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Towards Evidence-based Reform of European Universities

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Abstract

After the Bologna agreement and the Lisbon Agenda, reform of European university systems has been higher on the political agenda. This is necessary, since most European universities have been suffering from stifling blankets of government regulation, having to make do with much less funds than their North-American counterparts and do not appear high on the various rankings of top universities in the world. Furthermore, the booming economies of China and India will nurture and boost world-class universities in the coming decades. Also, universities are essential in their links to business and society to make the European economy more innovative and competitive, especially as European industries approach the world technology frontier. We argue on the basis of the stylized facts that foremost European universities need more autonomy to select students, reward staff, design new programmes, attract more funds and compete better in an increasingly tough environment. Although the general principles of the policy reform agenda are clear, the details are not. The link between governance, funding and performance is not obvious and needs still further data and research. We conclude that reform of European universities should much more be based on the best available empirical analysis. (JEL code: I23)

Keywords: University reform, governance, autonomy, funding, competition.

1 Introduction

Universities are among the key actors in constructing a knowledge-based society. Through their teaching, they disseminate knowledge and improve the stock of human capital; through the research they perform, universities extend the horizons of knowledge; and by their other activities, they transfer knowledge to the rest of society, work with established industry and create new companies. And the contribution of universities to society goes beyond economic and technical advancement, since they maintain a culture that fosters an environment for well-rounded graduates.

As Europe approaches the world technology possibility frontier and leaves the era of catching up behind, innovation and highly educated people have become crucial drivers of its growth potential. If forces are indeed to be mobilized in Europe to create the most competitive economy and knowledge-based society of the 21st century, European universities

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have to play a central role. But most European universities do not seem currently to be in a position to achieve their potential in a number of important ways. In a still too fragmented European higher education and research area, universities are hampered by a combination of excessive public control, bad governance coupled with insufficient funding opportunities. As a result, compared with their counterparts in the US, Australia and other countries (perhaps also China), are behind or falling behind in the increased international competition for talented academics and students, and miss out on fast-changing research agendas, innovative opportunities and teaching curricula.

Modernization of Europe's universities, involving their interlinked roles of education, research and innovation, has therefore rightly been acknowledged as a core condition for the success of a move towards an increasingly global and knowledge-based economy. Various policy communications have identified the main items for change, at the level of the EU and also in many European countries.[1] Spurred by the Bologna process, many countries have started designing a process of reforms. However, few countries make them national priority. Yet these changes are crucial to regenerate Europe's growth capacity. Perhaps, national governments rightly give priority to giving funds to primary and secondary education rather than to university education. But reform of the university system is not only a question of pumping more public money into the system. With a carefully designed social loans system of the type implemented in Australia, it may well be possible to raise private funds from higher tuition fees without sacrificing accessibility to higher education.

We give a brief review of the stylized statistical facts and the academic literature (both theoretical and empirical) that is available on the contribution of universities to economic growth and competitiveness (section 2) and the evidence on the performance of universities with respect to education, research and knowledge transfer (section 3). Having established the importance of universities for growth and the problems of European universities to deliver, it then goes on to examine two important drivers of university performance: governance and funding (section 4). With only limited evidence available on how governance and funding are linked to performance (section 5), the implications for the policy agenda reforming European universities have to remain tentative (section 6). Perhaps the most important conclusion for policy making at this stage is to invest more in data and analysis.

[1] For example "Mobilising the Brainpower of Europe: Enabling Universities to Make their Full Contribution to the Lisbon Strategy", COM (2005) 152 of 20 April 2005 and Council Resolution of 15 November 2005.

The main contribution of this special issue is to contribute to a more evidence-based reform process by providing empirical analysis on various dimensions of university performance. Section 7 provides an overview of these contributions. We hope that the contributions in this special issue will incite further research in this area.

2 Importance of universities for economic development

It is well recognized that European universities have several missions which are centerpiece contributions in a knowledge-based society: teaching, research and the transfer and exchange of knowledge with other parts of society. While education, basic research and transfer of knowledge are heavily interconnected within the university as institute, the academic literature, the statistics and the policy discussion mostly focus on one of these areas only. They thus ignore most of the time the multi-tasking challenge of universities having to balance the various activities which can be sometimes substitutes and other times complements. In the reminder of this contribution which reviews the literature and statistics, we will therefore also often have to resort to a focused discussion of each of the activities of the university separately.

2.1 Some evidence linking university education and research to global competitiveness

At regular intervals, the publication of various international rankings creates "frenzy" in the public opinion on how well European countries are doing on higher education, innovation and growth. Although these rankings are controversial, they nevertheless are very influential in the policy debate. In the *2006–2007 Global Competitiveness Index* compiled by the World Economic Forum (WEF), higher education is considered as one of the main pillars enabling national economies to achieve sustained economic growth and long-term prosperity. It ranks countries on their score on *Higher Education and Training*, measured by secondary and tertiary enrollment rates as well as the quality of education as assessed by the business community, and the importance of vocational and on-the-job training. It also ranks countries according to *Innovation*, measured by expenditures on R&D, especially from the private sector, high-quality scientific research institutes, collaboration between universities and industries and protection of intellectual property. The WEF exercise also enables one to link these scores to the countries' performance on their overall *Global Competitiveness*, a composite index for measuring national competitiveness which takes into account a whole set of drivers deemed critical for determining the level and growth of productivity and income.

The 2007 WEF report [Sala-i-Martin (2007)] stresses that the quality of higher education and training is especially important for economies that want to move up the value chain beyond simple production processes and products. This is akin to the arguments put forward by Aghion (2006) that the return on higher education increases as the economy moves towards the world efficiency frontier. This is why in the 2006–07 exercise, the weight of the pillar of *Higher Education and Training* increases in the ranking for those countries that have moved beyond a simple factor-driven growth stage.

The WEF evidence, by and large, confirms a positive relationship between higher education, growth and global competitiveness: all of the top 15 countries in the overall Global Competitiveness Ranking also have a high score on *Higher Education and Training* and a high score on *Innovation*,[2] reminiscent of the importance of higher education for innovation and growth, particularly for countries at the top. The US is high on the list on all three rankings, which explains why so many commentators on EU higher education reform point to the US as an example. But the top three countries leading the world on *Higher Education and Training* are Finland, Denmark and Sweden; three Nordic EU countries which are also considered as the innovation leaders in Europe [EIS 2007)] and, together with the UK and Germany, are the highest scoring EU countries in the Global Competitiveness Ranking.

Nevertheless, Table 1 also reveals the outliers in the average positive relationship. The overall competitiveness score of Hong Kong is clearly focusing on other efficiency enhancers beyond innovation, which accords with its lower score on higher education. Japan and Germany are also interesting outliers. The relatively low score of Japan and Germany on quality of higher education and training is surprising for these two innovation-driven countries. But for these countries, innovation performance is based more on their private-sector innovation performance and less to the performance of its public sector higher education and research. Surprisingly, UK, being the second ranked country on WEF Global Competitiveness Ranking, performs only moderately on the WEF *Higher Education and Training* ranking and also relatively poorly on *Innovation*. This contrasts with the UK's performance on other rankings (cf. section 3).

The WEF ranking information is crude and may be criticized for many shortcomings. Nevertheless, it suggests a positive link between higher

[2] Innovation includes the subcomponent *Knowledge Transfer between Universities and Industry*. The Top 10 countries in this subcomponent (in order) were Finland, USA, Austria, Israel, Iceland, Singapore, Germany (Bavaria), Switzerland, Sweden and Canada (*Source*: WEF 2006).

Table 1 WEF ranking on global competitiveness, higher education and innovation

Global competitiveness rank	Country	Higher education and training		Innovation	
		Score	Rank	Score	Rank
1	US	5.8	4	5.82	1
2	UK	5.56	11	4.78	12
3	DK	6.00	2	4.95	10
4	SUI	5.63	7	5.54	3
5	JP	5.39	19	5.8	2
6	FIN	6.12	1	5.47	4
7	GER	5.36	20	5.37	7
8	SIN	5.46	17	4.99	9
9	SWE	5.9	3	5.27	8
10	HK	4.96	26	4.28	22
11	NL	5.58	9	4.73	15
12	CA	5.53	13	4.77	13
13	TAI	5.74	5	5.37	6
14	ISR	5.48	15	5.39	5
15	FRA	5.55	12	4.8	11

Source: WEF 2007.

Note: Countries are ranked according to their overall score of Global Competitiveness; besides hard data from leading international sources, indicators include the results of an *Executive Opinion Survey* carried out by the World Economic Forum WEF annually.

education, innovation and growth, but at the same time also suggests that the macro-link between universities and growth is multi-faceted and country-specific. We still need to understand much better the links driving these relationships and to explain the heterogeneity among countries. The next two sections take a closer look at the economic literature trying to explain the contribution of universities to economic development, through education (section 2.2) and research (section 2.3).

2.2 The contribution of university teaching to economic development

There is a large amount of empirical evidence on the private and social returns to higher education to the individual in the form of a higher probability of finding better-paid jobs and increases in lifetime earnings (e.g. Jacobs and van der Ploeg 2006).

Economists have long argued that the benefits of human capital accumulation may not be restricted to the direct recipient but might also spill over to others. The idea of positive educational externalities is well

established. Channels for such types of externalities leading to social returns exceeding private returns include the possibility that educated workers may raise the productivity of their less educated co-workers, that there may be spill-over effects from technical progress or knowledge accumulation which in turn arise from investments in human capital, or that an environment with a higher average level of human capital may entail a higher incidence of learning from others.

The existence of positive economy-wide educational spill-over effects is an important economic justification for the public support of education and is often assumed *a priori*, although the difficulties of actually verifying their size and thus calculating true social returns are substantial.

Macro studies are especially relevant to assess the empirical importance of educational externalities. The two main macro approaches are the augmented Solow neo-classical approach [as first proposed by Mankiw, Romer and Weil (1992)] and the ''new growth theories''. The augmented neo-classical model simply extends the basic production function framework to allow human capital to enter as an extra input in the production function. Since this is estimated at the economy-wide level, it does take into account of human capital externalities that increase the *level* of output. The endogenous growth approach argues that there should be an additional effect of human capital over and above the static effect on the level of output. Based on the notion that economies richer in human capital have a higher rate of innovation, increasing the level of human capital is expected to have an effect on the *growth* rate of productivity. Some of the new growth theories have distinguished themselves from the traditional neo-classical approach by explicitly proposing a role for education externalities in economic growth (Aghion and Howitt 1998).

Taking the empirical studies as a whole, there is compelling evidence that human capital increases productivity, suggesting that education really is productivity-enhancing rather than just a device that individuals use to signal their level of ability to the employer [see Sianesi and van Reenen (2003) for an overview]. The empirical literature is largely divided over whether the stock of education affects the long-run *level* (augmented neo-classical approach) or long-run *growth* rate (new growth theories) of the economy. Increasing average education in the population by 1 year would raise the level of output per capita by between 3 and 6 percent according to the former approach, while it would lead to an over one percentage point faster growth according to the latter. Education is found to yield additional indirect benefits to growth, in particular, by stimulating physical capital investments and technological development and adoption. Nevertheless, this is an extraordinarily large effect, which needs to be taken with a lot of caution in view of the many methodological problems there still are to get the new growth channels correctly assessed. The most

pressing methodological problems are the measurement of human capital and reverse causality. More research is also needed to analyze further the systematic differences in the coefficient of education across countries (e.g. Sianesi and van Reenen 2003).

The macro-evidence also seems to indicate that type, quality and efficiency of education matters for growth. The impact of increases at different levels of education appears to depend on the level of a country's development. For developed countries, tertiary/higher education seems to be the most important education driver of economic growth. This is related to the argument that innovation and higher education become more growth enhancing for countries closer to the technology frontier (Aghion 2006). Empirical evidence, both across countries and across US States, suggests that the closer an economy is to the frontier productivity, the more growth-enhancing it is to invest in higher (in particular post-graduate) education (Aghion et al. 2005). In economies that are further below the frontier, growth is primarily enhanced by investments in primary, secondary and undergraduate education. With Europe having successfully caught up with the US during the '70s, '80s and first part of the '90s, this implies that, being located closer to the technology frontier, higher education has become increasingly more critical for EU's growth prospects.

2.3 The contribution of university research and technology transfer to economic development

A multitude of economic studies has shown the importance of *basic research* for innovation and economic growth (e.g. Adams 1990; Griliches 1998; Henderson Jaffe and Trajtenberg 1998; Mansfield 1995; Rosenberg and Nelson 1994). However, a coherent body of theory and insight into the multifaceted nature of the links between science and growth is still lacking (Stephan 1996). There are some industries where the link between science and innovation is explicit and direct. Industries such as biotechnology, pharmaceuticals, organic and food chemistry are "science-based" in the classic sense and rely heavily on advances in basic research to feed directly into their innovations (Levin et al. 1987). In non-science-based industries much innovation also derives from other-than-basic-research related activities. Nevertheless, even here innovation may be facilitated by better use of basic research resources, such as the training of skilled researchers helping to increase the absorptive capacity of industry.

The supply side of the scientific "knowledge market" includes, apart from universities, other institutions such as publicly funded research organizations. Nevertheless, as science-based innovations increasingly have a multidisciplinary character and build on "difficult-to-codify"

people-centered interactions, universities, which combine basic and applied research with a broader education mission, are seen as enjoying a comparative advantage relative to research institutes. Universities are increasingly demanded not only to play an active role in science development, but also to turn those scientific developments into useful innovations whenever possible and desirable. While basic research results can either be channeled to industry via collaborative research schemes or licensing arrangements of patented university inventions, spinning off is the entrepreneurial route to commercialize public research. The latter attracts a great deal of policy attention in the current wave of start-ups and new venture creation in many countries These new ventures have the potential to introduce technological disequilibria that change the rules of competition in existing industries.

Empirical studies have attempted to quantify knowledge transfers from academic research through various proxies. Shane (2002) investigated licensing of university generated innovations. Other papers have examined academic spin-off activities as well (Audretsch and Stephan 1996; Zucker, Darby and Brewer 1998) and yet others looked at citations to academic patents (Henderson, Jaffe and Trajtenberg 1998) and university science parks (Siegel, Westhead and Wright 2003). Citations in corporate patents to scientific literature have also been investigated (Branstetter 2003). Finally, university-industry collaborative research has received substantial attention in empirical studies (Cockburn and Henderson 2000; Hall, Link and Scott 2000; Mohnen and Hoareau 2003; Veugelers and Cassiman 2005).

All these empirical studies, using various industry science links indicators, suggest an intensification of the interactions between universities and industry over time (e.g. Branstetter 2003; Hall Link and Scott 2000). This holds *a fortiori* for the fastest growing technologies: biotechnology, information technology and new materials, which are all more closely science linked. Corporations appear to look more extensively towards public science as one of the external sources allowing rapid and privileged access to new knowledge, especially in the life sciences (Cockburn and Henderson 2000; Mowery 1998; Zucker Darby and Brewer 1998). Behind this rising trend is a change in the institutional environment, with public policies designed more to encourage the commercialization of university developed scientific discoveries.

While on average the evidence suggests a growing trend in—and a positive effect of—knowledge transfers from science to industry, there is nevertheless a strong suggestion of an inadequate scale and intensity of such transfers, with the link between science and innovations neither direct nor close. Differences in cultures and a highly uncertain and non-codifiable nature of scientific know-how result in high transaction costs

and systemic failures in the market for scientific know-how. Improving industry science links has thus figured high on the policy agenda in many countries, especially in Europe.

With universities being an important actor in delivering economic development, either through their education and/or through their research activities, and with the public good nature of the services provided by universities, both in education and research, there is a clear case for policy to be concerned about how well their universities are performing, and to intervene if necessary. This holds particularly in those countries or regions that have moved closer to the world technological frontier, and want to become leading knowledge-based societies. The next section takes a closer look at the performance of universities in Europe.

3 Performance of Europe's universities

By now a wide series of rankings abound, comparing the performance of universities across countries.[3] The most "mediatic" representatives, and also the ones most criticized, are the Times Higher Education Supplement, and the Shangai Jiao Tong University Ranking. Both rankings,[4] THES and Shanghai, paint a somewhat similar picture of Europe lagging behind especially at the top, and especially the larger continental European countries. Overall, the results from the rankings indicate the lower performance of Europe's universities relative to the US, especially at the top.

A closer look at the hard data shows however a more nuanced picture on Europe's performance. Veugelers and van der Ploeg (2008) take a look at the more standard official statistical evidence that is available to measure across countries the performance of universities on higher education and research, including the quality dimension of educational and research performance, and arrive at the following conclusions:

- The proportion of the population in the EU that has graduated from higher education is relatively low; Relatively few young people in the EU enroll in higher education but enrollment is growing strongly.
- The EU produces more mathematics, science and technology graduates than the USA but has fewer researchers in the labor market.
- The European Union produces a higher number of PhDs than its major competitors.

[3] For a discussion on the how to use rankings, see UNESCO, Berlin principles on ranking of higher education institutions, http://www.che.de/downloads/Berlin_Principles_IREG_534.pdf.

[4] Other rankings are Center for Higher Education German, bibliometric ranking by Leiden and ranking web of universities by CSIC Spain.

- Tertiary Education leads to higher employment, lower unemployment and higher earnings, also in the EU.
- Europe has caught up with the US on quantity of publications, a gap remains on quality.
- No sufficiently reliable data are available yet to measure performance of universities on knowledge transfer across countries.

Overall the statistical evidence indicates that Europe has made improvements, made especially in quantitative terms (number of graduates and number of publications). It also illustrates the heterogeneity within Europe, with a number of countries, particularly the Nordic countries, even outperforming the US on a number of indicators. At the same time, it shows the need for further improvements of the European higher education system, particularly on the quality of education, research and transfer dimensions.

4 Drivers of performance: funding and governance of Europe's universities

What explains these differences in performance of universities between the EU and other international competitors like the US, and among EU countries? Two components always show up in the discussion: funding and governance.

On *funding* for universities, Veugelers and van der Ploeg (2008) provide an overview of the recent statistical evidence:

- Total investment in higher education in the EU is below the level of key competitors. In particular, per student it is almost half the level of that in the US.
- The nature of public funding for education varies considerably across countries and time with the Scandinavian countries having much higher funding.
- Differences across countries in spending become even more pronounced when the public vs. private source if this funding is considered; the gap in private funding is particularly important.
- The differences in the level of private investment are a result of differences in tuition fees (most EU countries do not have tuition fees), in the share of private institutions, in philanthropic funding, contributions by alumni and in the level of funding provided by enterprises. This is why US universities are much better funded than their EU counterparts.
- There is no clear statistical evidence supporting less funding of research at higher education institutes in the EU as compared to the US,

although the way most of the research funding in the US is allocated may be different.

On *governance* of universities, OECD (2007) has developed a series of indicators, on the basis of surveys of its member countries measuring autonomy [financial autonomy, staff policy autonomy (hiring/firing and wages), student selection and course content] and accountability (evaluation mechanisms and funding rules).

The evidence shows a high variance in university governance across countries. There are also a lot of differences in different dimensions of governance across countries. It also shows the multifaceted nature of governance, where different dimensions of autonomy and accountability are not necessarily correlated. As a consequence, each system can be characterized as a relatively unique bundle of governance characteristics.

The US has the highest scores on all dimensions of autonomy. In Europe, the better performing countries, i.e. UK, Finland, Sweden and Denmark, also score high on autonomy, although there are some differences depending on the type of autonomy. On accountability, there is much more variance among the well performing countries with the UK high on both dimensions of accountability while the US (like Japan) is low on financial accountability (consistent with their high budget flexibility). Finland is high on financial accountability, but not to strong on evaluations.

Among the continental weak performers, France, Germany, Spain and Italy, there is also a large dispersion in governance characteristics. The common theme, nevertheless, seems to be low levels of autonomy, but relatively high levels of accountability. This is consistent with the complaint of overregulation in these systems. Nevertheless, the dimensions of (lack of) autonomy are different, with Germany and Italy particularly restricted with respect to students, course contents and wages, France on selection of students and both hiring and wages, Spain restricted in both hiring and wages.

A striking fact is thus the high variance in university governance across European countries. Also Bruegel researchers (Aghion et al. 2007), using survey information collected from European universities that belong to the Top-500 of the Shanghai Ranking, found a high variance in university governance, even among those countries which are performing well in terms of research. For example, among the three European countries with the best performance index, the practice of appointing people from within the own group (“endogamy”) is high in Sweden but low in Switzerland and the UK. Swedish and UK universities can set wages but Swiss cannot, and universities are mostly public in Sweden and Switzerland, whereas they are mostly private in the UK. They also found a high degree of

heterogeneity between countries in terms of size of universities in the Top-500: Southern Europe (Italy and Spain) has very large (more than 40,000 students on average) universities, while the UK and Switzerland have small (10–15,000 students) universities.

5 Explaining performance: funding, governance and size of Europe's universities

The evidence thus shows a high variance in university governance across countries. All this makes governance a very interesting candidate to for explaining the heterogeneity in performance of European universities. Nevertheless, since both the least and best performing countries shows a wide divergence in governance, a crude bird's eye view already suggests that the link between governance and performance will be complex and bodes badly for the quest for a unique optimal governance model.

The Bruegel study (Aghion et al. 2007) reports some first interesting findings on the relationship between their set of proxies for governance and research performance, as measured by the Shanghai Ranking of their set of surveyed universities. First, the results indicate that it is important to correct for other determining factors besides governance. Size, age and budget per student all positively affect research performance. But once these factors are included, the only governance indicator that turns out to be significant is budget autonomy. Perhaps the most important finding of the study is that the positive effects of having larger budgets per student are higher if institutes enjoy a higher degree of budget autonomy. This suggests that policy should tackle simultaneously funding and governance.

On economies of scale and the size of universities and countries, the evidence is not clear. Countries with a large population may benefit from returns to scale and be more efficient in providing public goods and generate higher productivity (Alesina and Spolaore 2003). Within the context of the market for higher education and research, it is clear from the law of large numbers that in such countries the chances of a genius surfacing is larger than for a small country. This is why it is important to engender competition (as well as cooperation) on a European level. However, the evidence so far fails to support that the number of top universities per million inhabitants is an increasing function of the size of the population (Thissen and Ederveen 2006). However, historical empirical comparisons neglect the potential of upcoming countries with a huge population like China and India.

At this stage, the most important conclusion that can be drawn from the available evidence is that more research is needed to pin down the drivers

of university performance. Nevertheless, a few policy implications for the reform agenda can already be put forward.

6 The policy agenda for higher education reform in Europe

The previous analysis has shown that the EU needs to improve its access to higher education, improve its higher education attainment levels and the quality of its education and research. For this it needs to increase total investment in higher education and research. Funding universities will become increasingly more challenging due to the relentless operation of Baumol's cost disease. Productivity growth in universities inevitably lags behind that in manufacturing, so the cost and price of university education inevitably rise over time. This is Baumol's cost disease applied to higher education (e.g. Jacobs and van der Ploeg 2006). On the plus side, the ongoing technical progress in the rest of the economy makes society much richer all the time and it is thus able to afford the escalating costs of higher education. Teaching and research need to be done by highly qualified people and is difficult to be replaced by technology.

If the EU has to make an effort to bridge its funding gap, be it public or private, this can only be realized if at the same time the *governance* of universities is tackled. This is necessary to increase the efficiency of spending by these organizations, thereby delivering results. To attract more *funding*, universities first need to convince stakeholders—governments, companies, tax payers and above all students—that existing resources are efficiently used and would produce added value for them. Higher funding cannot be justified without profound change. Providing for such change is the main justification and prime purpose for fresh investments.

6.1 Increasing total investment in higher education

While public investment in higher education in the EU is at the same level or even slightly higher than in key competitor countries, levels of private investment are clearly lower. A major effort will be needed to locate the necessary public and private financial resources to bring the EU countries closer to the standards of key competitors.

The debate on social and private returns from higher education has highlighted its role as an investment, benefiting both the individual as well as society as a whole. If *social returns* exceed private returns, education causes positive external effects to society and the government should support education. Although positive external effects may be substantially larger for secondary and especially primary education, they are nevertheless likely to prevail also for certain types of university education. For basic research, the public good characteristic is well known.

But beyond the need for a sufficiently large *public investment* in universities, there is also an issue of how to best invest public money. Governments should strike the right balance between core, competitive and outcome-based funding (underpinned by robust quality assurance) for higher education and university-based research. Competitive funding should be based on institutional evaluation systems and on diversified performance indicators with clearly defined targets and indicators supported by international benchmarking for both inputs and economic and societal outputs.

Beyond the case for public spending, the empirical evidence suggests that *private returns* to higher education are substantial, also in continental Europe.[5] All this evidence suggests more scope for *private funding* of higher education and in particular for asking students to pay higher tuition fees, particularly for those degrees where private returns are substantial. Free higher education does not by itself suffice to guarantee equal access and maximum enrollments. This casts the much debated issue of higher tuition fees in a fresh perspective, isolated from the discussion on access, which is better targeted through other instruments, such as income-contingent loans and scholarships for the brightest students from backgrounds with not much money. The experience with social credits in the form of an income-contingent loan system of the type used in Australia suggests that this need not jeopardize accessibility of higher education (Barr and Crawford 2005; Jacobs and van der Ploeg 2006). Since peer effects are important in higher education, it is crucial to attract the best students regardless of background. Europe would therefore benefit from shifting attention from scholarships for the poor to scholarships for the brightest regardless of background.

6.2 Improving governance

There is relatively little hard data and analysis on the link between governance and performance and the evidence not in favor of a unique optimal model. Hence, European policy makers should be careful not to impose a standardized, micro-managed governance model on their universities. They should rather try to nurture the heterogeneity of its institutions, allow for experimentation and learn from it. This calls for granting

[5] Canada is an interesting testing ground, since provinces levy different fees. Evidence suggests that rising fees by about 2,000 dollar in the 1990s reduced the probability of participation by persons aged 17, 18 and 19 relative to trend by amount 2 percent-points. Nevertheless, university participation increased dramatically during this period (Johnson and Rahman 2005). Unfortunately, this interesting study did not take account of factors like family income or parental education.

universities the space and thrust to develop autonomously their own strategies and structures. Public authorities should guide the university sector as a whole through a framework of general rules, policy objectives, funding mechanisms and incentives for education, research and innovation activities. In this way they can develop their own strategy, specialization and structures to respond to their heterogeneous environments.

In return for being freed from the stifling blanket of over-regulation and micro-management, universities should accept full *institutional* accountability to society at large for their results. In many countries this would mean a new approach to policy making with less *ex ante* checks and greater *ex post* accountability of universities for quality, efficiency and the achievement of agreed objectives. For universities, this requires new internal governance systems based on strategic priorities and on professional management of human resources, investment and administrative procedures. A pivotal area of university management is personnel management. Human resources are a core determinant of quality in higher education and research. Universities must therefore work to enhance their human potential, both qualitatively and quantitatively, by attracting, developing and keeping talent in the teaching/research career. Excellence can only emerge from a favorable professional environment based in particular on open and transparent procedures.

6.3 More competition among universities

Public and private stakeholders should provide the funds for universities to develop their own structures while holding them accountable for delivering results. Yet combined under-funding and system rigidities are so acute in some countries of the EU that they impede the reform process at universities, who are consequently trapped in a vicious circle. Differences in perspectives on reforms abound in the EU, so that it is not difficult to predict a tough political economy process of reforms.

To unlock the reform process, perhaps the most important driving force for modernizing higher education in Europe emerges from competition. Increased competition for students, faculty and funding, combined with more mobility of students and faculty and allocation of resources through open, competitive criteria, will lead universities to offer a more open and challenging environment to the most talented students and researchers, thereby making them more attractive to Europeans and non-Europeans alike.

In response to scarcer public budgets, a rationalization of the supply side of the higher education market has taken place in Europe. The resulting increase in the scale of universities has, however, generated the danger of creating (local) public monopolies. In the Netherlands the rapid

increases in scale and monopolistic practices have gone hand in hand with huge increases in overhead and capital expenditures leading to substantial falls in resources for teaching. Such monopolies reduce quality (''grade inflation''), ignore demand of students and employers, and increase overhead costs. Monopolistic price setting drives up tuition fees and lowers quantity and quality of supply of education, especially if the price elasticity of demand is low.

Competition for talents and brains is a global game, which is already removing the barriers within Europe and establishing a large, integrated market for higher education and research in Europe. This will provide an excellent environment for European universities to develop their comparative advantages and make them stronger players on the world scene.

7 Challenges for research into the economics of higher education reform

Universities are key players in the successful transition to a knowledge-based economy and society. However, this crucial sector of society needs restructuring if Europe is not to lose out in the global competition in education, research and innovation. While European universities have improved their quantitative performance with respect to the number of graduates and publications, it needs to further increase higher education attainment levels and improve the quality of its education and research. For this, public and private stakeholders should provide the funds for universities to develop their agenda while holding them accountable for delivering results.

Although the general principles of the policy reform agenda are clear, the details are not. The link between governance, funding and performance is not obvious and needs still further data and research. All this implies at this stage a careful stance for policy makers on which governance and funding structures to strive for. Perhaps the most important conclusion is to invest in more data and analysis to support a more evidence-based reform process.

This special issue collects a number of papers that provide more data and empirical analysis on various dimensions of university governance, funding and performance. We believe that many of these papers show that good empirical research, backed up with theory, can generate evidence-based ideas for policy reform of European university systems. The empirical literature on the economics of higher education is only beginning to emerge. The papers in this issue are not the definite statement, but they are state of the art and may show other researchers the road ahead in the burgeoning fields of the economics of higher education.

Looking at an interesting data set on the population of newly enroled students at the University of Brussels, Arias Ortiz and Dehon (2008) attempt to sheds light on the determinants of their success in the first year exams. They find that for the prior high school program, the mother's level of education and the father's occupation are important determinants. Still, one wonders whether parental background is not also a determinant of whether students go to university in the first place. Arias Ortiz and Dehon also suggest that foreign students coming to Belgium looking for a diploma do much better in their first year than Belgian students. Obviously, it is important to improve accessibility of higher education in order to get the brightest students from underprivileged backgrounds as well. This study also suggests that internationalization is crucial, since this can via peer effects raise the average level of university education.

In an interesting paper Bagues, Labini and Zinovyeva (2008) document detailed empirical evidence that grading standards vary significantly across Italian public universities and degrees. It is important to realize that the Italian government rewards universities according to the number of exams passed by their students. In contrast to the experience with the taximeter model in Denmark where there was almost no grade inflation, this empirical study suggests that this Italian puzzle can be resolved by heterogeneous grading standards. Effectively, universities whose graduates perform relatively bad in the labor markets more easily give higher grades. The lesson from this study is that governments should be very careful about output-based funding systems, since they can easily favor universities that do worse and generate less value added in economic terms.

Using a unique panel data set of German universities across German states on a stochastic frontier approach, Kempkes and Pohl (2008) relate the cost inefficiencies of German universities to differences in the liberal character of state regulatory regimes and to governance features like the management structure and characteristics of the university staff body. This type of study suffers from lack of good data on efficiency of universities. For example, bigger class size may lead to a lower cost per student but may also lead to a worse quality of education per student. Nevertheless, this study asks the right questions and already gives some suggestive evidence that stifling blankets of regulation can lead inefficient universities.

Flanders has proposed a reform of its university funding system, which aims to save costs by reducing the diversity and duplication of the various study programmes on offer. The detailed econometric analysis of Kelchtermans and Verboven (2008) suggests that reducing programme diversity typically induces a saving in fixed cost, but this saving is actually less than loss in consumer surplus due to students having to travel to

another town for their degree. This empirical result is due to the low mobility of students in Flanders. This article also shows that decentralized incentive mechanisms may be counterproductive, since they often promote programme cuts when this is undesirable, and vice versa. The main policy insight we draw from this innovative article is that savings and cuts in higher education may have perverse effects, especially when students have little willingness to travel. In that sense, it may be better to give universities the freedom to raise more funds from students and sponsors.

One of the few policy reforms that have been instigated at the European level is the Bologna process whereby European countries agreed to move to a system of Bachelor's and Master's degrees. Such a system is common in Anglo-Saxon countries and thus promotes internationalization. Mores students will find it easier to study abroad, both inside the EU and outside the EU, and European universities will become more attractive to the best students and staff from outside the EU. The more flexible system encourages students to take more difficult studies, to pursue an interdisciplinary career and to pursue the ideal of permanent education, since it is easier to switch later on to a Master's course in a related topic. Furthermore, the Bologna process has made a contribution to the much needed reduction in the effective study duration in Continental Europe. Of course, a proper implementation of the Bologna process requires not just a splitting up of old-style degree programmes but a restructuring of degree programmes. It is therefore comforting to know that the paper by Cardoso et al. (2008), using regression analysis with count data, finds empirical evidence in Portugal that degree programmes that did properly restructure in line with the Bologna process experiences greater demand from students than programmes that did not restructure. This suggests that universities that reform fastest stand to gain.

In their analytical paper Demange, Fenge and Uebelmesser (2008) investigate within a general equilibrium setting what role international mobility of skills can play in the reform agenda. Taking into account the individual incentives to invest in higher education, they examine how optimal government instruments, such as financing and quality standards, will differ depending on the mobility of skills. If only skilled workers are mobile, government have an incentive to cut subsidies and risk lowering the quality of education to sub-optimal levels or to raise tuition fees. Promoting the international and within-country mobility of students helps to offset some of these inefficiencies and provides a justification for the Bologna process. As pointed out by Ferreira (2007), the European Investment Bank may play an important role in setting up a European-wide system of income-contingent loans. This could avoid problems of graduates moving to another country in order to avoid repaying their loans, but more importantly it would give a real boost to

pan-European mobility of students. Also, Parey and Waldinger (2007) use a detailed data set on ERASMUS student exchange programmes to provide empirical support that student exchange mobility is an important determinant of later international labor market mobility. This may also help to boost economic integration and growth in Europe.

A very useful study on the determinants of investments in higher education beyond the upper-secondary level is provided by Boarini et al. (2008). They explore for a set of OECD countries the impact of the institutional setting of the higher education system on graduation rates, taking simultaneously into account the availability of funding for students and the private returns to tertiary education. Their results point to a strong potential for increasing graduation rates by improving the supply side of the higher education section, especially autonomy and accountability of higher education institutes. Furthermore, graduation rate can be raised by increasing funding per student and will be higher if private returns on higher education are higher. This OECD study thus also points in the direction of more autonomy and accountability for higher education institutes and boosting funding for universities by raising tuition fees and helping students with income-contingent loans. As private returns on higher education continue to rise, graduation rates and demand for higher education continue to rise.

Stephan (2008) closes this special issue with a keynote contribution discussing the new challenges faced by universities on both sides of the Atlantic. The challenges she discusses arise from increased incentives to publish, changes in the reward system and increased calls from society on universities to contribute to economic growth, through technology transfers. She outlines where further research is urgently needed.

Although each of these chapters improve our understanding of the economics of higher education and provide interesting new empirical and policy insights, they also at the same time call for more and better analysis with more and better data at the micro level. Still, the results in this issue already point to interesting directions of policy reform. We hope that these issues will incite further research on this fascinating topic in much the same way that is already prevalent in the economics of primary and secondary education.

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