Public Universities, in Search of Enhanced Funding

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1 Introduction: Public or Private

This chapter is written for university administrators to offer them an overview of the international practices of financing public universities, and its evolution. We also pay attention to the context of the funding of universities and its impact through education and research on society.

University finance has been a topic of interest from the earliest times of the existence of universities.¹ The interests came from the administrators of the university (how should I run the university?), from the participating students (what do I pay and what do I get?), from the staff (how am I paid for teaching and research?) as well as from the Government (how much budget should we make available, for what purpose and how should this budget be allocated?). In fact, finance was the dominant topic in the economics of education before the advent of “human capital theory”, pointing out that education is an investment in people which makes them more productive.

One of the first books on university funding (in 1922) in modern times² is by university—and college-administrator and—trustee Trevor Arnett (University of Chicago) [1] from

the perspective of a private university. Compared to present times, the world of university finance then was a wonder of simplicity: it is about receipts, disbursement, endowments, the physical plant (buildings and research equipment and accounting). All these elements are present today but in a far more complex and international setting.

In many respects the complexity of the funding of *public* universities (our focus) is even greater, particularly in those countries in which universities are encouraged to seek for other public funds than those of their prime funder (the Ministry of Education).

Universities, all over the world, private or public, they all crave to enlarge their resources. For private universities this is self-evident: their existence depends on resources acquired from private or public sources. Yet increasingly also public universities strive to improve their financial position by acquiring funds either from private sources or from public sources outside of the direct funding from Government.

In this respect the difference between private and public universities is then—depending on the country—less relevant. However it remains of importance in view of the different Government regulations that apply to public and to private universities.

In this chapter we consider the pressing dilemma’s around university finance, world-wide. Forced by international competitiveness Government are reducing taxation and shifting resources to other sectors (like health and social security). As a result they retreat from university finance, while enrolment and the costs³ per students keep rising.

To gain insight in the dilemma’s we give an overview of the different sources of funding, their purposes and how they have developed over the past decades, with a focus on public universities, so as to inform university administrators and

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¹We use the term universities to indicate tertiary education institutes.

²Universities—as we know them today—were in existence in Europe since as early as the year 1088 (Bologna). Their funding was very much along the lines as later described by Arnett.

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³We equate per student expenditures with costs. The research on the true costs in relation to output (in terms of additional learning) is still in its infancy.

policy makers on their context and the options before them. There are in the world some 17.000–30.000 universities depending on the definition used. More than half are public universities.

The backdrop of our presentation on funding is that globally enrollment in higher education has more than tripled in the last 30 years or so. At the same time, the financial returns to a university degree (as additional income earned with a degree) have remained about the same, both for the individual as for society. The likely explanation is that university graduates are directly or indirectly contributing to economic innovation that pays out in higher national income.⁴

Let us first dig a bit deeper in the public–private distinction in universities in the following subsection.

1.1 Developments World-Wide in Public Versus Private

Public universities are by the end of the Second World-war (1945) the norm in most countries, with very few private universities, the US being the exception. However, in many countries the increasing participation of youngsters to universities (in the period till 2000 in Western countries and 2000–2010 in Central and Eastern Europe) cannot be accommodated with sufficient quality by public institutions, because of financial restrictions in the form of the Government budget: enrolment grows faster than Government budgets, while the claims of other sectors on Government budget, in particular from the health sector also keep increasing. This is not only the case in higher income countries, but also in the lower and middle income ones [2]. Private universities spring up, sometimes as places with top-quality (like the Bocconi University in Milan), often as places made available to those who are denied entry in the public universities [3] or who want to combine work and study. When public per student budgets decrease, public universities are nudged by Government to acquire private funds. Student demand for private universities is substantial as potential students are aware that the benefits of such education are likely to exceed the costs by far.

Until approximately the year 1990, public universities are subject to strong government regulation and provision, at least in Western Europe. In the Anglo-Saxon world (US, UK and Australia) universities enjoy more autonomy, but still substantially less than private universities. In some countries they are almost part of Government. In the 1990's the awareness

grows that also for public universities more autonomy and more room for acquiring private funding or public funding from other sources than direct Government funding may strengthen their impact on economic and social innovation [4, 5]. More autonomy is assumed to give rise to a better connection in education with the (regional) labor market and in research to (regional, national and international) economic and social development. Central and Eastern European universities enjoy extra-ordinary autonomy after the newly acquired independence of the countries in the 1990s.

In contrast to public universities, private universities are free in the way they conduct their business, except that they are generally held to common, national or state, quality control, through accreditation, to create a minimum of transparency and in this way to satisfy the clients, the students, that the product (education) is sound.

The notion of autonomy of public universities has several dimensions: managerial autonomy (self-determination of the leadership), financial (being able to save and borrow money, charge tuition—and other fees), content (curriculum), the types of degrees being offered (most countries limit for example the number of universities that can grant a medical degree), organizational (can the university itself determine, for example, the ratio of professors to all teaching staff?) and staffing (can the university itself determine whom to appoint?) and promotion of staff [4]. Public universities differ across the world in these dimensions.

1.2 Some Figures on Private Versus Public

One of the richest sources on facts and figures on education is OECD's Education at a Glance [6]. It is not limited to the 36 OECD countries, but includes also information on Argentina, Brazil, Costa Rica, PR China, India, Indonesia, the Russian Federation, Saudi Arabia and South Africa. Furthermore, UNESCO Institute of Statistics and the World Bank Ed Statistics have data on other countries than the ones included in "Education at a Glance". All data show the tremendous variation across countries in the ratio of public to private funding with hardly any connection to the level of per capita income in the country. In OECD countries on average 32% of funding is private (of which the majority –23%—from households (tuition fees) and 9% from other private entities). The highest level of private funding is found in Japan (70%), the lowest in Finland (0%) [6, p. 290].

Interestingly enough it appears—although no data exist to the best of our knowledge—that the percentage of private *funding* does not seem to run parallel to the percentage of private *institutions*, because also public universities have been able to receive private funding, while at the same time some private universities can also apply for Government funds. We do know that South Korea has a substantial private

⁴It also means that expanding education no longer leads to less income inequality as was thought in the 1970's: an abundance of university graduates would reduce their relative wage.

university sector (perhaps even the largest one in the world). In 2012 some 87% of the approximately 430 universities were private, enrolling 76% of the university students. Central Asian universities are also mostly private. Most private universities are found in lower and middle income countries, with the exceptions in OECD countries mentioned above. In Latin American countries one finds side by side tuition free public universities with hardly any private income with private universities without any Government support [3].

Funding for universities has developed strongly in the 36 OECD countries, not only to keep up with the number of students, but also on a per student base: “between 2005 and 2016, spending on tertiary institutions increased by 28%, on average across OECD countries, more than double the rate of increase in student enrolments (12%).⁵ However, both the number of students and total spending has increased at a slower pace since 2010. In 2016, expenditure per tertiary education student amounted to US\$15,556,⁶ approximately one-third of which was devoted to research and development. While private sources financed more than 30% of the expenditure, on average, tuition fees for bachelor programs increased by more than 20% between 2007 and 2017 in half of the countries with data”, according to “Education at a Glance” [6]. To be sure, the increase in spending was devoted to higher salaries, as the student-staff ratio did not change. It also turned out that the economic crisis of the period 2008–2013 has hurt university funding severely, even more so in the US than in Europe [7]. This is perhaps a foreboding of what we may expect after the Covid 19 crisis is over, as we discuss in Sect. 7.

2 Funding Matters

“Craving to enlarge their resources” is not the right way to point out the motives of the university leadership in its search for more resources. The university leadership is responsible for continuity of the university and may aim—as most organizations—for growth. It may also be convinced that more resources per student enrolled can bring about better outcomes of universities, both in terms of new knowledge (through research, as in Subsect. 2.1) as in terms of student learning (as in Subsect. 2.2) which leads in turn to enhanced economic growth. Budgets then matter for a university to be able to contribute to society (Subsect. 2.3). Society (students, taxpayers, Governments) then can rightly ask why university costs per student have been rising, while the costs of products in other areas are decreasing (Subsect. 2.4).

⁵There are notable exceptions, like the Netherlands, which has seen a decrease in Government per student allocation.

⁶The range is between a maximum of \$30,000 in the US (with Luxemburg with one single university as an outlier on \$50,000) and a minimum of \$8,000 in Columbia as the lowest.

2.1 Research Funding Matters for Innovation

I make two steps in this section: first that research funding matters for research outcomes and second that research outcomes matter for innovation. University research is an important source for the creation of new knowledge which in turn has a substantial role to play the increase in productivity of the work force through the innovation of production processes or new products. Research in a country may take different shapes or forms: in the laboratories of private firms, in separate Government research institutes (like in Germany: the Max Planck institutes) or in universities. Most countries show that they put not all research eggs in one basket, but that there is substantial cooperation between different partners in research, not restricted to country borderlines (see: [8]).

University research funding in public universities is generally a combination of a “first” flow of money, directly coming from the Government together with the funding of students, a “second stream”, which is competitive with the framework of a national science foundation, and a “third stream” which includes international competitive funds (like in Europe the EU funds) but also funding from business (research contract with private partners). The total of research funding for a university is generally an indicator for the ranking of the university within the international ranking systems [9], like the Shanghai one [10]. This is because the rankings reflect proxy-indicators of the contribution of research to new knowledge, like the impact through citations. Hence, university administrators seeking larger funds for research can be said to seek to increase the impact of their university on new knowledge and through that knowledge on innovation in the economy.

The room for maneuver for the public university in seeking research funding is clearly limited by the legislation of the State of the country. More autonomy means, according to all evidence, better research funding and better research-outcomes [5].

Research in universities serves two goals simultaneously: the creation of new knowledge, as well as the contribution to creative and problem solving oriented learning on the part of the student population. Some would say that research will also serve to bring knowledge from abroad to the country.

2.2 Education Funding Matters for Economic Growth

Once again I relate first education funding to education outcomes and second I look into the relation between education outcomes and economic growth. Does funding per student have an impact on learning outcomes? This question has been widely debated for *primary and secondary*

education under the heading of “educational production functions” [11]. These studies are based on extensive data on pupil’s performance (as an output) and on education inputs (like the teacher, the school building, learning materials). When analyzing statistically the (generally linear) relation between output and inputs, the researchers find that the impact of the teacher (qualified as “teachers’ efficacy”) on student learning is overwhelmingly the most important factor [12]. New international comparable data (Project International Assessment of Adult Competences, OECD [13]) have allowed for a further appreciation of what competences make a teacher more or less effective in contributing to pupil’s learning [14], by constructing country-level measures of teacher cognitive skills using the PIAAC assessment data for 31 countries. They find substantial differences in teacher cognitive skills across countries that are strongly related to pupil’s performance. So far, so good, but what does this have to do with funding, with per student expenditures?

Hanushek et al. [14] make it plausible that teacher competences run quite parallel with teachers pay (in relation to other professionals with a higher education degree). Teacher salaries form by and large the majority of school expenditures. Hence we see a direct connection between higher per pupil expenditures and better student learning outcomes. Note that there are many other factors which determine learning outcomes, like the autonomy of the school [15]. This is a general case for improving teacher’s pay as a means to improve pupil’s performance (with the notion that this will increase the attractiveness of the teacher’s profession for highly qualified university graduates.

Do these relations between learning outcomes and budgetary inputs also pertain to universities? There are no measures available on student learning outcomes of universities, in the same way as the data of the Project International Student Achievement [16] give for 15/16 year olds. The only available info comes from PIAAC on the competences of 20–34 year old graduates of universities by country, as shown in Fig. 1. PIAAC average competencies of graduates differ between countries as the Figure shows. Moreover, the average competencies of graduates are closely related to per student expenditures in the country. This is all the impressionistic evidence we have on student outcomes and funding for education, realizing that there are many factors which determine the efficiency of the resources allocation in universities [17]. The ample literature on cost functions in higher education (relating total costs to the three outputs—graduate and undergraduate students and externally funded research) is not relevant in this respect as the quality factor (for university graduates) is not taken into account.

The PIAAC rank of Fig. 1 also closely resembles the innovation rank of the countries [18]. This should not come as a surprise since time and again it has been shown that

educational outcomes of students are closely related to economic growth [19].

2.3 Budgets Matter

The summary of the two previous subsections is that budgets are important for the public university leadership and for the Government, in view of realizing the best possible contributions to research and learning outcomes according to the strategy they follow for their university. In turn this leads to more innovation and higher economic growth. Yet, there is the caveat. Some universities have had little or no contribution to learning [20]. The relation between on the one hand the budget and on the other the outputs in terms of research or learning is a statistical one. It is statistically significant, but with a great variation around the line. Also it should be observed, that it is likely to be causal to a limited degree: universities with a better performance in learning or research tend to find it easier to acquire funds.

University administrators in search of enhanced funding have then strong arguments to plead with their prime financier (Government) for more funding: it pays off in research findings, in innovation and in particular in student competences developed during higher education. However, at the level of Government, these claims have to be balanced with those of other sectors. The weakness of the university claim is then that its reward is only visible at the longer run, while often the claims of other sectors (in particular of the health sector) are on the short run. Governments often are quite myopic to the short run as this ensures popularity and political support for the next election. This is particularly problematic in the aftermath of economic crisis, as the 2020 Covid one, as generally the budget cutting axe will hurt education more than other sectors.

2.4 Why is University Education Not Becoming Cheaper?

Students, their parents and Governments all grapple with the rising per student costs of university education. While all around us products become cheaper, university costs keep rising. Economists often will refer to “Baumol’s law”: the rise of salaries in jobs that have experienced no or a low increase of labor productivity, in response to rising salaries in other jobs that have experienced higher labor productivity growth. This “law” applies to many services (including health care). But what is the potential in universities of on-line learning to reduce costs? The Covid crisis has given rise to (forced) massive on-line learning. At the same time the MOOCs (Massive Open Online Courses) have sprung up where a student has access to excellent learning materials.

Fig. 1 Distribution of literacy among graduates 20–34-year-olds

Also, universities are engaged in technology enhanced learning. It is clear that there is a future ahead of us with technology enriched university learning which is likely to reduce the financial burden of universities on Governments and students and their parents alike. The limits of such forms of blended learning are in the social component of learning, in the interaction between students and teachers and among students themselves, required for high quality education.

3 Resource Acquisition

3.1 Potential Sources: Government

The most important potential source of income of a public university is the funding by the State of students and of research. That may sound simple for the university administrator if it were not that the most countries are not satisfied with simple input funding (according to the number of

students or as block grants for students or for research). Government like to fund in such a way that the tax payer (the ultimate funder) will get a return according to the goals set for the university. This will be considered in the following, after a general exploration of resource allocation of Governments to universities.

3.1.1 Government Funding for Education

Many Governments rely still heavily for funding university education on simple methods: either a block grant or a funding per student (possibly differentiated between medical students, technical and science students and all others). Yet, many add-ons have been developed, like in the Czech Republic additional funding for developing the teaching staff of the universities which is allocated in a competition between the universities.

Yet, increasingly the notion of “performance funding” has been explored by Government. Ultimately this would mean for education, that universities should be paid for the

value added in the competences of students, if this were observable or could be proxied. However, up to now all efforts to come up with a methodology to measure competences acquired in the academic process, like in the OECD Project Assessment of Higher Education Learning Outcomes, have stranded [21], mostly presumably of political opposition of the UK and US. It is rumored that these countries objected because of uncertainty on the outcomes for the university systems. At the same time the OECD notes in the analysis of another assessment⁷ (of young adults with a university degree who are at work) that there are significant differences in the competences of young university graduates among the countries who participated, as is shown in Fig. 1.

In the absence of measurements of competences, some Governments, like that of the Netherlands (1995) and Denmark (2003) have decided to focus on or the completion of exams (Denmark, the taximeter system) or graduation (the Netherlands) as an output measure for funding, while safeguarding the quality by a strict system of accreditation. This is assumed to incentivize universities to do their utmost to guide students towards their degree.

In the Netherlands (presumably the first country to introduce performance resource allocation) this system was brought in line with the incentives for students to complete their studies within the allotted time period, through the availability of provisional student grants in the forms of loans, which would be transformed into grants at graduation, but have to be paid back in case of dropout. It is difficult to evaluate these measures in their effects, as there is no comparison available to a situation without these measures. The overall impression, however, is that the measures have worked out favourably on students competency development, on retention and on transition, as well as on graduation. There appear to be no negative effects on equality of opportunity, as was expected, because of the tracked secondary school system. Once a student has completed the pre-university track, the social background is unlikely to play a role in the choice whether to go to university or not, when ample loan facilities are available. At the same time it is felt by students that the stress associated with studying has increased.⁸ More students have sought the support university psychologist than before.

In the US the debate about performance funding of students at public (State) universities has also been raging [22]. Several states have instituted performance funding, in response to the quest for greater accountability. The approach has generally been tied to funding to specific input

measures (like student teacher ratios) or throughput measures (like retention/prevention of drop out) or progression, or output measures like graduation). In [22] an evaluation is presented of the results of this funding policy for three US States: Indiana, Ohio, and Tennessee. They conclude that the outcomes of performance funding are ambiguous: there is no statistically significant impact of performance funding on student outcomes, while it appears that colleges were tempted to resort to weakening academic quality and to restricting the admission of less-prepared and less-advantaged students in order to improve their apparent performance.

In our view, the first should be a matter of strict oversight on the part of accreditation institutions, while the second might be intended by policy. If the intention of policy is to help less-prepared and less-advantaged students, then this should be part of the funding formulas.

The notion of performance funding is now finding its way throughout Europe, not so much through funding formula's (except for the Netherlands where in 2020 a weak remnant applies of the strict output oriented funding), but through agreements between Government and each individual university on improvements in retention, throughput and graduation (like in Denmark and also in the Netherlands). If these agreements are honored, then the university receives extra funding.

3.1.2 Government Funding for Research

Government funding for research in public universities generally used to be in the nature of a block grant sometimes in combination with per student research funding, often called: the first research funding stream, enhanced with funding from the National Science Foundation and/or Science academies [23] (the second stream). The latter was from the beginning characterized by some form of competition, albeit originally highly informal and without an organized process or a jury. Increasingly the second stream has become part of an organized process, based on a competition around research proposals around topics selected by National Science Organizations. In most countries it has also grown relative to the first stream. The UK has also introduced in the first stream some elements of performance, allocating funding to the universities which have demonstrated the ability to produce results as measured in publications in peer reviewed, recognized journals or in the form of citations. This might be called: Performance-based University research funding [24]. The difficulties in its application are in the balancing of peer reviews and metrics, accommodating differences between fields, and involving lengthy consultation with the academic community and transparency in data and results [24]. Countries differ considerably in terms of the efficiency of turning (financial)

⁷This is the PIAAC project: project international assessment of adult competences, <http://www.oecd.org/skills/piaac/>.

⁸This might also be the result of peer pressure to participate in university as well as to social media pressure to conform to the "perfect student's life".

input into bibliometrically measurable output [25] presumably as a result of differences in funding schemes.

There is also the third stream of research funding for universities, which does not come from the Ministries of Education or Science, but from other ministries, from international organizations (like the EU) or from business or non-Governmental parties. In Europe the EU has become a major source for funding research under the innovation umbrella, covering a sizeable percentage of some 10% of all research income of the top 100 European universities.

Many research funding organizations require “matching” of their contribution with funds which the university itself brings to the table and comes from the Government. This makes it difficult for public universities to increase their revenue from other sources than Government.

3.2 Limits to Acquisition: Mission and Money

Most well-known rankings of universities, like the Shanghai one [9] depend strongly on research performance. It was early on recognized that this does injustice to the many universities which fulfill important functions in the region through education or in research connected to the region. The EU decided to develop a “U-multi-ranking”, so that universities could compare themselves to others in *the same league* [26], increasing in this way the transparency of relative performance of universities, to policy makers, potential students and society at large. U-Multirank takes a multi-dimensional view of university performance; when comparing higher education institutions, it informs about the separate activities the institution engages in: teaching and learning, research, knowledge transfer, international orientation and regional engagement. Also, U-Multirank invites its users to compare institutions with similar profiles, thus enabling comparison on equal terms, rather than “comparing apples with oranges”. From thereon, it allows users to choose from a menu of performance indicators, without combining indicators into a weighted score or a numbered league table position, giving users the chance to create rankings relevant to their information needs. Thirdly, U-Multirank assigns scores on individual indicators using five broad performance groups (“very good” to “weak”) to compensate for imperfect comparability of information internationally. Finally, U-Multirank complements institutional information pertinent to the whole institution with a large set of subject (field-based) performance profiles, focusing on particular academic disciplines or groups of programs, using indicators specifically relevant to the separate subjects (e.g. laboratories in experimental sciences, internships in professional areas). Whereas transparency on individual fields is particularly important to, e.g., students looking for an institution that offers the subject they want to

study, other users (such as university presidents, researchers, policymakers, businesses and alumni) may be interested in information about the performance of institutions as a whole [26]. U-Multirank is an excellent basis for Governments to decide on funding, depending on the mix of objectives Government has for universities in specific categories.

4 Endowments and Gifts

Endowments have caught the eye of the university administrator with the image in mind of Harvard and other “Ivy League” universities in the US with endowments in the order of billions of dollars (Harvard in 2019: more than 50 billion US\$). These universities rely heavily on income from their endowments, to maintain their academic excellence, by salaries attracting the very best teachers and researchers, by supplying ample opportunities for research and reducing effective tuition fees for the selected few of the brightest students who are admitted [27]. Universities are usually endowed by private individuals, but sometimes also by Government, as was the case with the land-grant university in the US. By the end of the nineteenth century US states began to fund educational institutions by granting federally controlled land to the states for them to sell, to raise funds, to establish and endow “land-grant” colleges.⁹ Later some of these became private, but most remained public universities. Public universities in the US have a substantially lower endowment (order of magnitude of the mean endowment: 60 million US\$).

Endowment can be invested in the business world and yields a return that can be used as operating income for education and research. Often endowment is dedicated to a specific function of the university: to a discipline, to education of a specific type or to research of a specific type. Endowed professorships (chairs) are an example. In this respect the returns to endowment are quite comparable to gifts. There is also endowment in the form of buildings, made available by private donations to the university. Universities all over the world receive unrequited gifts from private individuals or companies for research and sometimes for education. The medical field, business administration and science [28] are the top runners.

Across the world alumni are increasingly involved in the alma maters (the universities they have graduated from) as a source of feed-back, as a potential target for recurrent education and as a potential source for “pay-back” towards the university. There is a culture in the high income English

⁹The first Morrill Act that led to the establishment of land-grant colleges is from 1862. It led to the creation of some of the most important Universities, namely MIT, Cornell, and several State Universities.

speaking countries (US, UK, Australia, Ireland) for alumni to “give” to their alma mater. In Canada this culture has only recently (in the period after 2000) been developed.

5 Tuition Fees and Access

When considering funding it is easily understood that this applies to the direct costs of education and research. However, on the part of the full time student there is also the cost of income foregone by full time participation. This amount generally is in excess to the costs of education and research (on a per student base).

The high private returns to university education [29] have led a number of countries to expect a greater financial contribution from the participants (or their parents) in the form of tuition fees. Tuition fees might be a threat to equality of opportunity: it is easier for well qualified youngsters with rich parents to study at university than for poor parents. Therefore countries have implemented financial support mechanisms to ease the burden on individuals when tuition fees are raised. Sometimes this is done by grants (depending on parental income), sometimes by loans. To reduce the trap of “loan aversion” [30], i.e. a negative attitude to loans for education, in particular among youngsters from lower income households, Governments have engaged in income-contingent repayment. This is an arrangement for the repayment of a loan where the regular (e.g. monthly) amount to be paid by the borrower depends on his or her income. This type of repayment arrangement is mostly used for student loans, where the ability of the new graduate borrower to repay is usually limited by his or her income. There are a number of important parameters in these loans, in order to make them successful for equality of opportunity: the interest rate and the amortization period. In the Netherlands an income contingent loan system was introduced in 1994 with an interest rate of the Government borrowing rate (low) plus 2% (for defaults and deaths) with an amortization of 20 years and a pay-back scheme limiting pay back to 10% of income above a threshold. It turned out to be fully self-funding. The trap in such schemes is the party who provides the loans and bears the risks: the Government (or a semi-Government institute) or a private bank. In the latter case the terms for income contingent loans might be exorbitantly high for students from low or middle income families to consider entering university. The positive aspects of income contingent loans are substantial. They would also have helped in the 2020 Covid crisis.

In some countries differential tuition fees (nationally determined) are used to encourage students to choose studies which are deemed more relevant for societal development (like medicine and sciences) in contrast to liberal arts studies. In other countries there are *numeri fixi* (limitations on the

number of students to be admitted) to steer the choice of students.

5.1 International Students as a Source of Income

In the 1960’s and thereafter, gradually the flow of foreign students going for studies in the US increases [31], mostly in response to the generous availability of scholarships. Other rich countries follow suit in providing scholarships for international students. This is the start of gradual rise of international students. A new stage is reached in the 1980’s and 1990’s. The pool of potential foreign students who were able to pay tuition at US, the UK and Australia colleges and universities expands markedly, with a notable increase among potential undergraduate students from China and India.

At the same time, substantial declines in state support, driven by contractions in state budgets, have occurred at public sector universities. For such universities, declines in state appropriations force a choice between increasing tuition levels, cutting expenditures, or enrolling a greater proportion of students paying full out-of-state tuition. Foreign, tuition paying, students became part of a business model for universities: “For the period between 1996 and 2012, we estimate that a 10% reduction in state appropriations is associated with an increase in foreign enrollment of 12% at public research universities and about 17% at the most research-intensive public universities” [31]. Later studies [32] confirm this finding. Australia is the country where higher education is the third most important export product with a value of \$32.4 billion (or 3% of GDP) [33]. In this way Australia earns more from foreign students (relative to its GDP) than any other country.

There is definitely a flip side to this development. Many foreign students decide to stay in the country which has welcomed them as a student, resulting in a brain drain which not always results in “brain circulation” (i.e. that graduates return with work experience after a while to their home country). The generosity of the US, for example, was amply returned by the large number of medical doctors and engineers which choose to stay after their training.

5.2 Selling Education

There is a huge market for retraining and further education. It is then but a small step to go from tuition fees covering part of the costs of education towards a full cost plus coverage for education and training which is not supported by Government funding. In most countries, universities have embraced further education and retraining on an academic

level as a means to contribute to the resources of a university. The retraining is done with the expertise in education and research used for regular academic education. Examples of recurrent training are in the medical field, providing the needed training to retain the physician's license, in economics and business with courses on management and governance of companies and in the legal field. In many countries alumni of universities are actively engaged in setting up and maintaining the framework for such courses, in order to ensure that these courses are as much rooted in academia as in practice.

6 Income from Research Alliances, Patents and from Start-ups

Income earned from successful research alliances, from patents and from start-ups generated by the university might be a substantial source of revenue for the university. However, it generally takes decades to develop the entrepreneurial spirit in a university, once the Government has allowed this and the university leadership has embraced this as a task for the university. These activities can be seen as true contributions of the university to society [8]. Yet, they need to be carefully monitored, so that ethical principles of correct representation of data and analysis are not violated because of commercial interests [34]. Generating money from university research alliances, from patents and from start-ups requires substantial incentives to be put in place in the management of the university, so that individuals feel that their efforts to earn money for the university are rewarded. Individual staff members realize that these efforts take time away from publishing in top journals, which is important for their individual career. University incentives should balance with the loss of opportunities in scholarly publishing.

Income from research cooperation, inventions and start-ups can be substantial. In the US universities reported US\$1.8-billion in earnings on inventions in 2011 (155 responding universities) [35], collecting, for example, royalties from new breeds of wheat, from a new drug for the treatment of HIV, and from longstanding arrangements over enduring products like Gatorade.¹⁰ Average earnings are 11 million per university, which means generally less than 5% of the total budget. In Europe there is some evidence that university licensing is not profitable for most universities, although some do succeed in attracting substantial additional revenue from inventions [36].

7 Post COVID 19 and University Resources

World-wide COVID19 has put a thick fog over the old normal of social and economic life. There are at least three elements of serious concern for public university resources:

- funding from Government and from other sources is likely to decrease;
- “purchasing power” from individuals is likely to be under pressure;
- university funding from foreign students is likely to decrease due to travel restrictions.

In April 2020 some expected that COVID19 would imply a temporary dip (a V shaped) development, leading to “business as usual” with a delay of one year, and a one-time loss of GDP. The expectations half a year later are less optimistic: the loss of GDP might be ten times the annual loss in 2020 [37].

The lock-down measures of Governments have caused a major recession, much stronger than the global financial crisis (2007–2008), and perhaps the worst economic crisis since the Great Depression of 1930, with major economies losing 5–10% of GDP in 2020. The down-sizing and closure of companies can cause unemployment that may—depending on the country—run up to 25%. Tax revenues will fall and governments are going into debt on a large scale, with a subsequent pressure on government budgets.¹¹ Countries with substantial export earnings from minerals are severely hurt, as prices for minerals, especially for oil are likely to remain low for a substantial period. Social safety nets, as well as public funding for health care and education, will be severely constrained.

This is not the place to dwell on the dilemmas of long run strategies of Governments. Yet, public universities could benefit from a strategy in which the solution to Government deficits is not primarily found in cutting budgets, but rather in raising taxes, in particular on the profits of international firms (which now mostly find refuge in tax heavens) and on wealth. Such a strategy does not stand in the way of international competitiveness and favors intergenerational mobility.

A second dilemma is the trade-off between different Government sectors when budgets are cut in order to restore the fiscal balance (Government expenditures and Government income). The general experience from other crises is that the position of (university) education is weak, when compared to health or to other sectors. The substantial

¹⁰Sporters' nutrition.

¹¹The long run effect on interest rates is uncertain. Some expect an international credit crisis and rising interest rates. Others believe that the decrease in the demand for borrowing for investment will keep interest rates down.

economic return to education is on the long run, while policy makers often care mostly about benefits from Government spending in the short run.

Government resources for research may be under less pressure as the public has become aware of the tremendous need for good science to understand the impact of the virus on the human body, the way it is spread and the possibilities of vaccine.

Whatever happens, there will be increasing pressure on public universities to look for other resources than the Government ones. At the same time public universities will have to demonstrate more clearly their contribution to society, through the skills and competences of their graduates and through the importance of the knowledge they produce to society.

There will also be increasing pressure to take on “technology” to reduce the costs of education. Technology encompasses a broad array of fields, ranging from on-line instruction, to online pre-programmed modules, to computer assisted instruction including the use algorithms to enhance teachers’ effectiveness.

Not only Government revenue to universities is likely to decline. Also private contributions (tuition fees) will be under pressure, if indeed incomes decrease with the decrease in GDP. Income contingent loan schemes might be helpful in the process to keep student—demand on the level which works for society.

The number of students pursuing university education globally has grown continuously over the past two decades and was expected to continue growing to 2030 [38] from some 213 million in 2015 to 332 million in 2030.¹² This increase reflects on the one hand the substantial rise in demand for skilled labor creating bright prospects for university students and on the other increased household incomes and the growing number of Government financial support policies to promote access to tertiary education. In this process the number of students studying abroad was assumed to grow from some 4.5 million to 6.9 million [38]. Until the COVID crisis came and made international travel far more difficult. The first signs are that 2020–2021 of enrolment of international students has not decreased, presumably due to “pipeline effects”: students had already decided for international studies long in advance. Longer run development is highly uncertain.

8 Conclusions

Public universities (tertiary education institutions with a substantial degree of research) are faced today with a complicated set of issues regarding their funding. They are aware that good funding is important to provide education of high quality and high quality research, which in turn are formidable factors for economic growth on the longer run and may contribute to social cohesion. This applies equally to top universities as to regional universities which may be less research intensive. This puts them seemingly in an excellent position to negotiate with Government: the average public rate of return to university education is 9% in OECD countries [6, p. 110]. This is much higher than market interest rates. However, the claims on Government budgets are manifold including claims with a short run impact, like claims for health or social services. Government in the electoral cycle may prefer the short run above the longer run and may want to reduce per student funding, in particular when student enrolment is increasing, as is still world-wide the case. This is widely recognized as a threat to the potential contribution universities can make to social cohesion and economic growth [39, 40].

Traditionally Government funding for education was either in the form of a block grant or based on the number of students (sometimes differentiated between medical, science/technical and other). Increasingly Governments have attempted to bring resource allocation in line with the performance of the university, in terms of throughput (successfully concluded exams by students) or output (successful graduation). Some European countries have tied this funding to student financial support and tuition fees, so that there is a match in incentives for the university and for the student.

Governments worry about the increased costs of university education and explore with universities ways and means to reduce the per student costs, by means of more distance and more “Ed Tech”. It is likely that blended forms of learning will emerge which could be slightly more effective (same quality, less costs). However, education is a social activity in which the meeting of students among each other and the meeting between teachers and students matter.

In research, there is generally in most countries still a block grant of the Government for universities or/and a research funding based on the number of students. The part of Government research funding which has been acquired through competition has in most countries been increasing. Competition can be in the form of an application through a research proposal or through bibliometry. In many countries national science organizations will consider proposals for funding, selecting the “best”. Such funds often require for their contribution matching by the university. This puts a limit to the potential for universities in the competition for

¹²The world population is expected to grow from 7.4 billion people in 2015 to 8.6 billion in 2030.

research funding. Some Governments rely on a national comparative assessment of research output (in the form of publications in peer reviewed journals and their impact, and through citations) for allocating research funding across the universities in their country.

Endowments and gifts are important for public universities, even if they are substantially smaller than for private universities. The role of tuition fees in public universities is subject to intense political debate, centered on the question whether the level of tuition fees will discourage social mobility, i.e. the participation of students from lower socio-economic strata whose parents have not a university degree. Income contingent loans schemes (with a pay-back of loans for study based on income earned) are likely to mitigate or fully compensate the impact of tuition fees on participation from students from lower and middle income groups.

Increasingly international full-cost-plus-fee paying students are viewed as a source of income of universities in Anglo-Saxon countries. In particular in Australia, university education is an important “export” business. Selling education as a service for those who want to improve their career can also generate funds for the university.

Research funding is increasingly found in universities from engagement with society through “knowledge transfer”, by means of research contracts with outside partners, by means of start-ups by students or staff from the university of by means of patents.

Covid-19 will have a marked impact on social and economic development, even if an effective vaccine is developed and available by the beginning of 2021. Early (2020) hopes of a V shaped economic development (deep recession, steep recovery in 2021) are unlikely. More-over, the extensive borrowing by Governments needed for fighting the first fall-out of the crisis in 2020 will put a strain on Government budgets for the years to come. The Government contribution to university budgets is likely to be under pressure as a result.

A special case is universities with substantial numbers of fee-paying international students. The admissions of September 2020 have not shown a decline in the number of students. However, it is likely that in the years to come the number of international students will decrease, as a result of less international mobility to conform to the safety standards to keep Covid infections under control.

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