50.9%	Austria	66.7	Finland	100.0
Belgium	40.7%	Cyprus	47.8%	Belgium	13.2%	Norway	44.1%	Belgium	50.0	Germany	100.0
Bulgaria	36.2%	Denmark	44.7%	Bulgaria	6.7%	UK	31.2%	Bulgaria	50.0	France	83.3
Cyprus	47.8%	Norway	43.4%	Cyprus	50.9%	Netherl.	28.9%	Cyprus	0.0	Turkey	83.3
Czech Rep.	32.2%	Malta	43.2%	Czech Rep.	4.9%	Denmark	28.4%	Czech Rep.	66.7	Austria	66.7
Denmark	44.7%	Switz.	43.0%	Denmark	28.4%	Sweden	25.4%	Denmark	50.0	Czech Rep.	66.7
Estonia	35.2%	UK	41.6%	Estonia	7.4%	Slovenia	23.2%	Estonia	66.7	Estonia	66.7
Finland	40.8%	Portugal	41.6%	Finland	14.7%	Iceland	22.5%	Finland	100.0	Greece	66.7
France	41.1%	Germany	41.4%	France	7.4%	Italy	20.2%	France	83.3	Hungary	66.7
Germany	41.4%	France	41.1%	Germany	18.9%	Germany	18.9%	Germany	100.0	Latvia	66.7
Greece	25.1%	Finland	40.8%	Greece	5.0%	Slovakia	17.5%	Greece	66.7	Lux.	66.7
Hungary	35.4%	Belgium	40.7%	Hungary	14.3%	Austria	17.4%	Hungary	66.7	Poland	66.7
Ireland	38.2%	Spain	40.3%	Ireland	12.7%	Turkey	15.5%	Ireland	50.0	Portugal	66.7
Italy	28.7%	Netherl.	40.2%	Italy	20.2%	Portugal	14.9%	Italy	16.7	Romania	66.7
Latvia	33.6%	Poland	39.1%	Latvia	7.1%	Finland	14.7%	Latvia	66.7	Slovenia	66.7
Lithuania	33.4%	Ireland	38.2%	Lithuania	14.1%	Hungary	14.3%	Lithuania	33.3	Spain	66.7
Lux.	30.0%	Croatia	37.8%	Lux.	12.7%	Lithuania	14.1%	Lux.	66.7	UK	66.7
Malta	43.2%	Austria	37.8%	Malta	3.8%	Belgium	13.2%	Malta	0.0	Iceland	66.7
Netherl.	40.2%	Iceland	37.5%	Netherl.	28.9%	Lux.	12.7%	Netherl.	50.0	Belgium	50.0
Poland	39.1%	Turkey	37.1%	Poland	1.5%	Ireland	12.7%	Poland	66.7	Bulgaria	50.0
Portugal	41.6%	Romania	37.0%	Portugal	14.9%	Spain	9.9%	Portugal	66.7	Denmark	50.0
Romania	37.0%	Bulgaria	36.2%	Romania	7.9%	Romania	7.9%	Romania	66.7	Ireland	50.0
Slovakia	28.3%	Hungary	35.4%	Slovakia	17.5%	Estonia	7.4%	Slovakia	50.0	Netherl.	50.0
Slovenia	31.7%	Estonia	35.2%	Slovenia	23.2%	France	7.4%	Slovenia	66.7	Slovakia	50.0
Spain	40.3%	Latvia	33.6%	Spain	9.9%	Latvia	7.1%	Spain	66.7	Sweden	50.0
Sweden	50.9%	Lithuania	33.4%	Sweden	25.4%	Bulgaria	6.7%	Sweden	50.0	Norway	50.0
UK	41.6%	Czech Rep.	32.2%	UK	31.2%	Greece	5.0%	UK	66.7	Switz.	50.0
Croatia	37.8%	Slovenia	31.7%	Croatia	3.1%	Czech Rep.	4.9%	Croatia	0.0	Lithuania	33.3
Iceland	37.5%	Lux.	30.0%	Iceland	22.5%	Malta	3.8%	Iceland	66.7	Italy	16.7
Norway	43.4%	Italy	28.7%	Norway	44.1%	Croatia	3.1%	Norway	50.0	Cyprus	0.0
Switz.	43.0%	Slovakia	28.3%	Switz.	2.2%	Switz.	2.2%	Switz.	50.0	Malta	0.0
Turkey	37.1%	Greece	25.1%	Turkey	15.5%	Poland	1.5%	Turkey	83.3	Croatia	0.0
Average	38.0%	Average	38.0%	Average	15.9%	Average	15.9%	Average	56.2	Average	56.2

Note: values in red are imputed

Northern European countries have the highest funding for higher education, Cyprus and Malta being an exception. Expenditure on higher education per student averages 48% of GDP per capita in Cyprus and 43% in Malta according to our estimates, both Governments showing awareness of the need to invest in higher education and research to increase their competitiveness (despite some signs of reduction in funding per capita in Cyprus).

Countries with more modest levels of funding than the EU mean include some Southern European states, such as Italy, as well as many Eastern European countries, such as Hungary or Slovakia.

Some of the comments from the EEU correspondents on funding in their countries are included below. The high level of expenditure in Denmark is the result of the Danish Government's commitment to the Barcelona Targets of 3% of GDP invested in R&D – 1% public investments and 2% from industry. The public investments reached 1% in 2010 and in 2011 it was 1,08% (while in recent years private investments have reached the desired 2%). Cyprus has one the highest level of expenditure per student as a percentage of GDP per capita, a result of the Cypriot Government having prioritized the

development of the higher education sector (which includes three public universities) over the past two decades.

Besides Denmark, Austria and Malta, Germany counts as one of the few countries where the funding per student is said to have increased. In Germany this is the result of the Higher education pact. This links funding to newly created study places, thus increasing funding as student numbers increase. Combined with the Excellence Initiative (additional research funds made available to universities which 'do well') this improves the funding of German HE institutions. Malta's funding is also quite favorable and has experienced improvements. Third party funding has increased in Austria but universities generally face difficulties in receiving sufficient financing for education.

Universities in several countries are experiencing difficulties with funding. Slovenian universities are facing the effect of the Act on Intervention Steps (accepted in 2010, amended in 2011) that has changed earlier measures to stimulate teaching and research. The amount spent per student was reduced in the process. Various austerity measures of the Bulgarian Government have affected all budget sectors during the last several years, including education. Spending per student has also been reduced in Greece, due to recent spending cuts. Hungary's higher education sector faces the problem of a non-transparent financial system for educational purposes, but the feeling is that funding for universities is reduced. Ireland entered an EU/ECB/IMF bailout program at the end of 2010. This put pressure on all areas of public spending. Spending per student has fallen dramatically and is likely to continue to fall in the future, especially as student numbers are projected to increase over the next couple of decades. The same holds true for Portugal. The bailout agreement signed with the EU/ECB/IMF has led to a decline in student spending as cuts in staff wages have occurred and are likely to be enforced at least until 2014. The severe economic crisis is also affecting the capacity to compensate these cuts in public transfers through alternative sources. Decreases in the amount of funding per student arose after the crisis in the Czech Republic, Latvia and Lithuania.

In Spain, the crisis has led to the Royal Decree-Law 14/2012 of 20 April 2012 with urgent measures to rationalize public spending in education, a reform which implies less funding per student and forces institutions to get to grips with the new managerial needs related to autonomy.

In Cyprus, the Government has also imposed reductions in university spending for students. In Italy, much of the 2010 reform on the modernization of Italian universities is only on paper for the moment. While there is some increased funding for specific projects, the system has not been granted any significant new student funding. The situation remains largely unchanged with non-state universities being able to attract more funding than state universities. In the Netherlands, students are expected to pay more and government spending per student is expected to decrease. In Estonia, in 2008 the base cost of state-commissioned study place increased 30% compared to 2007, but due to the economic crisis was reduced by 7% in 2009 and 9% in 2010. With the new reforms planned in higher education, the funding per student should be increasing in the next years, according to the Minister of Education and Research. It might even double, but stakeholders are rather skeptical about that.

In France, the funding gap between universities and other institutions, i.e. "grandes écoles" and research centres of CNRS remains high. The CNRS keeps the monopoly of access to the main resources. In the UK, overall funding levels have been maintained for the future, but at the cost of replacing government money with student fees. In Sweden an increase in the allocation for education in humanities and social sciences occurred since Autumn 2011. But whether this has an impact on additional external funding for education remains unclear. External funding for education in Sweden is usually only obtained within European programs.

Higher education expenditure includes research funding. Public R&D expenditure in the higher education sector as a % of GDP can be very low in certain countries. For example, it is only 0.07% in Bulgaria in 2010. It has had diverse trends. Several of our correspondents list an increase in R&D spending while

seven register decreases and four no changes at all. Positive developments can be observed in Austria, Denmark, Germany, Malta, and Romania. Less money is spent on public R&D institutions in Bulgaria, Croatia, Portugal, the Netherlands, Ireland, Latvia and the UK. In Lithuania and Sweden R&D expenditure has stayed stable. In Italy, public R&D funding is still concentrated in some areas and among some institutions. The introduction of a Research Assessment Exercise has raised awareness and this increased transparency and created cultural shifts in some institutions. However, R&D spending for higher education as a percentage of GDP was 0.13 percentage point below EU average in 2011

The crisis was listed as a reason for a reduction in R&D expenditure in many countries. In Bulgaria, a recent shift of Government's focus on renewing of national infrastructure and general cuts in public funding for all areas of education have for instance had negative consequences on R&D spending (which went down from 0.07% of GDP for higher education in 2010 to a predicted 0.06% in 2011). Ireland entered an EU/IMF bailout program towards the end of 2010, putting considerable pressure on all areas of public spending. Public expenditure on R&D for higher education went down from 0.51 to 0.45% of GDP between 2009 and 2010. In this context, the Report of the Research Prioritization Exercise Group (2012) recommends 14 priority areas for research activity. These areas will now receive 80% of all research funding. Certain areas, such as the arts, humanities and social sciences (AHSS), will be excluded but some funding will be available through the Irish Research Council. Funding also depends on the extent to which the AHSS are able to successfully align their research interests with the priority fields.

In the UK real-terms funding reductions in the research budget were introduced two years ago. Portugal had experienced a major transformation of its research intensity, mainly due to a persistent focus on strengthening the research basis of the Portuguese HE system. This was significant and persisted even during the first phase of the current crisis. However, since 2011, the depth of the crisis and the changes in government have contributed to a weakening of that commitment and many have expressed the view that if the current cuts in science will persist they may endanger some of the advances that took place in recent past, particularly in more expensive and competitive areas. In the Netherlands, a country where R&D spending is generally high, R&D budget cuts are expected. .

Four years ago, the Swedish Government changed funding mechanisms in research. Research funding is now only divided between the large research universities, leading to some large universities not using all research funds and small institutions competing for external funding to complement the small amounts of research funding received from the state. R&D allocation mechanisms have also changed in Hungary: Research performance as a former indicator for the distribution of grants for HE institutions, has been replaced by the number of qualified staff.

Other countries have benefited from favorable legislation. In France, universities can now set up foundations and public-private partnerships, which should enhance R&D revenues in the long-term. Fresh money for R&D is readily available for German HE institutions thanks to the Excellence Initiative. Support through government scholarships (MGSS and STEPS), Competitiveness and Innovation Programs (EUREKA, Euro Stars, Incentives for Enterprise) and the National Research and Innovation Program (FP unit and COST) increases funding in Malta and R&D spending in higher education has increased. But many opportunities for major transnational research projects are lost due to lack of local funds for research. In Poland, the establishment of a National Leading Scientific Centers may help increase effective financing of research.

In the Czech Republic R&D expenditure for higher education has increased from 0.24% in 2008 to 0.4% in 2011. In Romania, there was a spectacular increase in state funding allocated to academic R&D between 2004 and 2008 due to the sharp rise in the university general public funds. The new Law on National Education nr 1/2011 should further stipulate mechanisms for R&D. which will only show its impact on R&D expenditure in the long-term. In Poland the Government used 'Cohesion and Structural

funds' for funding investments in higher education. The Slovak Government also intends to make further use of EU funds.

3. 2. 2 Funding for equity.

“Equity” in higher education for students from different socio-economic groups has been a recurrent theme in politics. Inequity arises amongst others if the financial thresholds for participation are not sufficiently reduced for students from lower and middle income backgrounds because these students have no access to the capital market to borrow on reasonable rates (“capital market imperfections”). Most countries have enacted correction mechanisms to allow access to education independently from background in the form of financial aid mechanisms, such as grants, scholarships and loans. Extra child allowances and extra tax deductions are also used in Europe as instruments to support parents with children in university. Student grants and more recently loan schemes (in some cases the latter have been replacing the formers) have been implemented in all European countries, but they are also constantly subject of political debate (Johnstone and Marcucci, 2010). The debate concerns the impact of loans on student choice behavior and on the distribution of the risk of non-completion or inability to pay back between the lender and the Government. Some scholars argue in favor of grants over loans for students from low income backgrounds with the rationale that debt aversion is correlated with social background, even though it appears that the introduction of student loan schemes did not affect negatively the number of applications from students from a varied backgrounds if one controls for their grade after high school (Babb et al., 2004: 17). However, that does not yet undercut the argument in favor of more aid to students from poor backgrounds, as they might not have had the same chances to develop their ability.

As the indicator for “equity policy” in higher education we use public subsidies to households and private entities as a percentage of total public expenditure on higher education in 2008 from Eurostat, also presented in Table 3-2. To replace missing data, we have used public subsidies on financial aid from the previous years (2005 was only the case for Greece). We would have preferred the ratio of the expenditures on equity in relation to the private costs for higher education (the tuition and the living costs). However this was not available in a European-wide study – the affordability study conducted by Usher (2010) contains only ten European countries. We realize the imperfection of our present measure as we do not control for the private costs in the country. For example, if the ratio was 100% then public subsidies to higher education would be 100% (there would be no other expenditures). At the same time the degree of equity would be determined by the size of public expenditures for equity in relation to the tuition costs. This would not be a problem if private costs were more or less the same in Europe. However, countries like the UK, Portugal and the Netherlands have (considerable) higher tuition fees than the rest of the countries.

One should bear in mind that other measures, like the availability of state-funded places might also affect equality of opportunity (besides financial aid), to promote access (measures which may have a differentiated impact on equity). The reduction of the number of state-funded places in Hungary between 2000 and 2012 from roughly 60,000 to 35,000 (plus 15,000 places with 50% funding) could well have had a (substantial) impact on the composition of the student force by parental background with the likelihood that inequity will be increasing. In Table 3-2 we see that subsidies in the form of grants loans and scholarships show a large variation in Europe, ranking from around 50.9% of public expenditure for tertiary education in Cyprus to merely 1.5% in Poland. The position of the UK/England in the table is not surprising. The UK has by far the largest public loan scheme, to compensate for the highest tuition fees in Europe. The UK ranks high in terms of the availability of facilities, but the trend is towards (slightly) less availability of loans and grants. The same holds true for the Netherlands.

Our correspondents do not report major changes in the policies to facilitate access in Latvia, Germany, and Italy while equal access has become or will become more difficult in the Czech Republic, Hungary, Ireland, the Netherlands, and Romania

In Italy, the 2010 reform set aside funds for grants and for student accommodation. But its impact has been minimal. In Estonia, a reform is being planned to change the student support system from merit-based to needs-based. This reform is expected to decrease the inequality of access, as all students would have the opportunity to study without a tuition fee. Yet some argue that the new system actually might increase inequality, as it would require students to study full-time only which would make it difficult to earn income from job for those students who need sufficient funding to cover other study related costs who do not want to take out a loan.

In France new scholarships schemes have been introduced by certain institutions, such as Science Po, to reward student performance, even if the impact of the new scholarship scheme has been limited so far since it does not include many students. In Latvia, higher education is generally accessible to all people. However, students still express resentments concerning state loans; many prefer to work besides studying or live on parental support. On June 2, 2009 the Cabinet of Ministers of the Republic of Latvia made changes in the regulations regarding scholarships. Scholarships are awarded on the basis of merit, with need being the second selection criterion (if two candidates have equal merit base, then those in need get the priority). State financed scholarship schemes are very limited and there are not many private scholarships either.

In Ireland students are increasingly concerned about their loan take-up rate. This might be exacerbated as a result of rising tuition fees. In Romania students from rural areas remain underrepresented. In the Czech Republic, the introduction of a student fee together with a lack of adequate compensatory measures is expected to deteriorate affordability and therefore accessibility of higher education.

In Malta, the projected increase in student population to 35% by 2020 will be fully covered by an increase in stipends (grants over and above free access) thus improving access to tertiary education in Malta. In Denmark, the Thorning-Schmidt Government (2011) has declared the goal that by 2020, 95 % of a cohort should obtain a secondary degree and 60% of a cohort should obtain a higher education degree, thus contributing to equal access. The student grant system will follow this line. In Spain, a new financial aid system introduced in 2008 has led to better access. Due to the economic crisis this program has however been cancelled this year. In Ireland an introduction of a bank-financed loan scheme has been discussed recently (as a response to increasing tuition fees and difficulties in finding employment during studies). However the future of this plan is uncertain as it has been met with mixed opinions.

When we compare the two columns in Table 3-2 we see a striking relation between the “willingness” to pay for higher education (higher education expenditures related to GDP) and the policy effort to generate more equality of opportunity. This is well expressed in the correlation coefficient of 0.39 between these two variables. Governments that spend a lot per student also tend to be generous in terms of financial aid measures and the two indicators are therefore significantly correlated. These countries include Norway, Sweden and Denmark . Slovenia constitutes an exception as a country with a lower than average annual expenditure but financial aid measures above the EU mean.

3. 2. 3 Incentives in higher education funding.

Public funds are increasingly allocated with the awareness that they should achieve social goals . The substantial increase in higher education budget, resulting from the increase in the number of students since the 1960s has led to changes in the funding formulas, mostly driven by efficiency expressed as the number of students enrolled, but increasingly expanded with performance indicators and with contracts (Salmi and Hauptman, 2006).

We use data from the Center for Higher Education Policy Studies regarding incentives in funding, which measure the importance of formulas and contracts in the allocation of public funding (as opposed to

incremental allocation and negotiation), in order to reflect the tendency to shift away from incremental increases and negotiations. We recoded this indicator from CHEPS with a score between 0 and 100. The maximum score (100) is given if all funding is based on formulas and contracts. A score of zero implies that the budget allocation is purely incremental or by negotiation (CHEPS et al, 2008). The scores are also presented in Table 3-2.

The relative importance of incentives appears to be uncorrelated to annual expenditure per students. Some countries, such as Latvia and Estonia, are above the EU mean regarding the percentage of funds for education and research allocated competitively or through performance-related measures.

According to Table 3-2 Finland and Germany give the highest importance to performance indicators in allocating funds for higher education and research.

Our EEU correspondents reported the following directions in “funding incentive”⁷ policies.

In the UK universities find it increasingly difficult to get state research funding as a result of the fierce competition for fund. Irish universities have received a block grant for research equivalent to approximately 27% of their budget⁸. The Recurrent Grant Allocation Model (RGAM) being introduced by the HEA will contain a performance-based element; 5% is due to be awarded according to research activity. Over time more funding will be allocated according to competitive criteria for Irish higher education institutions. Projects aligned to national research priorities probably stand a better chance to receive funding while others may lose.

In Lithuania, the current higher education reform, which started with the adoption of the Law on Higher Education and Research (2009), has set as one of its targets to allocate 50% of financing for research competitively. In Portugal, the tight financial retrenchment has forced higher education institutions to be more parsimonious and to diversify revenue, making it more difficult for universities to receive funding.

In France, incentives for higher education performance have been included in the negotiation of contracts with the Ministry every four years. There are however still not many incentives to get funds aside from the National Research Agency or the National Center for Scientific Research. But currently, some funds have been allocated through national programs: “investments of excellence”, and “research units of excellence” to develop innovative and creative programs. It is however too soon to assess their impact on French higher education institutions.

In the Czech Republic, Technopolis carried out an evaluation of the competitive allocation of research funding in 2011, which could lead to major changes.

In Estonia, a Research, Development & Innovation Strategy (2009-2013) has been introduced to increase competitiveness in research funding even more and to make it dependent on research outcomes instead of the number of researchers in an institution. A separate institution called Estonian Research Council has been set up by the Ministry of Education and Research in 2012 to evaluate research applications independently and to support and develop R&D activities and policies in Estonia. The effect of these changes will have to be evaluated in the near future. In Italy, performance based funding is still very small and more incentives are needed. In Croatia, the allocation of funding remains incremental despite much talk to move toward more output-based criteria. The World Bank is currently financing a pilot project in Croatia with a voluntary participation of universities, to try out performance agreements whereby output criteria would be decided. This project is still in the preparatory phase, and it is difficult to assess when and how the funding model of Croatia’s higher education institutions will change.

⁷ “Funding incentive” relates to the competitive allocation of funds in order to encourage universities to improve performance.

⁸ The Institute of Technology sector has not received similar funding

In Greece, a new method for submitting research proposals and evaluating them was introduced in 2010. Proposals are assessed by international experts, and favours the concentration of funding around highly active research institutions In Denmark, competitive funding will often require co-funding, which calls for a strategically rational allocation between competitive funding and basic funding, making it easier for universities to receive funding.

4. Measuring higher education performance.

“Performance” encompasses a certain subjective notion (Pollitt and Bouckaert, 2004). In higher education, the starting point to measure such performance comes from focusing on the two main missions of institutions, i.e. education and research which are recognized in most of the legislations of EU countries. There is in most legislations on universities a third mission, namely to “contribute to society”, but there are no measures available to assess the performance of universities on this dimension.

The performance of universities in education and research is measured in many studies. Such studies started in the 1940s with an emphasis on the returns to both education and research and the discovery that the returns to higher education and research in the form of economic growth might (substantially) exceed those of investments in physical capital. Increasingly the realization grew that these returns are not just a matter of the size of funding, but also how the funding is translated into effective learning and effective research outputs. A major step was made by Barro and Lee (2002) when they found (using OECD’s PISA’s data) that the quality of education has an overwhelming impact on education as well as on economic growth. Hanushek and Woessmann (2010) follow this line further by indicating that institutional reforms in primary and secondary education could have a substantial positive impact on economic growth.

In higher education, this “rationalization” effort takes the form of various measures, based for example on direct returns to education, either through investment and skills, knowledge acquired or much publicized international comparisons (Grek and Ozga, 2010; Hoareau, 2011; OECD, 2011).

Here –in this assessment of university polices- we distinguish three sets of performance indicators:

- Performance in education (section 4.1). Here we rely on an indicator of graduate employment (section 4.1.1) as well as indicators on the graduation rate (“throughput”). In a second part we look at the relative inflow of foreign students, enrollment and the relative inflow of students from non-universities into universities as performance factors for universities (section 4.1.2).
- Performance in research measured through the percentage of publications in the top 10% most cited worldwide, the international visibility of higher education institutions and the degree of joint public-private publishing (section 4.2).

4.1 Education performance.

4.1.1 Graduate employment and graduation.

Labour economists have always been quite doubtful about the use of the measure “education level achieved” as an approximation of the productivity of a worker, because of the tremendous heterogeneity of the traits of workers with the same level of education achieved. The heterogeneity was present within the group of workers with the same level of education within a country, but also between workers with the same level across countries. Pritchett (2002) made the point that the number of years in school, embodied in the labour force, does not provide a contribution to the explanation of economic growth, soon to be succeeded by Barro and Lee (2002) and Hanushek and Woessmann (2010) who showed that the picture changes drastically if rough measures of the quality of the schooling are applied to the years of education. These measures had become available through the “project international student achievement” (PISA) in which – for the first time in 2000 - 15 year olds in a large number of countries took the same test. If the average test result in the country was multiplied by the

size of the labour force with secondary or higher education, then education became significant as an explanatory force for economic growth. Hanushek and Woessmann (2010) took it one step further and calculated that school improvements falling in primary and secondary education could (within currently observed performance levels in the OECD) yield through 2090 an additional income of as much as 13.8 % of the discounted value of future GDP.

Unfortunately we do not yet have similar tests in higher education despite debate in Europe about the purposes of university training, with the general idea that labour market perspectives should not have the overriding importance in university education. But university education should also lead to the ability to function well in society at large and in its institutions. However, convergence seems increasingly prominent, given that a full development of talents appears to be in line with the demands on the labour market. Similarly, the demands for talents on the labour market are not different from those for good citizenship or a good functioning in society. In other words: there should be no trade-off in teaching between talents needed for the labour market and for society (Ritzen, 2012).

The OECD's Assessment of Higher Education Learning Outcomes (AHELO) project, which runs along similar lines as PISA for university education, aims to measure the outputs of higher education, but the first results will not be available before 2014. In the mean time we use graduate employment 3 years after graduation as a proxy for the quality of higher education in relation to the labour market.

We use graduate employment three years after graduation for those of 18-34 year olds as an indicator for the success/performance of universities to contribute to success on the labor market. Countries with high higher education performance should be able to achieve an easier absorption of graduates in the labor market. Hence we regard this indicator as a performance indicator for the education component of higher education. For missing data on employment on Croatia, we imputed fitted values from an indicator we do not use for this assessment, namely a ratio of graduate employment over the employment of rate of the average population (compiled from Eurostat).

The data on graduation and graduate employment are presented in Table 4-1, both in alphabetical order of the countries concerned as in order of magnitude.

Table 4-1: Graduation and employment rates.

COUNTRY	Graduates	COUNTRY	Graduates	COUNTRY	Employment	COUNTRY	Employment
Austria	16.4%	Slovakia	32.8%	Austria	92.1%	Netherl.	93.5%
Belgium	23.1%	Romania	30.6%	Belgium	89.6%	Norway	92.1%
Bulgaria	21.1%	Ireland	30.3%	Bulgaria	83.7%	Austria	92.1%
Cyprus	15.7%	Switz.	29.4%	Cyprus	78.7%	Switz.	91.8%
Czech Rep.	23.1%	Poland	29.1%	Czech Rep.	88.0%	Malta	91.5%
Denmark	22.6%	UK	28.6%	Denmark	86.7%	Germany	90.0%
Estonia	16.6%	Malta	28.0%	Estonia	72.9%	Belgium	89.6%
Finland	16.1%	Lux.	26.7%	Finland	86.6%	Sweden	89.5%
France	21.0%	Latvia	23.6%	France	80.7%	Poland	88.7%
Germany	19.3%	Czech Rep.	23.1%	Germany	90.0%	Czech Rep.	88.0%
Greece	10.1%	Belgium	23.1%	Greece	64.7%	Denmark	86.7%
Hungary	18.1%	Croatia	22.9%	Hungary	82.3%	Finland	86.6%
Ireland	30.3%	Iceland	22.7%	Ireland	82.6%	Slovenia	85.8%
Italy	10.9%	Denmark	22.6%	Italy	63.3%	Lux.	85.6%
Latvia	23.6%	Lithuania	22.4%	Latvia	80.3%	Lithuania	84.8%
Lithuania	22.4%	Bulgaria	21.1%	Lithuania	84.8%	Portugal	84.3%
Lux.	26.7%	France	21.0%	Lux.	85.6%	Iceland	84.2%
Malta	28.0%	Portugal	20.5%	Malta	91.5%	Bulgaria	83.7%
Netherl.	14.8%	Germany	19.3%	Netherl.	93.5%	Croatia	82.9%
Poland	29.1%	Hungary	18.1%	Poland	88.7%	Ireland	82.6%
Portugal	20.5%	Spain	17.9%	Portugal	84.3%	Hungary	82.3%
Romania	30.6%	Slovenia	17.1%	Romania	82.3%	Romania	82.3%
Slovakia	32.8%	Norway	16.8%	Slovakia	80.6%	France	80.7%
Slovenia	17.1%	Estonia	16.6%	Slovenia	85.8%	UK	80.7%
Spain	17.9%	Austria	16.4%	Spain	67.9%	Slovakia	80.6%
Sweden	13.5%	Turkey	16.2%	Sweden	89.5%	Latvia	80.3%
UK	28.6%	Finland	16.1%	UK	80.7%	Cyprus	78.7%
Croatia	22.9%	Cyprus	15.7%	Croatia	82.9%	Estonia	72.9%
Iceland	22.7%	Netherl.	14.8%	Iceland	84.2%	Spain	67.9%
Norway	16.8%	Sweden	13.5%	Norway	92.1%	Greece	64.7%
Switz.	29.4%	Italy	10.9%	Switz.	91.8%	Turkey	63.8%
Turkey	16.2%	Greece	10.1%	Turkey	63.8%	Italy	63.3%
Average	21.2%	Average	21.2%	Average	82.9%	Average	82.9%

Note: values in red are imputed

Countries with the highest level of graduate employment are the Netherlands, Norway and Austria. For example, 93.5% of graduates were likely to be in employment three years or less after graduation in 2010 in the Netherlands. This relatively high employment rate is likely to be influenced by the active role of the social insurance agencies and municipalities in contracting out work placements to employers for unemployed youth. Moreover, access to unemployment benefits has become more tied up to work experience with six months of work required (OECD, 2008d: 6). The chances to find a job are surprisingly low in Spain, Greece, Turkey and Italy (note: this was in 2009).

The number of graduates proportionally to the total number of enrolled students is used as a performance measure. For the missing observation on France, we have used the enrollment indicator to interpolate the value.

This is a measure of the efficiency of the university system (the throughput). Slovakia, Romania and Ireland have the largest throughput and Italy and Greece the lowest.. Of course, graduation is only a partial measure of the educational output of higher education, and may be an indicator of loose standards rather than quality. However, a low throughput is indicative of costly losses in the system as many students who do not graduate presumably drop out or progress slower to their degrees than the program requires.

Four correspondents provided insights in how recent legislative changes may have impacted graduate employment in their respective countries. Denmark, Greece, Ireland and Malta changes in legislation have positively impacted graduate employment.

Since 2007 Danish universities have been required to appoint joint committees with industry partners which provide advice on how to develop courses to reflect the needs of the labour market / employers, to make it easier for universities to perform in graduate employment. The Greek law (4009/11) stipulates that funding to the universities will be distributed according to the employability of the graduates as one of the factors. In Ireland, there have been a number of funded Labour Market Activation Programs aimed at the unemployed, and national internship schemes. But the number of places available is likely to be far too small for the size of graduate unemployment. Other Irish initiatives have made an important contribution, with respect to reskilling people previously employed in sectors which have since declined, like construction. There is also an attempt to retrain for the IT sector. In general, these measures make graduate employment easier but at this early stage it is difficult to tell to which extent they are making a real or significant difference. The present Maltese government is engaged in attracting direct foreign investment which absorbs new graduates, mainly in the science, technology, finance and IT sectors. Additionally, there is a conscious strategic plan to produce more graduates in the areas of science and technology to facilitate graduate employment

4.1.2. Enrollment and students transitioning from a non-university education background.

Governments often seem to believe that the supply of the skilled labour force is best promoted by encouraging universities to increase the number of students. This implies that we have to use the size of the student body (measured as the percentage of enrolled students in comparison to the population aged 20 years) as a “university performance indicator”.

Signatories of the Empower European Universities manifesto agreed that differentiation across higher education institutions was important. Smelser (1959) provided a general definition of differentiation as a process whereby a social unit changes into two or more other units. In higher education, the notion of differentiation is best analyzed by Van Vught (1997). Differentiation, as a process, is substantially different from diversity, which indicates the variety of entities within a system (Huisman ,1995: 51). Van Vught (1997: 2) isolated different types of diversity from the literature: systemic, structural, programmatic, procedural, reputational, constitutional, values and climate diversity, to determine the different dimensions of diversity (i.e. whether it takes place at the level of institutions, programmes, students, or values). EEU captured differentiation by measuring students’ transition from non-traditional background (namely vocational or professional backgrounds), using Eurostudent (2011). To compensate for missing data, we have used enrollment data divided by the population for 20 years old. This measure is an imprecise proxy. Differentiation is often achieved in countries by allocating students directly after secondary school to different types of higher education (using selectivity).

Both indicators are reported in the Table 4-2.

Table 4.2: Percentage of enrolled students relative to the population aged 20 years and students transitioning from a non-university education background

COUNTRY	Enrollment	COUNTRY	Enrollment	COUNTRY	Transition	COUNTRY	Transition
Austria	27.0%	Slovenia	57.5%	Austria	9.0%	Sweden	29.0%
Belgium	50.7%	Lithuania	55.2%	Belgium	14.9%	UK	24.0%
Bulgaria	41.0%	Ireland	51.3%	Bulgaria	13.4%	Ireland	23.0%
Cyprus	30.1%	Belgium	50.7%	Cyprus	11.7%	Finland	21.0%
Czech Rep.	40.7%	Poland	48.9%	Czech Rep.	3.0%	Slovenia	15.9%
Denmark	17.8%	Greece	46.6%	Denmark	6.0%	Lithuania	15.5%
Estonia	39.5%	Croatia	43.4%	Estonia	10.0%	Portugal	15.0%
Finland	31.1%	France	42.0%	Finland	21.0%	Belgium	14.9%
France	42.0%	Bulgaria	41.0%	France	2.0%	Poland	14.6%
Germany	23.1%	Czech Rep.	40.7%	Germany	4.0%	Greece	14.3%
Greece	46.6%	Latvia	40.5%	Greece	14.3%	Croatia	13.7%
Hungary	38.5%	Spain	40.3%	Hungary	13.1%	Bulgaria	13.4%
Ireland	51.3%	Estonia	39.5%	Ireland	23.0%	Latvia	13.4%
Italy	36.2%	Netherl.	38.9%	Italy	12.7%	Hungary	13.1%
Latvia	40.5%	Turkey	38.8%	Latvia	13.4%	Netherl.	13.1%
Lithuania	55.2%	Hungary	38.5%	Lithuania	15.5%	Turkey	13.1%
Lux.	7.8%	Slovakia	37.1%	Lux.	8.4%	Slovakia	12.8%
Malta	27.7%	UK	36.5%	Malta	10.0%	Italy	12.7%
Netherl.	38.9%	Italy	36.2%	Netherl.	13.1%	Romania	12.5%
Poland	48.9%	Portugal	36.1%	Poland	14.6%	Cyprus	11.7%
Portugal	36.1%	Romania	34.7%	Portugal	15.0%	Iceland	10.6%
Romania	34.7%	Finland	31.1%	Romania	12.5%	Estonia	10.0%
Slovakia	37.1%	Cyprus	30.1%	Slovakia	12.8%	Malta	10.0%
Slovenia	57.5%	Norway	29.7%	Slovenia	15.9%	Spain	10.0%
Spain	40.3%	Malta	27.7%	Spain	10.0%	Austria	9.0%
Sweden	24.8%	Austria	27.0%	Sweden	29.0%	Norway	9.0%
UK	36.5%	Sweden	24.8%	UK	24.0%	Lux.	8.4%
Croatia	43.4%	Germany	23.1%	Croatia	13.7%	Switz.	7.0%
Iceland	22.8%	Iceland	22.8%	Iceland	10.6%	Denmark	6.0%
Norway	29.7%	Switz.	18.7%	Norway	9.0%	Germany	4.0%
Switz.	18.7%	Denmark	17.8%	Switz.	7.0%	Czech Rep.	3.0%
Turkey	38.8%	Lux.	7.8%	Turkey	13.1%	France	2.0%
AVG	36.1%	AVG	36.1%	AVG	12.7%	AVG	12.7%

The countries with the largest size of student body in relation to the population aged 20 are Slovenia, Lithuania and Ireland. Sweden, the UK and Ireland have the highest percentage of students from non-university to university education.

Regarding the transition to higher education, Sweden has the highest percentage of students entering higher education through an alternative route (vocational training, accreditation of prior learning, aptitude/entrance examination or post-secondary education on a non-tertiary track), namely 29%. Some students take further education courses to improve their chances of getting entry in their preferred courses in Sweden (Eurostudent, 2011: 33).

Correspondents provided the following information on recent changes regarding differentiation. Ireland has a traditional binary system which is undergoing modernization. Within the new Higher Education Landscape, all HEIs are required to position themselves in a distinctive way to strengthen the capacity of the system and to avoid duplication. Estonia has made a step towards differentiation in 2011, when its new institutional accreditation system recognized the need for a differentiated system.

In Turkey the levels of transition are expected to increase as a result of the introduction of the Farabi program in 2009. The program promotes cross-university mobility for students and professors. It covers one to two years periods based on financial support and students transitioning from a non-university education background.

4.1.3 International students.

The percentage of incoming mobile students is used as a measure of international openness. Inward mobile students are different from foreign students. According to Eurostat, 'mobile students (diploma/degree mobility) are defined as foreign students who have crossed a national border and moved to another country with the objective to study. In other words, the student has moved from what we in this context call the country of origin to the reporting country of study (also called country of destination). The status as a mobile student is dependent on the crossing of a border motivated by education and is not dependent on formal resident status in the reporting country of destination. The status as a mobile student is maintained for as long as continued education at the same level of education lasts. This may involve more consecutive educational programmes with no or only minor gaps between'⁹. This measure also reflects the quality of higher education, the most attractive systems to students being in theory the ones with the highest quality. We have imputed missing data on international students using the number of incoming Marie Curie fellows per million inhabitants (both measure reflecting attractiveness).

⁹ For more information, see Eurostat metadata on Student mobility and foreign students in tertiary education, URL: http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/educ_mo_esms.htm .

Table 4.3: Inward mobile student as a percentage of the population in the host country.

COUNTRY	Internat. students
Austria	15.1%
Belgium	8.0%
Bulgaria	3.4%
Cyprus	31.8%
Czech Rep.	0.0%
Denmark	5.4%
Estonia	1.6%
Finland	3.7%
France	6.9%
Germany	7.4%
Greece	4.6%
Hungary	3.7%
Ireland	8.6%
Italy	5.1%
Latvia	3.7%
Lithuania	1.3%
Lux.	3.7%
Malta	6.2%
Netherl.	3.8%
Poland	3.8%
Portugal	2.5%
Romania	0.9%
Slovakia	2.7%
Slovenia	1.8%
Spain	2.7%
Sweden	6.4%
UK	15.3%
Croatia	0.5%
Iceland	4.6%
Norway	2.3%
Switz.	14.9%
Turkey	5.9%

Average	5.9%
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COUNTRY	Internat. students
Cyprus	31.8%
UK	15.3%
Austria	15.1%
Switz.	14.9%
Ireland	8.6%
Belgium	8.0%
Germany	7.4%
France	6.9%
Sweden	6.4%
Malta	6.2%
Turkey	5.9%
Denmark	5.4%
Italy	5.1%
Iceland	4.6%
Greece	4.6%
Netherl.	3.8%
Poland	3.8%
Finland	3.7%
Latvia	3.7%
Lux.	3.7%
Hungary	3.7%
Bulgaria	3.4%
Slovakia	2.7%
Spain	2.7%
Portugal	2.5%
Norway	2.3%
Slovenia	1.8%
Estonia	1.6%
Lithuania	1.3%
Romania	0.9%
Croatia	0.5%
Czech Rep.	0.0%

Average	5.9%
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Note: values in red are imputed

Cyprus, the UK and Austria emerge as highly successful in terms of inward mobility. 32% of the student population in Cyprus at ISCED levels 5 and 6 is from abroad. Cypriot universities typically reserve a sizeable percentage of their admission places for Greek students (Maull, 2010).

Seven correspondents gave information regarding recent changes in legislation that could affect inward student flows. In Austria, Bulgaria, Finland, Italy, Latvia and Spain recent changes seem to be positive. In Hungary the recent changes are most likely harmful to inward mobility.

Austria has recently (March 2012) released a document, 'Act on Quality Assurance in Higher Education'. In this document the importance of international cooperation is stressed several times, indicating that the 'Agency for Quality Assurance and Accreditation Austria' has made international openness a serious part of its agenda. There is however no information how much this new act diverges from previous policies, regarding international openness.

In Finland, universities may charge tuition fees to international students, which could affect mobility flows. In Latvia, the "Action Plan for Necessary Reforms in Higher Education and science for 2010 – 2012", which is a short-term policy planning document and serves as a starting point for long-term structural reforms in higher education and science, aims to make access to students from abroad easier. Hungary changed its laws regarding the portability of grants in 2011. Before this change the portability of grants was allowed, at least partly. The 2011 law did not include the portability of grants, making it harder for students to study abroad.

4.2 Research performance.

Higher education also plays an important part in the advancement of society through the generation of innovative research, be it applied or fundamental, curiosity-based or part of a broader programme. Research output ("new knowledge") can lead to economic growth through new businesses, sometimes destroying existing production lines, as Schumpeter (1942) observed ("creative destruction"). Several efforts have been made to transfer research from universities to businesses in order to increase the contribution of universities to innovation. The Demola platform (offered by the University of Tampere and Hermia Ltd) in Finland is an example of strengthening the cooperation between university research and business development. In this platform, students from three regional universities in cooperation with regional businesses can demonstrate novel services and product concepts (European Commission, 2009: 30).

To measure research performance we use the following indicators (all variables relative to the population measured in million inhabitants):

- Scientific publications within the 10% most cited scientific publications worldwide as a percentage of total scientific publications of a country (4.2.1).
- The presence of universities in the Jiao Tong top 500 (4.2.2).
- The ability of universities to attract Marie Curie fellows in a given country as well as the number of winners of European Research Council Starting Grants (4.2.3).
- The number of scientific co-publications between the public and the private sectors, as proxies for the translation of research into practical ideas (4.2.4).
-

4.2.1 Productivity: scientific publications.

One of the output measures for university performance in research is measured by scientific publications within the 10% most cited scientific publications worldwide as a percentage of the total scientific publications in the country as indicated in Table 4.4. This measure could introduce a bias toward countries with a high level of publications in English given that it relies on Scopus data. Countries like France and Germany may underperform with this indicator given the tendency of researchers to publish in their national language in these countries (ProInnoEurope, 2012). Moreover, Scopus records publications with an ISSN number as well as conference proceedings independently of the institutional affiliation of the authors, and scientific publications therefore include publications from non-university organizations as well as universities (Elsevier, 2012).

Table 4-4: Top scientific publications.

COUNTRY	Top publications	COUNTRY	Top publications
Austria	11.4	Switz.	15.6
Belgium	13.4	Netherl.	14.9
Bulgaria	3.6	Denmark	14.8
Cyprus	8.6	Belgium	13.4
Czech Rep.	4.9	UK	12.8
Denmark	14.8	Sweden	12.2
Estonia	7.6	Finland	11.7
Finland	11.7	Austria	11.4
France	10.1	Germany	11.4
Germany	11.4	Ireland	11.3
Greece	9.3	Norway	11.0
Hungary	5.4	France	10.1
Ireland	11.3	Italy	9.8
Italy	9.8	Spain	9.5
Latvia	2.1	Greece	9.3
Lithuania	5.8	Iceland	9.3
Lux.	9.3	Lux.	9.3
Malta	4.7	Portugal	9.3
Netherl.	14.9	Cyprus	8.6
Poland	3.7	Estonia	7.6
Portugal	9.3	Slovenia	7.6
Romania	4.2	Turkey	6.5
Slovakia	3.8	Lithuania	5.8
Slovenia	7.6	Hungary	5.4
Spain	9.5	Czech Rep.	4.9
Sweden	12.2	Malta	4.7
UK	12.8	Romania	4.2
Croatia	3.1	Slovakia	3.8
Iceland	9.3	Poland	3.7
Norway	11.0	Bulgaria	3.6
Switz.	15.6	Croatia	3.1
Turkey	6.5	Latvia	2.1
AVG	8.7	AVG	8.7

Table 4-4 it shows that Switzerland, the Netherlands, Denmark and Belgium have a comparatively high number of top cited publications, while Slovakia, Poland, Bulgaria, Croatia and Latvia have a more

modest performance. 15.6% of total scientific publications in Switzerland are cited within the top 10% of most cited scientific publications worldwide.

Our correspondents assessed legislative changes that might impact university performance in research (as measured here as the number of scientific top publications). Overall it appears that research performance has the attention of the national legislators, well realizing that legislative changes only have an impact on the mid-term.

In the Netherlands, performance in research may decrease in the near future, as the Dutch government plans to reduce substantially the R&D budget.

In Bulgaria, the new Law on Scientific Research Promotion, the new schemes of the National Research Fund and the National Roadmap for Research Infrastructure (2010) are designed to improve the research performance of universities. The recent changes in submitting and evaluating research proposals may lead to better research performance in Greek higher education institutions. The creation of the Estonian Research Council by the Ministry of Education and Research in 2012 to independently evaluate research applications and to support and develop R&D activities and policies will possibly have an effect on universities' performance in research, as it will provide more incentives for it. In France, further incentives would be required in addition to the recent creation of the Agence Nationale de la Recherche as well as various other initiatives

In Ireland, there has been a concerted effort to create an on-line repository of Irish Research (www.rian.ie) and to ensure that Thomson Reuters (which is used by government agencies) has an accurate account of Irish research. Further initiatives are being undertaken with the intention of ensuring that:

- 1) Researchers are aware of the importance of making their research visible.
- 2) There is a common platform and there are common definitions for recording research. Forfas, the state agency responsible for science and technology policy, collects data biennially. The research performance of Irish institutions has largely increased thanks to these initiatives.

In Malta, the most significant change is the freeing-up of well-funded researchers from teaching duties, to focus exclusively on research. One major challenge to date is the self-image of the University as primarily a teaching institution. As a result, many academics are overworked with teaching and administrative duties. Conscious of this fact, the University of Malta does not have a "publish or perish" culture but strives for general improvements.

In Croatia and Portugal, measures taken to reduce the impact of the crisis have led to reductions in R&D funding, making high research performance more difficult for universities. Austrian universities face an increasing competition for research funding while the amount of publicly available funding is decreasing. The UK, a generally high performing research country, faces severe funding cuts, making research performance increasingly difficult.

4.2.2 International visibility and attractiveness.

University performance in research is also measured by the presence of universities of a certain country among the top 500 institutions correcting for population size, as a way to capture the international visibility of the higher education system of a given country (rather than as a way to rank universities in these countries) and illustrated in Table 4-5 We are also aware of the restrictions based on the methodologies that these rankings have. They are as good as the indicators and data they use.

Table 4-5: International attractiveness indicators.

COUNTRY	Top500 Uni.	COUNTRY	Top500 Uni.	COUNTRY	Marie Curie fellows	COUNTRY	Marie Curie fellows	COUNTRY	ERC wins	COUNTRY	ERC wins
Austria	0.83	Sweden	1.17	Austria	4.45	Switz.	8.16	Austria	1.55	Netherl.	2.82
Belgium	0.64	Finland	0.93	Belgium	3.66	UK	7.80	Belgium	1.92	Switz.	2.79
Bulgaria	0.00	Switz.	0.89	Bulgaria	0.00	Netherl.	6.58	Bulgaria	0.00	UK	1.98
Cyprus	0.00	Austria	0.83	Cyprus	1.27	Denmark	6.57	Cyprus	0.00	Belgium	1.92
Czech Rep.	0.09	Norway	0.81	Czech Rep.	0.29	Ireland	4.77	Czech Rep.	0.09	Finland	1.86
Denmark	0.72	Netherl.	0.78	Denmark	6.57	Austria	4.45	Denmark	1.80	Denmark	1.80
Estonia	0.00	Denmark	0.72	Estonia	0.00	Sweden	4.03	Estonia	0.74	Austria	1.55
Finland	0.93	Ireland	0.67	Finland	1.89	Belgium	3.66	Finland	1.86	Sweden	1.49
France	0.32	Belgium	0.64	France	3.14	Norway	3.38	France	0.87	Ireland	1.34
Germany	0.48	UK	0.59	Germany	1.57	France	3.14	Germany	0.78	Norway	1.02
Greece	0.18	Slovenia	0.49	Greece	0.80	Malta	2.44	Greece	0.35	France	0.87
Hungary	0.20	Germany	0.48	Hungary	0.30	Slovenia	1.99	Hungary	0.30	Germany	0.78
Ireland	0.67	Italy	0.36	Ireland	4.77	Finland	1.89	Ireland	1.34	Estonia	0.74
Italy	0.36	France	0.32	Italy	1.31	Germany	1.57	Italy	0.46	Spain	0.54
Latvia	0.00	Spain	0.24	Latvia	0.00	Italy	1.31	Latvia	0.00	Slovenia	0.49
Lithuania	0.00	Croatia	0.23	Lithuania	0.00	Cyprus	1.27	Lithuania	0.00	Italy	0.46
Lux.	0.00	Hungary	0.20	Lux.	0.00	Spain	1.26	Lux.	0.00	Greece	0.35
Malta	0.00	Portugal	0.19	Malta	2.44	Greece	0.80	Malta	0.00	Hungary	0.30
Netherl.	0.78	Greece	0.18	Netherl.	6.58	Portugal	0.75	Netherl.	2.82	Czech Rep.	0.09
Poland	0.05	Czech Rep.	0.09	Poland	0.08	Hungary	0.30	Poland	0.05	Poland	0.05
Portugal	0.19	Poland	0.05	Portugal	0.75	Czech Rep.	0.29	Portugal	0.00	Bulgaria	0.00
Romania	0.00	Turkey	0.01	Romania	0.05	Poland	0.08	Romania	0.00	Cyprus	0.00
Slovakia	0.00	Bulgaria	0.00	Slovakia	0.00	Romania	0.05	Slovakia	0.00	Latvia	0.00
Slovenia	0.49	Cyprus	0.00	Slovenia	1.99	Turkey	0.01	Slovenia	0.49	Lithuania	0.00
Spain	0.24	Estonia	0.00	Spain	1.26	Bulgaria	0.00	Spain	0.54	Lux.	0.00
Sweden	1.17	Latvia	0.00	Sweden	4.03	Estonia	0.00	Sweden	1.49	Malta	0.00
UK	0.59	Latvia	0.00	UK	7.80	Latvia	0.00	UK	1.98	Portugal	0.00
Croatia	0.23	Lithuania	0.00	Croatia	0.00	Lithuania	0.00	Croatia	0.00	Romania	0.00
Iceland	0.00	Lux.	0.00	Iceland	0.00	Lux.	0.00	Iceland	0.00	Slovakia	0.00
Norway	0.81	Malta	0.00	Norway	3.38	Slovakia	0.00	Norway	1.02	Croatia	0.00
Switz.	0.89	Romania	0.00	Switz.	8.16	Croatia	0.00	Switz.	2.79	Iceland	0.00
Turkey	0.01	Slovakia	0.00	Turkey	0.01	Iceland	0.00	Turkey	0.00	Turkey	0.00
		Iceland	0.00								
Average	0.34	Average	0.34	Average	2.08	Average	2.08	Average	0.73	Average	0.73

Table 4-5 shows that Sweden, Finland and Switzerland have the most universities in the top 500 proportionally to population size.

The ability to attract, train and retain the most talented researchers in Europe is measured by the number of incoming Marie Curie fellows in a given country as well as the number of winners of European Research Council Starting Grants (as before controlling for the population using the number of

inhabitants in a country, in millions¹⁰). This table shows that that Switzerland, the UK, and the Netherlands are the most attractive to Marie Curie fellows.

The Netherlands, Switzerland and the UK rank far above the EU average in terms of starting Principal Investigator grant winners (ERCwins in the Table). Incentives for research, including an external evaluation every six years by an independent peer review group and an internal evaluation every three years, which stresses the international value of research groups in its standard protocol, may positively influence the research competitiveness of Dutch universities (VSNU, 2012).

4.2.3. Connectivity.

Universities are connected to their environments, university researchers operating in a network where they frequently interact with private actors, during conferences and workshops, consultancy work or supervising students who will work in firms (Verspagen, 2006: 629). The level of connections of higher education systems with their environment is indicated by the number of annual public-private co-publications. Higher education systems are mostly public across Europe. The private domain may include private higher education institutions, as well as businesses and other private organisations which conduct research. Table 4-6 presents the numbers of co-publications between the public and the private sectors.

¹⁰ Population at the 1st of January 2012 according to Eurostat for 2011, last updated on the 06th of March 2012

Table 4-6 Co-publications between the public and the private sectors.

COUNTRY	Co-publications	COUNTRY	Co-publications
Austria	56.3	Switz.	198.5
Belgium	61.5	Iceland	170.0
Bulgaria	2.3	Denmark	123.2
Cyprus	8.3	Sweden	117.3
Czech Rep.	24.7	Norway	110.6
Denmark	123.2	Finland	104.7
Estonia	19.0	Netherl.	90.0
Finland	104.7	UK	61.7
France	31.8	Belgium	61.5
Germany	49.5	Austria	56.3
Greece	12.5	Slovenia	51.0
Hungary	19.6	Germany	49.5
Ireland	25.8	France	31.8
Italy	20.7	Ireland	25.8
Latvia	2.0	Lux.	24.9
Lithuania	3.0	Czech Rep.	24.7
Lux.	24.9	Italy	20.7
Malta	1.2	Hungary	19.6
Netherl.	90.0	Estonia	19.0
Poland	2.5	Croatia	17.7
Portugal	8.7	Spain	15.9
Romania	6.3	Greece	12.5
Slovakia	10.3	Slovakia	10.3
Slovenia	51.0	Portugal	8.7
Spain	15.9	Cyprus	8.3
Sweden	117.3	Romania	6.3
UK	61.7	Lithuania	3.0
Croatia	17.7	Poland	2.5
Iceland	170.0	Bulgaria	2.3
Norway	110.6	Latvia	2.0
Switz.	198.5	Turkey	1.7
Turkey	1.7	Malta	1.2
Average	45.4	Average	45.4

Switzerland, Iceland, Denmark and Sweden appear as the highest performers in terms of co-publications, as Table 4.6 shows. Denmark, the first top EU country, has 123 co-publications per million inhabitants, Switzerland 198.5 co-publications per million inhabitants.

A co-funding rule in performance-based public funding allocation, coupled with an increase in R&D investment from the Government (from 0.9% of GDP in 2008 to 1.08% at the end of 2011, may contributed to the comparatively high level of co-publications in Denmark.

Strong correlations exist between the level of funding on the one hand and on the other the research and education performance of the higher education system in a country. Indicators of research performance directly correlate to public expenditure. The higher is the level of public expenditure (per student as a % of GDP per capita) is, the higher the number of scientific publications and co-publications, as well as international visibility and attractiveness (with more incoming Marie curie fellows and ERC grant wins).

5. Measuring economic performance.

Our assessment of university policy takes place through the lens of the contribution of higher education to economic growth. We realize that the impact of the performance of universities measured through the quantity and quality of graduates and research will only affect economic growth with a relatively substantial time delay and with a variable impact (for instance, depending on the composition by subjects and the capacity of demand to absorb them in an efficient way). In economics, the performance of universities only affects the inflow of new graduates on the labour force. This inflow constitutes of no more than around 5-10% of the total graduate labour force at a maximum (i.e. in the times of the great expansion of higher education). Thus, only a sustained high level of quality over a long period of time will be visible in economic growth with a time lag of some 20-30 years. In research, on the other hand, the return to investment is visible at an earlier stage, given that research can be adequately translated into new firms with new products and services or into new products and services in existing firms.

We also realize that the impact of higher education on growth depends on the state of technological advancement of the economy. Countries with a larger high tech sector (as described by Aghion et al., 2009: closer to the technology frontier and with higher per capita incomes) will have more to profit from higher education and research than countries in the converging state.

To account for this complexity we present in section 5.2, the two variables we have chosen to indicate international competitiveness and innovation, namely the percentage of knowledge workers and labour productivity. We have refrained from the available composite measures of innovation as they contain many variables which we have already included in university performance.

5.1. Realized economic growth.

Cumulative economic growth for the EU Member States in the period 2000-2010 is presented in the Table 5-1.

Table 5-1: Cumulative economic growth (score), 2000-2010.

Countries	Cumulative Economic Growth	Countries	Cumulative Economic Growth
Austria	16.63	Slovakia	59.69
Belgium	14.41	Lithuania	53.27
Bulgaria	48.8	Romania	49.15
Cyprus	32.15	Bulgaria	48.8
Czech Rep.	36.9	Poland	46.39
Denmark	6.61	Estonia	45.93
Estonia	45.93	Latvia	43.23
Finland	20.29	Czech Rep.	36.9
France	11.72	Luxemb.	35.11
Germany	9.46	Cyprus	32.15
Greece	26.14	Slovenia	30.28
Hungary	20.48	EU aver.	27.02
Ireland	26.62	Ireland	26.62
Italy	2.53	Greece	26.14
Latvia	43.23	Spain	22.67
Lithuania	53.27	Sweden	22.36
Luxemb.	35.11	Hungary	20.48
Malta	19.63	Finland	20.29
Netherlands	14.5	Malta	19.63
Poland	46.39	Austria	16.63
Portugal	6.8	UK	15.05
Romania	49.15	Netherlands	14.5
Slovakia	59.69	Belgium	14.41
Slovenia	30.28	France	11.72
Spain	22.67	Germany	9.46
Sweden	22.36	Portugal	6.8
UK	15.05	Denmark	6.61
EU aver.	27.02	Italy	2.53
Croatia	30.14	Croatia	30.14
Iceland	.	Iceland	.
Norway	16.49	Norway	16.49
Switzerland	.	Switzerland	.
Turkey	.	Turkey	.

Source: International Monetary Fund, World Economic Outlook Database, 2011.

Table 5.1 shows that the high growth rates were part of the convergence between Central/ Eastern Europe and Western Europe (Gill and Raider, 2012 call this the “converge machine Europe”): Slovakia, Lithuania, Romania, Bulgaria, Poland, Estonia, Latvia and the Czech Republic, all countries with a relatively low GDP per capita (see Figure 1.2).

Cumulative economic growth is the indicator of the evolution of a country’s economy which we aim at concentrating on as the goal for higher education policies. However, the size of cumulative growth for each of the EU member states depends on the starting point as well as the final year of the period under consideration. The period under consideration is characterized by:

-Continued convergence between Central and Eastern European countries and Western Europe. This convergence has started soon after the demise of the USSR. This explains the high positions of those countries in cumulative economic growth ranking displayed in the table above. Both Central and Eastern European economies registered strong growth because they were in an intensive development phase and thus they were “catching up”.

-The financial crisis of 2008 and the debt crisis of 2011 have significantly worsened the positions of Greece, Italy, Ireland, Portugal and Spain which in the years preceding the crisis (i.e. until 2008) had a higher level of economic growth. What is more, the situation of the aforementioned countries is

expected to worsen even further and at the end of 2013 they are likely to be much lower, possibly even at the very bottom of cumulative economic growth. Those predictions are based on serious economic contraction observed in 2011 and 2012 most notably in Greece, but also visible in the other countries with high Government deficits and indebtedness in 2012: Italy, Ireland, Portugal and Spain (South-Western European countries). Greece is expected to decrease from 2010 to 2013 (after a decrease by some 7% between 2008 and 2010) by some 10%, Ireland is (slightly) growing again and Italy, Portugal and Spain are around a minus 2-5 % growth.

The disparities in cumulative economic growth in the EU member states can therefore be best explained by differences in indebtedness and budget deficits on the one hand and in convergence on the other. Higher education and research only enter the equation, after we account for these more basic trends, in “explaining” the differences within the group of converging countries and within the group of the South-Western European countries, i.e. Greece, Italy, Ireland, Portugal and Spain.

5.2. Innovation.

Therefore, rather than using cumulative economic growth in our analysis, we focus on innovation as the translation of the performance of universities into economic growth, while acknowledging that innovation themselves are precursors to long-run growth (OECD, 2007). Those variables are more likely to be affected by higher education performance than (cumulative) economic growth considering its strong dependence on Government deficits and Government indebtedness nowadays. To account for and measure innovation in the EU countries, we used the percentage of employees in knowledge intensive industries and labour productivity (GDP per capita produced per hour worked in purchasing power standard). Labour productivity and the percentage of employees in knowledge intensive activities help us to measure the output of the system. The more innovative an economy is, the more GDP would be created by the labour force.

The percentage of the workforce in knowledge intensive industries relative to total employment is chosen with the assumption that the bigger the knowledge intensive sector is in number of employees, the more innovative and competitive the countries are. The countries with a high level of employment in knowledge intensive activities generally tend to fare well (i.e. above the EU average) in the innovation index. The same holds true for productivity and innovation (with the CEE countries as an exception).

For missing data on labour productivity, we have used GDP per hour worked in current prices for Turkey and Iceland, and interpolated the value for Croatia using GDP per capita.

Table 5-2: Labour productivity (GDP per hour worked in PPS€) and knowledge employment as a proportion of total employment.

COUNTRY	Know. empl.	COUNTRY	Know. empl.	COUNTRY	Labour prod.	COUNTRY	Labour prod.
Austria	35.4%	Lux.	56.2%	Austria	€ 38	Lux.	€ 60
Belgium	41.4%	Iceland	43.0%	Belgium	€ 43	Norway	€ 56
Bulgaria	26.0%	UK	42.8%	Bulgaria	€ 14	Netherl.	€ 45
Cyprus	33.9%	Sweden	42.3%	Cyprus	€ 26	Belgium	€ 43
Czech Rep.	29.2%	Switz.	42.0%	Czech Rep.	€ 21	France	€ 41
Denmark	39.2%	Belgium	41.4%	Denmark	€ 38	Germany	€ 41
Estonia	31.8%	Ireland	41.1%	Estonia	€ 21	Ireland	€ 40
Finland	36.5%	France	39.5%	Finland	€ 36	Austria	€ 38
France	39.5%	Denmark	39.2%	France	€ 41	Denmark	€ 38
Germany	37.3%	Malta	38.8%	Germany	€ 41	Sweden	€ 38
Greece	31.6%	Norway	38.7%	Greece	€ 25	Switz.	€ 37
Hungary	33.5%	Netherl.	37.4%	Hungary	€ 20	Finland	€ 36
Ireland	41.1%	Germany	37.3%	Ireland	€ 40	Italy	€ 35
Italy	33.0%	Finland	36.5%	Italy	€ 35	Spain	€ 35
Latvia	30.1%	Austria	35.4%	Latvia	€ 16	UK	€ 34
Lithuania	31.2%	Cyprus	33.9%	Lithuania	€ 18	Iceland	€ 31
Lux.	56.2%	Hungary	33.5%	Lux.	€ 60	Cyprus	€ 26
Malta	38.8%	Italy	33.0%	Malta	€ 26	Malta	€ 26
Netherl.	37.4%	Slovenia	31.9%	Netherl.	€ 45	Slovakia	€ 26
Poland	28.0%	Estonia	31.8%	Poland	€ 18	Slovenia	€ 26
Portugal	27.9%	Greece	31.6%	Portugal	€ 22	Greece	€ 25
Romania	19.8%	Lithuania	31.2%	Romania	€ 14	Turkey	€ 22
Slovakia	29.1%	Spain	30.3%	Slovakia	€ 26	Portugal	€ 22
Slovenia	31.9%	Latvia	30.1%	Slovenia	€ 26	Czech Rep.	€ 21
Spain	30.3%	Czech Rep.	29.2%	Spain	€ 35	Estonia	€ 21
Sweden	42.3%	Slovakia	29.1%	Sweden	€ 38	Croatia	€ 21
UK	42.8%	Poland	28.0%	UK	€ 34	Hungary	€ 20
Croatia	27.4%	Portugal	27.9%	Croatia	€ 21	Lithuania	€ 18
Iceland	43.0%	Croatia	27.4%	Iceland	€ 31	Poland	€ 18
Norway	38.7%	Bulgaria	26.0%	Norway	€ 56	Latvia	€ 16
Switz.	42.0%	Romania	19.8%	Switz.	€ 37	Bulgaria	€ 14
Turkey	18.4%	Turkey	18.4%	Turkey	€ 22	Romania	€ 14
Average	34.5%	Average	34.5%	Average	€ 31	Average	€ 31

Table 5.2 combined with the information on the differences in GDP per capita in Europe of Figure 1.2 gives an impressionistic view of the relation between cumulative growth, labour productivity and the percentage of workers in knowledge intensive industries. Countries with above average labour productivity and employment in knowledge intensive industries are Western and Northern European countries, bar Malta (for knowledge employment). 56% of employees in Luxembourg are employed in a knowledge intensive industry and they produce 60 euros of GDP per hour worked.

This may suggest that Western and Northern European countries achieve higher GDP per capita with high innovation. Central and Eastern European Countries had a strong rate of cumulative economic growth between the years 2000 and 2010. They have made much faster strides when compared to Western and Northern Europe as their initial levels of GDP per capita were much lower. Hungary is the only exception: it fared less well than the EU mean in terms of economic growth. Innovation and global competitiveness did not play as clearly a role for the ranking of the CEE countries in cumulative economic growth as in the case of Western and Northern European countries in the first decade of the 21st century. These factors (innovation) will however become more important in the near future, as countries have made a major convergence leap and as the BRIC countries are entering in competition with them. The third group of countries is constituted by the South-western European countries (Greece, Italy, Ireland, Portugal, and Spain) which found themselves in the center of the debt crisis. They are more modest in innovation (in relation to their GDP per capita, see Figure 1.2). And their performance is lower than one would expect from their “closeness to the production frontier”.

6. Grouping national higher education policies in Europe.

In the preceding we have laid the ground work for an assessment (scoring) of the quality of university policy for progress in the EU. This chapter presents the way we assessed the “quality” of national higher education policies, namely how we computed the scores for the country policies of the 33 countries we considered. The score for the “quality” of higher education policy is based on the impact of the policy on the performance of higher education and on its economic output which has been described in the preceding chapters. For this purpose we have firstly, factorized separately the policy variables, the performance variables and the economic output variables (see section 6.1).

Secondly, we have estimated the statistical relations between the factors (see section 6.2).

The sizes of these statistical relations determine the weight to be attached to the policy in view of the economic output (see section 6.3). We compute a score by multiplying these weights to the fitted values corresponding to the factors for each country. This approach follows the OECD and European Commission handbook (2008)). The last sections of this chapter include tests of reliability and robustness regarding our assessment, as well as an interpretation of these values.

6.1. Factorizing policy, performance and economic output.

As input for the scoring we have first standardized the values of all the different variables used (and discussed in chapters 3-5) with a mean of 0 and a standard deviation of 1 and used the minimum and the maximum values for all the values to be superior to 0.

We have then used a factor analysis with a non-orthogonal (oblique) rotation, called “direct oblimin”. A rotation allows us to make the output more understandable, by producing a pattern of loadings where items load more strongly on one factor and more weakly on others. Non-orthogonal rotation allows the factors to correlate between each other, and we allowed factors to correlate at $0.3 < \gamma < 0.8$; γ standing for the correlation coefficient gamma, 0.3 for the policy and performance factors and 0.8 for the economic factors (Jenrich, 1979).

Relevant factors for each of the three groups of variables (policy, performance an economic output) were then selected based on their eigenvalue (>1) and factor loadings (≥ 0.6) as per convention. Table 6.1 presents the different factors.

Table 6-1: List of factors and corresponding indicators.

Dimension	Factor	Indicator	factor
	Funding	Tertiary Education Expenditure per student relative to GDP per capita Expenditure on financial aid Role of formulas and contracts in funding mechanism	p1 p1 x
Policy	Policy autonomy Managerial autonomy	Policy Autonomy Organizational Autonomy Financial autonomy	p2 p3 p3
Performance	Research attractiveness and productivity	Scientific publications within the 10% most cited scientific publications worldwide as a percentage of total scientific publications per country	q1
		Universities in the top 500 ARWU ranking per million inhabitants	q1
		Number of incoming yearly Marie Curie fellows per million inhabitants	q1
		Number of yearly European Research Council Starting grant wins per million inhabitants	q1
	Size	Public-private scientific co-publications per million inhabitants	q1
		Transition: students with non-tertiary education background transitioning into higher education (%) Enrollment /population aged 20 years old	q2 q2
	Graduation and employment	Employment rates of 18-34 years old, 3 years after leaving formal education (ISCED 5 and 6) Graduates in ISCED 5 and 6 / enrollment	q3 q3
		Foreign students: Inward mobile students as percentage of student population in the host country (%)	x
Econ. output	Innovation	Employment in Knowledge Intensive Industries as a percentage of total employment GDP per hour worked in PPSE	e1

The pattern matrix provided us with the following factor loadings. In the policy domain we find three factors which have been named as follows¹¹:

P1: “Funding”, loaded by expenditure per student (.78) and expenditure on loans and grants (.87).

P2: “Policy autonomy”, loaded by itself (.84).

P3: “Managerial autonomy”, loaded by organizational autonomy (.83) and financial autonomy (.74).

Note that the role of formulas and contracts in funding mechanisms does not emerge as a factor, while also not having a significant load on other factors.

In the performance domain also three factors emerge:

Q1: “Research attractiveness and productivity”, loaded by top scientific publications (.90), the number of universities in the top 500 ARWU ranking as a percentage of the EU population (.94), incoming Marie Curie fellows (.90), the number of ERC Starting grants (.94) and the number of public private co-publications (0.75).

¹¹ The numbers between brackets represent factor loadings.

Q2: “Size of the sector”, loaded by enrollment rates (.78) and the percentage of students who transition into higher education (.79).

Q3: “Graduation rate and employability”, loaded by graduation rates (0.87) and employment rates (0.71).

Innovation is factorized into one factor with loads:

e1: the percentage of employees in knowledge intensive industries (0.84) and labour productivity (.84)

6.2. Weights based on the statistical strength of the relation between factors.

We then compute a weight for each of the policy factors, based on its statistical relation with economic output, using the variance inherent in the data for the 32 countries. The regression coefficients are presented in Table 6.2 for the relations between performance and economic output and in Table 6.2 for the relations between policy and performance.

Table 6-2: The impact of research attractiveness and productivity (q1), size (q2) and graduation rate and employability (q3) on economic innovation.

	Coef.	Std. Err.	P>t
Research	0.54	0.119	0.00
Size	-0.26	0.120	0.04
Grad/empl	0.04	0.119	0.75
_cons	0.00	0.116	1.00
R2 = 0.50; N = 32			

This Table 6.2 shows that scientific appeal, graduation/employability and international openness positively influence a country’s economic innovation: increasing scientific appeal by one unit corresponds to a 0.54 unit increase in economic innovation, all other variables held constant. However, the relative size of the student body and the percentage of students who transition from a non-traditional background to higher education, does not have a positive relationship with the country’s economic output.

It is therefore, not so much the quantity of students which matters, but the propensity of the higher education system to generate quality education (reflected through employment/graduation and attractiveness to international students) as well as research, which improves the country’s economic output. We therefore put a zero weight on student size as a university performance factor for determining the country’s score, given that it does not constitute a positive explanation for a country’s innovation.

The p-value indicates that we are more confident regarding the significance of this finding to a broader hypothetical population for research rather than education indicators. This p-value -level of significance- is a function of the size of the sample and is not a measure of effect size. High p-values could indicate that our interpretation should be limited to the European countries given our small sample size rather than making broader inferences to a hypothetical population.

The Tables 6.3, 6.4 and 6.5 present the regressions for the policy factors on the two remaining performance variables: research attractiveness and productivity (q1), graduation rate and employability (q3). In general, funding has a higher and more positive impact on research performance than managerial and policy autonomy. This is expected as the measurements for autonomy are far more “fuzzy” than those of funding.

Table 6-3: The impact of policy factors on research attractiveness and productivity.

	Coef.	Std. Err.	P>t
Funding	0.57	0.148	0.00
Policy aut.	-0.10	0.149	0.50
Manag. Aut.	0.31	0.147	0.05
_cons	0.00	0.143	1.00
R2 = 0.40; N = 32			

An increase in funding (expenditure per student as a percentage of GDP per capita or expenditure on financial aid) significantly corresponds to an increase in research performance and attractiveness (an increase of one unit in the former factors leads to an increase of 0.57 units in the latter one). Managerial autonomy (which includes organizational and financial autonomy) has a more significant and more sizeable impact on research than policy autonomy. An increase in managerial autonomy by one unit results in a 0.31 unit increase in research attractiveness and productivity (at $p \leq 0.05$). Policy autonomy does not have a positive or significant impact on research attractiveness and productivity.

Table 6-4: The impact of policy factors on graduation and employment.

	Coef.	Std. Err.	P>t
Funding	-0.14	0.183	0.44
Policy aut.	0.27	0.184	0.15
Manag. Aut.	-0.13	0.181	0.46
_cons	0.00	0.177	1.00
R2 = 0.09; N = 32			

The relation between funding (p1) and managerial autonomy (p3) on the one hand and the students’ likelihood to graduate and find employment three years after graduation (q3) on the other is not significant. Policy autonomy positively relates to graduation and employment. A one unit increase in policy autonomy corresponds to an increase in graduation and employment by 0.27 all other variables being held constant (at $p \leq 0.25$).

A plausible interpretation is that policy autonomy increases student graduation by providing the academic staff the ability to design their own courses and tailor them to the needs of their students in order to facilitate their learning and the acquisition of skills relevant to the labour market.

6.3. Assessing the university policy of country x.

The university policy of a country (say country x) is measured by its “score” on the different policy variables which have been identified. Those “scores” are brought together into three factors for each country, based on the statistical factor loads.

The quality of the country’s university policy is computed by multiplying the size of each of the factors with the weights.

The weights are the beta coefficients which measure on the one hand the impact of these factors on performance and on the other the impact of performance factors on economic output. These weights are calculated by simply multiplying these two beta coefficients, assuming a linear relationship.

In other words, in our framework we have assessed the two steps in the relation between policy and economic output assuming a relationship between the following three dimensions:

Policy → research and performance → economic output.

We only use the positive beta coefficients of the Tables 6.3-6.5. The score on the policy quality scale (how well each country’s policy impacts the economic performance given the performance factors), can then be determined by the following relation¹²:

$$\text{Score} = (0.54 \cdot 0.57 \cdot p_1) + (0.54 \cdot 0.31 \cdot p_3) + (0.04 \cdot 0.27 \cdot p_2)$$

Each of the policy factors has as a result obtained the weights presented in Table 6.6.

Table 6-5: Weight of policy factors on economic innovation.

Funding	0.54*0.57	0.30
Policy autonomy	0.04*0.27	0.01
Managerial autonomy	0.54*0.31	0.16

Table 6-6 shows that funding is attributed the largest weight as it exceeds the ones of managerial and policy autonomy.

These weights show that one unit of funding would equal nearly twice the more effort in managerial autonomy (1.8, which comes from 0.30/0.16) and is thirty times more influential than policy autonomy on universities’ relevance for the economic output (0.30/0.01).

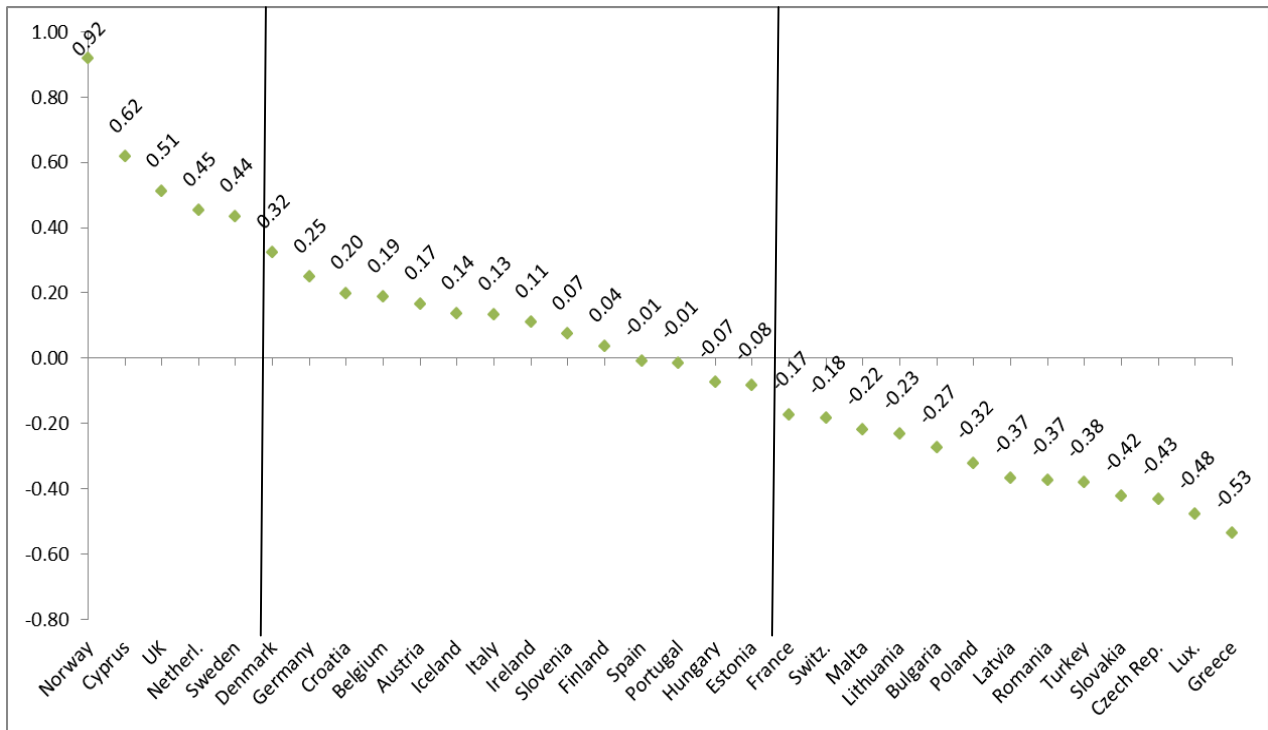
The results of the scoring are presented in Figure 6.1. These scores have an intuitive meaning. They indicate the likely increase in economic output/innovation resulting from a one unit increase in the

¹² In order to compile these scores, we only take the factors for which we are confident that the same results would occur in a broader population at $p < 0.25$.

policy factors. The presence of negative scores in Figure 6.1 is due to our standardization of the policy variables (with an average of zero and a standard deviation of one).

Notice that all relations have been assumed to be linear. The investigation of a possible (and likely!) interaction between funding and autonomy is beyond the scope of this study.

Figure 6-1: The quality of university -policy in European countries.



These scores provide a basis to group countries given the proximity between their scores (Tables of scores and differences between country scores are included in an appendix).

Norway, Cyprus, the UK, the Netherlands and Sweden appear as the countries with the highest impact of higher education policies on innovation potential. The UK is the only larger EU country in the top league. Cyprus has the highest funding per capita as a percentage of GDP as well as one of the most generous financial aid policies

The 'middle group' includes Denmark, Germany, Croatia, Belgium, Austria, Iceland, Italy, Ireland, Slovenia, Finland, Spain, Portugal, Hungary and Estonia.

Then there is a more modest group with France, Switzerland, Malta, Lithuania, Bulgaria, Poland, Latvia, Romania, Turkey, Slovakia, the Czech Republic, Luxembourg and Greece. .

The relatively low score for very small countries, like Luxembourg and Malta may be due to the fact that both have only one university (in the case of Luxemburg relatively recent) instead of a whole university system. At the same time the Government in Luxembourg spends less on its university than other countries with a similar or lower GDP per capita.

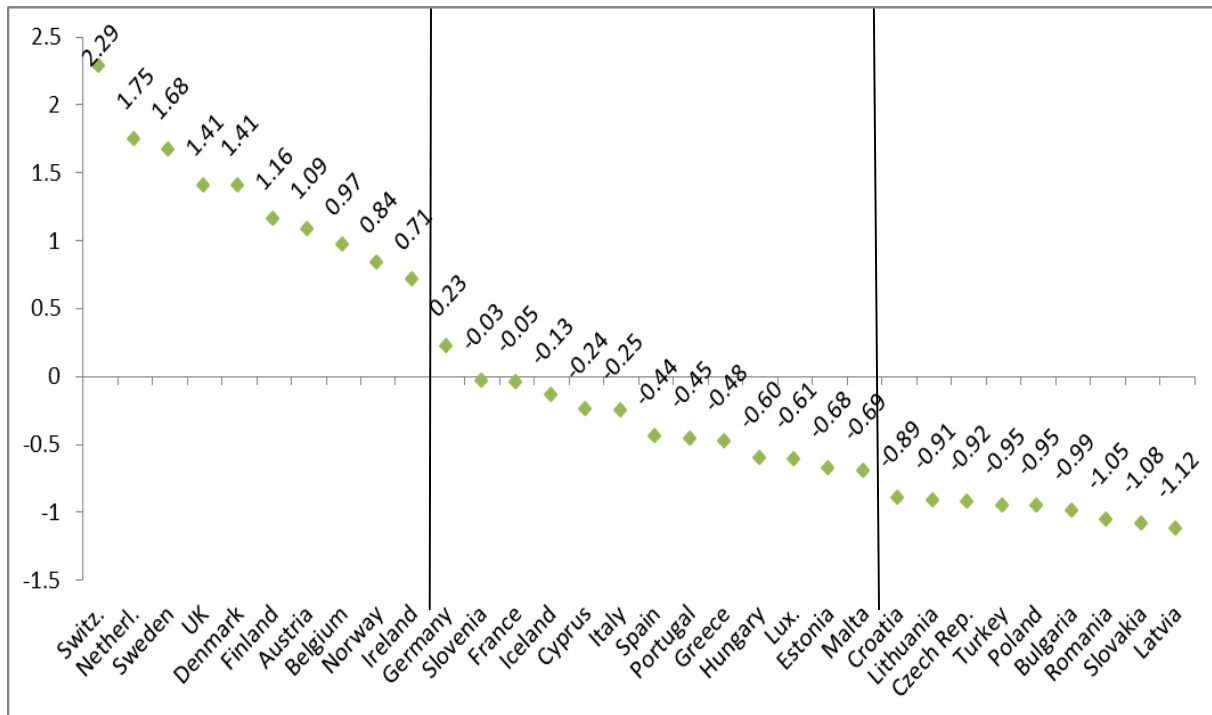
The middle group constitutes the largest category with fourteen countries.

Remember that in our analysis we are referring to policies from 2008. Since then many changes were introduced which gave rise to the correspondents view on possible changes in the scores as described in Section 6.7.

6.4 Disaggregated scores.

As a background for Figure 6.1 we present here Figure 6.2 , 6.3 and 6.4 with the scores of countries, when research attractiveness and productivity (in Figure 6.2) graduation and employment rates (in Figure 6.3) and international openness (Figure 6.5) are considered as expressions of the quality of the policy. Notice however that these are factor scores, and not computed using policy variables.

Figure 6-2: Scores on research attractiveness and productivity.



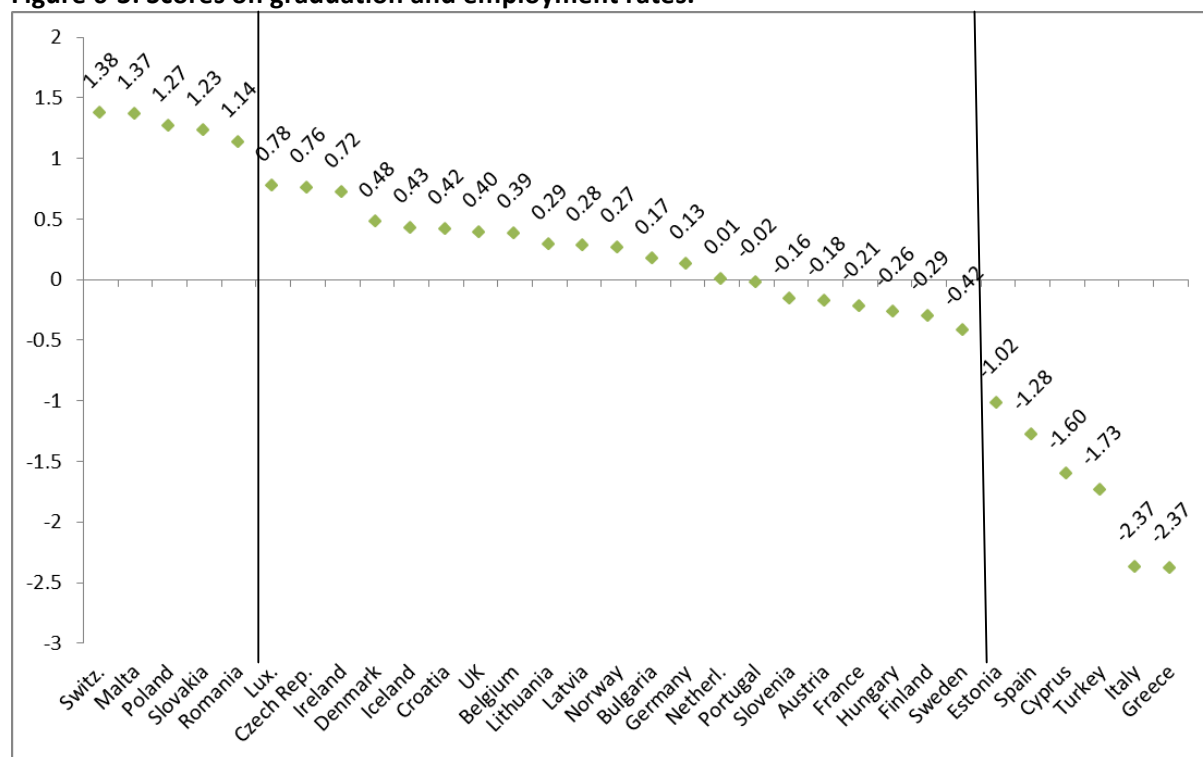
In terms of research attractiveness and productivity, top performers in Europe include Switzerland, the Netherlands, Sweden, the UK, Denmark, Finland, Austria, Belgium, Norway and Ireland

A middle group includes Germany, Slovenia, France, Iceland, Cyprus, Italy, Spain, Portugal, Greece, Hungary, Luxembourg, Estonia and Malta.

A more modest group includes Croatia, Lithuania, the Czech Republic, Turkey, Poland, Bulgaria, Romania, Slovakia and Latvia.

There is some variation in terms of the research performance of the top group than for the middle and more modest groups. The range between the scores of the top group is 0.48, for the middle group 0.41 and for the more modest group 0.36.

Figure 6-3: Scores on graduation and employment rates.



In terms of graduation and employment rates, top performers include Switzerland, Malta, Slovakia, Poland, Romania,. The middle group includes Luxembourg the Czech Republic, Ireland, Denmark, Iceland, Croatia, the UK, Belgium, Lithuania, Latvia, Norway, Bulgaria, Germany, the Netherlands, Portugal, Slovenia, Austria, France, Hungary, Sweden and Estonia. A more modest group includes Spain, Cyprus, Turkey, Italy and Greece.

The top group appears to be more coherent than the middle and more modest groups, given that it has variations between scores of 0.24 as opposed to a range above 1.19 for the middle and 1.36 for the more modest groups.

A comparison of these disaggregated scores with Figure 6.1 shows the importance and influence of policies, which increase the research capacities in countries on their economic innovation, as is the case for Sweden, the Netherlands or the UK and Switzerland. However, highly productive research does not necessarily correspond to high graduation and graduate employment rates (the correlation between these two scores is close to zero).

The policies of countries like France and Germany do not seem to positively influence graduation and employment rates. Drop- out rates after the first year of university are notoriously high in France, where the reforms related to the Bologna process of the late 1990s highlighted the average failure rate as 55%ⁱ. Greece and Italy are the lowest in Europe in terms of graduation and employment rates. Some other countries fare better in terms of how their policies contribute to graduation and employment, such as Switzerland or Malta. For example, Malta reported a high graduate employment rate three years after graduation (of 91.5%) and one of the highest graduation rates as a proportion of total enrollments (of 28%) in Europe in 2010.

6.5 Sensitivity analysis and tests of robustness.

In the course of the production of this report a great variety of alternative specifications have been researched, amongst others by using different variables than the ones reported here. In the sensitivity analysis presented in this chapter we restrict ourselves to a different specification, namely by correcting the scores for the country's general economy. This assumption follows closely the Aghion et al. (2009) reasoning that higher education policy is more important the closer the country is to the production frontier. Figure 6.4 presents a scatter-plot between the overall scores of our study and GDP per capita. It appears that highly performing countries also tend to have a higher than average GDP per capita, as is the case for Sweden, Denmark, or Norway, while countries with a lower GDP per capita have a more modest score, as is the case for Slovakia, or the Romania and Bulgaria. This may indicate that country policies, especially in research which are strongly related to economic output, are very important for its economic development. At the same time it appears that less developed countries in Europe find it difficult to make quantum leaps. This is in deviation to the experience in Korea in the seventies where the country pulled itself by the hairs of research policy out of the swamp of development thresholds. Policies to ensure employability and a good throughput of higher education are also important in every step of the economic development process.

Figure 6-4: Relationship between performance on economic innovation and GDP per capita.

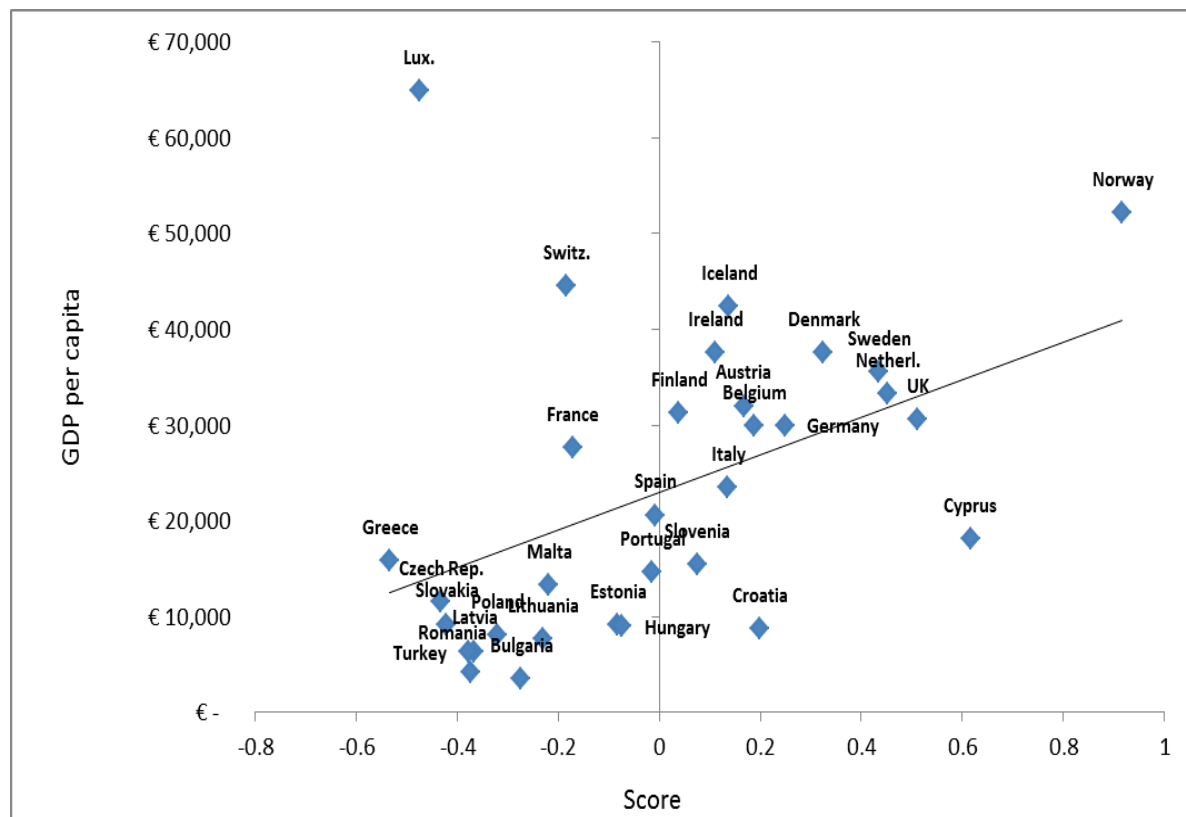


Figure 6.4 illustrates the relationship between the scores that countries have obtained and GDP per capita. It seems at first sights that highly performing countries also tend to have a higher than average

GDP per capita, as is the case for Sweden, Denmark, or Norway; while other countries with a lower GDP per capita have a more modest score, as is the case for Slovakia, or the Romania and Bulgaria.

However, the performance of some countries such as Cyprus appears to be independent from GDP per capita (as explained above from the large investments in Cypriot universities).

To check for the sensitivity of our scores to the inclusion of additional factors, we have also calculated the overall scores based on an alternative method relying on all of the regression coefficients, in contrast to the central method in which we concentrated only on those factors which were significant. This sensitivity analysis provides us with the policy weights of Table 6.6.

Table 6-6: Weights of policy factor on economic factor in a sensitivity analysis.

Funding	0.3
Policy autonomy	-0.03
Managerial autonomy	0.07

The scores which are obtained in this way are very similar to the ones of the central method (correlated at 0.94).

Our overall scores correlate well with other similar exercises ($r=0.63$), even when these were based on a-priori weights rather than weights based on empirical relations in a model. Table 6.7 presents the scores from a publication by Universitas21 published in May 2012 on the contribution of higher education to the economy which covered forty eight countries worldwide and twenty six European countries. There is some correspondence between these results and ours.

Table 6-7: Comparison with Universitas21 overall scores.

Sweden	83.63	Austria	73.76	Portugal	60.11	Greece	54.71	Slovakia	50.64	Switzerland	80.32
Finland	81.96	Belgium	73.74	Spain	59.88	Italy	54.01	Cyprus		Norway	78.03
Denmark	80.95	France	70.61	Czech Rep.	57.89	Bulgaria	52.51	Estonia		Croatia	44.93
Netherlands	77.37	Ireland	69.52	Poland	56.16	Romania	51.29	Latvia		Turkey	44.35
UK	76.76	Germany	69.43	Slovenia	55.76	Hungary	50.78	Lithuania		Iceland	
								Luxembourg			
								Malta			

Please note that the countries where no value is reported did not appear in the Universitas21 ranking.

6.6 Interpretation.

The contribution of higher education to the economy, and the impact of policy on that contribution encompass a range of complex dynamics and processes. Obviously, these relations are highly simplified in our model. Nevertheless, our analysis provides some striking conclusions.

6.6.1 General observations on policies.

The amount of funding matters more the economic innovation of a country than organizational independence measured with “fuzzy” indicators of managerial or policy autonomy. The ways, in which funding is allocated, for example through performance-related contract or incremental negotiation process, does not emerge as a significant factor with the present, highly “fuzzy” indicator for “incentives in funding”. Yet maintaining or improving the material conditions of universities in Europe is found to be a significant contributor to the generation of competitive research and quality education. Presumably incentives in funding will make funding more effective.

Policy autonomy (i.e. whether academic staff can create their own degree programs) has a significant impact on the quality of higher education, measured by the capacity of institutions to graduate students proportionally to their enrollment numbers and to integrate them in the labour market. Admittedly, employment rates are not solely a measure of higher educational quality. The embeddedness of higher education systems in a nation’s broader economic functioning influences graduates’ likelihood of integrating into the labour market (Hall and Soskice, 2001).

The tension between education and research, which is traditional at research universities, has been captured in the form of disaggregated scores. While we find that educational quality is a more significant contributor to economic innovation than the sheer size of the student body, research performance is also very important to a country’s economic innovation potential. And the mismatch between the contribution of research and education to the economic output of countries shows that more may be done by all European countries to contribute better and more efficiently to quality graduates.

Europe is marked by some homogeneity in higher education viewed through the lens of innovation (rather than polarization), with a “middle group” containing the highest number of countries. At the same time we also find for research attractiveness and productivity (not unexpectedly) a concentration around Northern and Western European countries. It is likely that this concentration has a self-reinforcing effect: highly talented students and researchers ‘vote with their feet’ by moving toward the most rewarding systems. This effect may have become accentuated by the economic crisis in the aftermath of the financial crisis of 2008. Governments of countries which are less attractive should consider this as a challenge, namely by providing as a priority the means to their higher education systems to be competitive on a European and international scale. Further convergence in Europe will depend on convergence in the quality of higher education and research.

6.6.2 Explaining differences between country scores.

The differentiated performance across Europe is not entirely contingent on the size of a country’s economy, as the example of countries like Cyprus, show. Cyprus’ GDP per capita was below the EU average in 2010, yet it is one of the countries with the most praiseworthy assessment. However, this high “score” may be the result of the period in which funding was measured. One can only expect the benefits from the Cyprus policies if these policies would remain stable over a longer period. Cyprus had a high funding per student (as a percentage of GDP per capita), but its research and educational performance is not as high comparatively to other European countries. Cypriot universities are relatively recent in Cyprus. Following the creation of three public universities in 1989, 2002 and 2003, a further four private universities have been created. The creation of public universities implies that initial investments appeared to be really high (undergraduate students do not pay fees for example). However,

the progression in public spending has been decreasing since 2007¹³ and the lower score of Cyprus in managerial autonomy shows that universities still work on improving internal processes concerning decentralization and accountability.

At the opposite end of the scale, we find Greece with lowest overall score. The Greek score is due to its financial situation (Greece having among the lowest funding for higher education and financial aid according to our 2008 data). It also related to governments' policy on autonomy: Greece has low policy and managerial autonomy scores. Greek universities are unable to manage their assets by borrowing money, or to introduce new programs (a significant factor for educational performance according to our study).

Luxembourg may appear as an outlier in our study, given a perceived mismatch between its overall wealth and higher education performance (Luxembourg having one of the highest GDP per capita in Europe, above Switzerland). Its expenditure per student as a percentage of GDP per capita is lower than several other European countries of a similar economic size and slightly lower than the Czech Republic. This mismatch may come from the novelty and small size of its university system: the University of Luxembourg was created in 2003.

6.6.3 Explaining communalities and differences across groups of countries.

The similarities in terms of national income do only partially explain the clustering of countries. For example, countries like Cyprus or Croatia are doing better than one would expect from the level of GDP per capita. The distinction between Northern and Western European Countries and Southern and Eastern European countries emerges clearly from Figure 6.1. These geographic differences may be the manifestations of the role of different higher education models (or rather ideal-types), which spread around neighboring countries and influenced the structure of the higher education system. For example, the Oxbridge model characterized by a strong emphasis on personal development influencing Anglo-Saxon countries while the Napoleonic model influenced France and Spain with a highly centralized and elitist approach (with different systems including different levels of selectivity) and the Humboldtian model with a strong tradition of independence in research and study influenced countries such as Germany, the Netherlands and Sweden, as well as the Czech Republic, Poland and Romania before 1945¹⁴. At the same time the historic roots have not been in the way of reforms: the Nordic, the Netherlands, as well as the Hungarian and Polish system all have moved into the direction of making the universities themselves fully responsible for their performance and providing with corresponding autonomy, which has been traditionally a feature of the UK system.

Several countries with high scores are parliamentary democracies where the executive is accountable to the legislative branch (Norway, Sweden, the Netherlands) where the requirement for coalitions make it challenging to adopt new laws and hence more likely to have policy stability (but not necessarily cabinet stability) than in presidential systems. This might be related to the continuity in the political environment of universities. Higher education policies tend to bring its effect to fruition over time. Volatility in policies due to the political cycle is bound to take divert the energy away from good

¹³ Republic of Cyprus Ministry of Education and Culture (2011) 'Interim report on the implementation of the strategic framework for European cooperation in education and training', p. 6, URL:

http://ec.europa.eu/education/lifelong-learning-policy/doc/natreport11/cyprus_en.pdf

¹⁴ Dearing, (1997) higher education in the learning society, URL:

http://www.leeds.ac.uk/educol/ncihe/r11_065.htm

education and research towards change processes related with compliance. Such volatility might be higher in centralised or presidential systems, such as France.

Finally, the overall scores do not necessarily reflect scores in terms of research and education performance. This is because the overall scores concentrate on policies and the disaggregated scores on performance aspects of research and education. More precisely, we multiply the predicted scores from the factors on policy by the regression coefficients between policy and performance and performance and economic innovation to obtain the overall score. And we simply use the predicted scores from the factors for the performance scores on research and innovation.

6.7 Trends in higher education policies.

In order to complement our statistical analysis and scores we referred to our correspondents and asked them for their predictions regarding trends in higher education policies and their impact. Table 6.9 presents the trends in higher education policies as assessed by our correspondents.

Table 6-8: Trends 2008-2012 in policy and their impact- correspondents' assessment.

Country	Policy					Performance			Output
	Governance	Funding				Education	Research		Innov.
	Autonomy	Research	Education	Access	Fund. Alloc.	Output	Productivity	Attactiveness	Innov.
Austria	↑	↓	↓	→	→	↓	↓	↑	↑
Belgium(FI)		↑	↓		→				
Bulgaria		↓	↓		→		→	→	
Croatia	→	↓	→	↓	→	↓	→	→	→
Cyprus	↓	↓	↓	↓	→	↓	→	→	→
C. Republic	→	↑	↓	↓	→	→	→	→	→
Denmark	↑	↑	↓	↓	→	↓	↑	↑	↑
Estonia	↑	↑	→	→	→	→	↑	↑	↑
Finland	→	↓	↓	↓	→	↓	↑	→	↑
France	↑	↓	↓	↓	→	↓	↓	→	→
Germany	→	↑	↓	→					
Greece	↑		↓	↓	↑	→	→		
Hungary	↓	→	↓	↓	→	→	↑	↑	↓
Iceland		↓	↓		→				
Ireland	↓	↓	↓	↓	→		↑		↑
Italy	→	→	→	→	→				↓
Latvia	↓		↓				↓		
Lithuania	↓	→	↓		→	↑	→		
Luxembourg		↓	↓		→				
Malta		↑	↑	↑		↑	↑	↑	↑
Netherlands	↓	↓	↓	↓	↑		↓		
Norway		↓	↓	→					
Poland	↑	↑	→	↓	→	→	↑	↑	↑
Portugal	↓	↓	↓	↓	↓				
Romania		↑		↓					
Slovakia									
Slovenia		↓	↓	↓	↓				
Spain	→	↓	↓	↓	↑	↑	→	↑	→
Sweden	↑	→	→	↑			↑		
Switzerland									
Turkey	↓	↑	↑	↑	↓	→	→	↑	↓
UK	↓	↓	→	↓	↓		↓		

The majority of the correspondents reported a negative outlook for their national higher education policies in autonomy or funding. Eight correspondents thought that the consequences on performance and economic output would be negative as well. A majority of national correspondents predict lower

levels expenditure per student for education, research or financial aid in the years to come. Most of them also indicated that the crisis negatively affected the percentage of GDP spent on research, because of austerity measures imposed in many of the observed countries. About half of respondents predict that governmental policies on funding for equity in education, through scholarships, grants and loans are likely to get worse while others see an improvement or continuation of existing levels, as for Denmark, Greece, Malta and Sweden.

Our correspondents seem to be uncertain concerning developments in research. Some think that recent national policies have kept research steady or helped universities in publishing and submitting patent applications. Others, such as the UK/England correspondents, are of the opinion that recent reductions in public funding and new incentive mechanisms could have even a detrimental effect on publications. Correspondents from eight countries explicitly commented on the economic situation in general. Hungary, Italy, Portugal, Sweden and the UK face economic situations which impinge on the future of universities. The outlook for Ireland is more mixed, with government reforms to increase the competitiveness of the Irish economy through public pay cuts. In Cyprus, initiatives to bring the higher education sector and businesses closer together have not yet demonstrated great impact. Correspondents in Cyprus, Denmark, Ireland and Malta felt that their governmental reforms concerning skills and knowledge may improve the economic outlook of their countries.

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Appendices

Table of scores

Overall score			
	Country	Score	Difference
TOP	Norway	0.92	
	Cyprus	0.62	0.30
	UK	0.51	0.11
	Netherl.	0.45	0.06
	Sweden	0.44	0.02
MEDIUM	Denmark	0.32	0.11
	Germany	0.25	0.08
	Croatia	0.20	0.05
	Belgium	0.19	0.01
	Austria	0.17	0.02
	Iceland	0.14	0.03
	Italy	0.13	0.00
	Ireland	0.11	0.02
	Slovenia	0.07	0.04
	Finland	0.04	0.04
	Spain	-0.01	0.05
	Portugal	-0.01	0.01
	Hungary	-0.07	0.06
	Estonia	-0.08	0.01
MODEST	France	-0.17	0.09
	Switz.	-0.18	0.01
	Malta	-0.22	0.03
	Lithuania	-0.23	0.01
	Bulgaria	-0.27	0.04
	Poland	-0.32	0.05
	Latvia	-0.37	0.05
	Romania	-0.37	0.01
	Turkey	-0.38	0.00
	Slovakia	-0.42	0.04
	Czech Rep	-0.43	0.01
	Lux.	-0.48	0.04
	Greece	-0.53	0.06

Research score			
	Country	Score	Difference
TOP	Switz.	2.29	
	Netherl.	1.75	0.54
	Sweden	1.68	0.07
	UK	1.41	0.27
	Denmark	1.41	0.00
	Finland	1.16	0.25
	Austria	1.09	0.07
	Belgium	0.97	0.12
	Norway	0.84	0.13
	Ireland	0.71	0.12
MEDIUM	Germany	0.23	0.49
	Slovenia	-0.03	0.25
	France	-0.05	0.02
	Iceland	-0.13	0.09
	Cyprus	-0.24	0.11
	Italy	-0.25	0.01
	Spain	-0.44	0.19
	Portugal	-0.45	0.02
	Greece	-0.48	0.02
	Hungary	-0.60	0.12
MODEST	Lux.	-0.61	0.00
	Estonia	-0.68	0.07
	Malta	-0.69	0.01
	Croatia	-0.89	0.20
	Lithuania	-0.91	0.02
	Czech Rep	-0.92	0.02
	Turkey	-0.95	0.02
	Poland	-0.95	0.00
	Bulgaria	-0.99	0.04
	Romania	-1.05	0.06
Slovakia	-1.08	0.03	
Latvia	-1.12	0.04	

Graduation and employment score			
	Country	Score	Difference
TOP	Switz.	1.38	
	Malta	1.37	0.01
	Poland	1.27	0.10
	Slovakia	1.23	0.03
	Romania	1.14	0.09
MEDIUM	Lux.	0.78	0.36
	Czech Rep	0.76	0.01
	Ireland	0.72	0.04
	Denmark	0.48	0.24
	Iceland	0.43	0.05
	Croatia	0.42	0.01
	UK	0.40	0.02
	Belgium	0.39	0.01
	Lithuania	0.29	0.09
	Latvia	0.28	0.01
	Norway	0.27	0.01
	Bulgaria	0.17	0.10
	Germany	0.13	0.04
	Netherl.	0.01	0.12
Portugal	-0.02	0.03	
MODEST	Slovenia	-0.16	0.14
	Austria	-0.18	0.02
	France	-0.21	0.04
	Hungary	-0.26	0.05
	Finland	-0.29	0.03
	Sweden	-0.42	0.12
	Estonia	-1.02	0.60
	Spain	-1.28	0.26
	Cyprus	-1.60	0.32
	Turkey	-1.73	0.13
	Italy	-2.37	0.63
	Greece	-2.37	0.01

Europe is in many respects in a crisis: a financial crisis, one of sustainability and one of demography. For universities there exists also an intellectual crisis, as the complexity of the present world – and how to cope with it - is insufficiently transmitted through teaching to the next generation.

We believe that universities are an important force to address these crises and to find new ways to surmount them.

The undersigned plead for urgent action to be taken by universities, EU member states, the European Commission and civil society to empower universities so that they can fully utilize their innovative potential.

1. Increase mission differentiation within higher education, along with differentiation of strategies, new governance and financial arrangements. Much of today's diversity is stuck in regional or national contexts. Increased differentiation is needed in order to integrate the full spectrum of students who aspire to adequate participation in the emerging innovation society. This includes a substantial part of presently untapped talent, like underrepresented groups and life-long learners. But European universities must also become more attractive to the best and brightest in order to maintain Europe's competitive position in a globalizing world.
2. Mobilize the full potential of universities to engage in innovative teaching and learning and in research. This requires their full autonomy. A professional management approach by universities makes it necessary to separate academic leadership, responsible for high academic standards, and a (supervisory) Board of Trustees. The latter must be independent and responsible for the strategic pursuit of the mission and appoints an independent university leadership for the day-to-day management. The arrangement for public funding of higher education should be assigned to support such autonomy, which includes risk-taking and innovation as well as public accountability.
3. Make European universities and HE systems much more international. This means attracting more students and researchers from Europe itself, but also from other parts of the world. Education should be based on effective learning and geared towards problem solving, preparing them for a global labour market embedded in responsibility for a sustainable future. The development of broad, general education in the introductory part of renovated curricula has the potential to enhance cultural awareness and democratic citizenship among students. Universities themselves need to develop a stronger culture of placement, a sense of responsibility for the destiny of their students in society and in the labour market. In short, European universities should train for globalized leadership.

These recommendations can be better realized when European Governments commit themselves to a financing of universities which is balanced with the social and economic returns. Time has come for creating a differentiated world class system of higher education within the context of the European Higher Education and Research Area.

Governments and the EC are requested to take further steps in this direction e.g. by portability of (students) grants and loans over national borders and the introduction of a European Statute for a limited part of European universities.

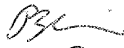

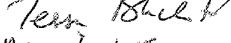
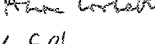
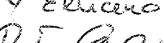










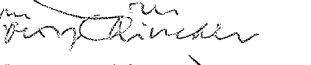




The undersigned are in full agreement on these points, led by a wish to promote the empowerment of Europe's higher education. We hope to produce a basic guideline to assess the performance of EU member states to empower European universities by

June 2011. A first progress report is scheduled to be prepared by June 2012, to be followed by successive progress reports. These documents shall be produced by an NGO (Empower European Universities – EEU) for which the undersigned act as founding members in collaboration with independent correspondents in each of the 27 EU countries.

“Educate the next generation so as to cope intellectually, morally and politically with the messiness and complexity of the world”

Brussels June 16, 2010

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Germany	Stueckradt*	Michael	Chancellor	University of Cologne
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Malta	Mayo	Peter	Professor	University of Malta
Netherlands	Enders	Jurgen	Director	University of Twente
Netherlands	Groot	Wim	Professor	Maastricht University
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Spain	Bernabeu	Guillermo	Professor	University of Alicante
Spain	Vidal	Javier	Professor	University of Leon
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*: tacit consent

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ⁱ CNESER (1999) "Harmonisation europeenne", 25 and 26 January 1999.