CHAPTER 6

Why Do Universities Rise and Fall? The Crucial Factors

After looking at continental and country specific contextual patterns in our quantitative analysis in Chap. 4 and the 10 case studies in Chap. 5, we now go back to what we defined in Chap. 2 as necessary conditions for competing among the best in the world. Have the 10 characteristics of world-class research universities (WCRUs) regarding local context, funding, faculty, students, research portfolio, governance, leadership, global spirit, off-campus stakeholders and reputation management proven their importance? Do they convincingly distinguish between supportive and challenging environments in which universities act and between successful and unsuccessful universities at the institutional level? And what is the weighting of the individual criteria? Can we identify a ranking list of causes for the rise and fall of universities? The 10 criteria are highly interdependent. Despite this obvious fact, we discussed each separately for analytical reasons, in the order in which they were introduced in Chap. 2; we bring them together again in the concluding parts of this chapter.

A Politically, Economically and Culturally Favourable Local Context

Our quantitative analysis of 171 universities across three continents has revealed patterns that partially explain the development of the institutions in a specific region. Asia is gaining ground, but within the continent, Japan is faltering. UK and Danish universities do much better than those

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in Germany and Austria in a Europe that is keeping its place, whereas the USA seems to be the prime victim of Asia's ascent. Looking at specific features and characteristics of these continents and countries, we found some explanations for what the rankings tell us. Context matters, but crude input indicators such as national R&D spending or specific structural properties of the science system in question explain performance and status of universities only in some cases and fall short in others. As shown in the 10 case studies, the relationship is complex; there are numerous intervening variables, combined in different patterns and rapidly changing configurations.

Context, or more precisely, context that matters in the framework of what we are trying to explain, is three-dimensional: political, economic and cultural. What counts **politically** is a stable system with high priorities regarding the different levels of knowledge production and their application from basic education via advanced science systems to efficient innovation schemes. All eight countries that host one or several of our 10 case studies—Austria, the UK, the USA, Germany, Hong Kong SAR, South Korea, Japan and Switzerland—profit from such a supportive political framework, with practically all the major political actors on board. I haven't found a single programme document or policy paper that would deny the relevance of science and technology (S&T) for the current and future strength of a country and its universities. Of course, some question the distribution of funding to the different actors, propose measures to enhance the efficiency of universities, demand stronger cooperation with the private sector or suggest changes in the research portfolio, but the importance of a high performing university community in modern knowledge based societies, leading to economic growth and social well being and the necessity to provide for it, funding wise and by creating supportive environments, is not really contested.

But sympathy, a general political commitment, is one thing; corresponding actions something else. And here, some countries in the list do indeed do much better on paper than in practice. We found some where the levels of funding by the main funding source, the national government (Austria) or the political entities in charge of higher education (Lower Saxony in Germany and to some extent the State of New York), don't correspond to the ambitions of politics: funding is simply too low to promote successful competition in the highest international leagues (see "Funding" below). In other systems, where higher education is partially privatized—a combination of private universities and public ones,

as in the USA, or hybrid type universities, as in the UK—and most of a university's revenue comes from tuition fees, politics faces another problem. What worked well in the past has reached its limit: tuition fees have got to a level where potential candidates for enrolment (and their parents) start to think twice before engaging in further education where the cost benefit analysis has become highly questionable. Apart from the likes of Harvard, MIT and Oxford, domestic demand suffers. To retain their income level, universities must compensate by lowering the entrance level or finding more students from abroad willing to pay the exorbitant fees. The measures are not likely to enhance the quality of the nation's higher education, and politics must eventually face the question of jumping over the political shadow and start to subsidize private schools or, in the case of public schools, to bring block grants back to former levels. And there are other national specificities. One is a perennial issue—Japan's high political hurdles against student and faculty mobility that meets the international standard. Two others are developments preoccupying countries that were largely spared from political troubles in their GHE history, Hong Kong and Switzerland. The problems are rather new and had no strong effect on how Hong Kong and Swiss universities developed over the whole period we observed (very well, as we know). But they may already have left their mark in the recent past, at least in Hong Kong. Politics was at the heart of my report on the University of Hong Kong (HKU). There were many signs in the summer of 2015 that what has worked relatively well in Mainland China over the last three decades, the balancing act between a market-based economy and a highly controlling political regime based on Marxist principles, is faltering. As discussed in the case study, nobody knows on which side the balance will fall. But if political forces feel the need to tighten the screws further, Hong Kong's universities will be in real trouble. The difficulty in the Swiss case is self-made. In a referendum in spring 2014, the Swiss population decided to restrict immigration. The result is not only a weakening of its workforce by hindering the intake of highly qualified foreign personnel but also the danger of being excluded from the research and mobility programmes of the European Union (EU). This would be a disaster. Of course, science is an international affair and Switzerland could tighten its non-European collaboration. But as we have seen and discussed, the production of scientific knowledge also has a very important local and regional component, and the natural regional environment for a small country like Switzerland, networking and benchmarking wise, is Europe.

A final political aspect: do the quantitative and qualitative analyses in Chaps. 4 and 5 speak in favour of one or the other of the two key types of universities, strongly linked to their history and the political system in which they act: public or private? Not according to our data. I looked for eventual statistical correlations between our change index and the legal status of the 31 US universities of our sample: there are none. Of the two private schools in our case studies, NYU developed splendidly and the other, the University of Rochester (UR), didn't. The two rising stars in Europe are in one case classically public (École Polytechnique Fédérale de Lausanne [EPFL]) and in the other public on paper but in reality closer to a private than a public institution (King's College London [KCL]). Politics matter and can explain part of the variations we have found among the universities we looked at, less along the lines of basic characteristics and categories like public versus private and more along those of how the political actors interpret general support in policy papers and translate it into action. Science and technology are in fashion politically, but the fashion is expensive and not all budgets can stretch to haute couture.

At least as important as political context variables are those shaped by the **economy**. Firstly, a sound economic base with a decent gross domestic product (GDP) per capita, relatively stable prices and at least moderate economic growth is a condition for realizing what is wanted politically. All the host countries of the 10 universities of our sample are in this category. Second, highly beneficial for high performing university research is the presence of a strong research intensive and internationally well anchored industry. The USA, the UK, Germany, Japan, Switzerland and South Korea are spoiled in this regard. What is true for nations is also true for a university's immediate vicinity. The best examples of universities acting in unfavourable economical areas are Stony Brook University (SBU) and UR. Although denied by my interview partner at UR, there is no doubt in my mind that what has happened in the city of Rochester in the last two decades, the economic collapse of its major industry with the disappearance of tens of thousands of jobs, had and still has a major influence on its flagship university. UR is (still) well off financially, but it used to act in an economically much more promising region when Kodak was still around and Rochester was the imaging capital of the world. There was no such collapse on Long Island, where Stony Brook is located, but contrary to Rochester, there was never really anything around to collapse. Brookhaven National Laboratory was and is an important partner. But its research is highly specialized, actually too specialized to help a comprehensive school

in its neighbourhood to really flourish. Stony Brook University is a lone wolf out there in Long Island, a beautiful, peaceful place but not a location that allows easy cooperation and joint ventures with industry. Korean Advanced Institute of Science and Technology (KAIST), EPFL and Kyoto are perfect counterexamples to UR and SBU for fruitful connections with industry. King's College London does beautifully regarding joint ventures with a domain that represents the other potentially highly promising off-campus partner for modern research universities, health, and NYU takes advantage of the presence of economic powerhouses in all the relevant economic sectors of its home town, New York City. Stony Brook is just 50 miles away, but it's another world, economically and intellectually.

Which brings us to the third category of relevant context variables, the **cultural** environment. Of course, culture has different meanings relative to the context in which it is discussed. What I mean by "culture" is a typical areal mindset that fosters or hinders the production of scientific knowledge. Generally speaking, the closer a local culture comes to the norms and values of the globalized world—openness, multiculturalism, rapid change, dynamism, deregulated post-liberal economic schemes, to just mention some—the more supportive it is for the development of WCRUs. The best positive examples—positive if one believes in the benefits of a globalized world—are New York and London; the most negative, Rochester, Stony Brook and, to some extent, despite being located in area devoted to the production of science, Daejeon, South Korea. Why not include Vienna, another world city, in the positive list? There is a lot of culture in Austria's capital, as everybody knows, but it is culture of another type, certainly less connected to the production of knowledge compared with a century ago. Fortunately for the quality of life but unfortunately for efficient science production, the city of Vienna does not have the vibrant spirit typical of London and New York.

What else did we learn about the relationship between culture and university performance? Three things: Firstly, the benefits and blessings of universities that try to match global ambitions with local presence. KCL, EPFL and Kyoto are champions in this regard, and despite its president's international extravaganzas, so is NYU. Secondly, the danger of self-sufficiency and complacency at universities that were former giants and stars, not particularly challenged, and forced to change and improve by the environment in which they acted and act, nationally and locally. Striking examples are the universities of Vienna and Göttingen, with the latter rudely awakened by its adventure in the German *Exzellenzinitiative*.

And thirdly, the existence of a sort of culturally motivated denial or, less dramatically, serious questioning of the process of knowledge production "à l'Americaine". As discussed in the Kyoto report, even if the president's position may not be mainstream, it is the position of the head of one of Japan's leading schools. We don't know its impact on Kyoto's present and future strategy; even less do we know how to measure it, specifically, not with an instrument based on and powered by the system it wants to check (and balance), international rankings. The question leaves the empirical categories of the present study—which doesn't take away its relevance; quite to the contrary. I will come back to it below, in Chaps. 7 and 8.

In summary: all in all, from a global perspective, our 10 universities profit from satisfactory to excellent political, economic and cultural conditions for their business. They face no insurmountable obstacles in the way of attaining and defending the status of a WCRU, as one easily finds in other regions of the world, like South America or Africa. But within this generally favourable framework, some of the 10 are obviously better off than others. The potential of the context is one thing, but to be really supportive of the universities that act within it is something else. Specifically revealing in this regard is funding.

Abundant Funding

Funding is probably the most important single factor for competing on the international scene. Consequently, Fig. 6.1 presents key data for understanding the rise and fall of universities over the last decade. It shows the universities' "revenue per student" in real terms in 2004 and 2014 (although the 2004 figures for HKU are missing).

Most striking in Fig. 6.1 are the huge differences among the individual funding levels. The richest university of our sample, UR, has 10 times more money per student at its disposal than the poorest, the University of Vienna (Appendix D). Even considering the facts that the cost per student does not linearly increase with size, i.e. tends to be somewhat lower in large universities, and that factors like a school's research profile and the cost of living at its location evidently also matter, schools like Rochester and Vienna obviously play in different income leagues. Similarly revealing is the development of funding over the last decade. In sharp contrast to political commitments to increase investment in higher education and research to meet the demands of modern knowledge societies reported above, there is no trend toward "more money per student". Five out of

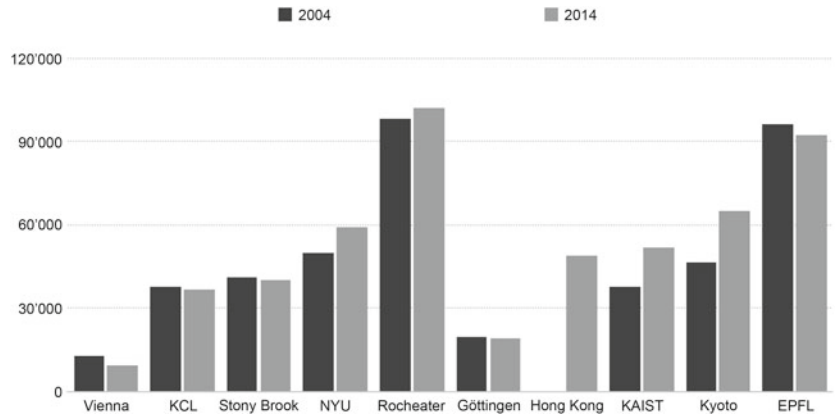

Fig. 6.1 Revenue per student 2004 and 2014 (US$ real prices)

the nine universities for which we have the data for both 2004 and 2014 show negative growth rates; only the two Asian universities, KAIST and Kyoto, and the two private US schools, NYU and, albeit only marginally, UR, are in a more comfortable situation than 10 years ago.

Two universities suffer from exceptional low revenue per student, Vienna and Göttingen. Although the term "abundant" is relative and universities have learned to operate in a given framework, i.e. have adapted to the circumstances that are part of their specific history, a revenue of less than US$ 20,000 per student—in the case of Vienna even less than US$ 10,000—is clearly below the level that allows a university to compete in the champions' league. This single criterion alone explains why Vienna and Göttingen struggle: the gap with the richest is simply too big. And because they are both public universities with limited possibilities of securing additional funds via tuition fees (Lower Saxony recently even decided to completely abolish tuition fees) or to influence state funding contributions, quick relief is not in sight. Despite bold plans in policy papers, state money for the University of Vienna has not increased in real terms, and even if Göttingen's efforts to be reconsidered as an elite university should bear fruit, the university will not get rich, at least not in the foreseeable future. Two other universities, SBU and KCL, with revenue per student in the US$ 40,000 range, are in a better but not really comfortable situation. They have at their disposal small endowments which gives them a useful mass for manoeuvring and widens the gap with Vienna and Göttingen,

but the sum is clearly smaller than that of the leading national competitors in the UK, Oxford and Cambridge, and the private elite schools in the USA, including the two universities of our sample, NYU and UR. In other words, they are sufficiently funded but have to do very well regarding most other criteria to keep a place in the sun. As we learned from the rankings and have observed in the case studies, one does, the other does not. A third group, this one in the US$ 50,000–60,000 range, comprises NYU and the three Asian universities, HKU, Kyoto and KAIST, and is in good shape financially from an international perspective. KAIST and HKU perform accordingly. NYU does surprisingly well in the US context. To perform at the level it does as a private university with US$ 59,000 per student and a relatively low endowment is unique in the USA. Its New York City rival, Columbia University, is above US$ 100,000; Harvard and MIT exceed US$ 200,000 and Stanford even US$ 300,000. The University of Kyoto's income per student, and specifically its 2004–2014 growth, the highest in the sample, surprises. Considering what we learned about Japan in Chap. 4, this was not to be expected of a Japanese university. Its ability to attract money despite a difficult environment is most certainly one of the reasons it shows better ranking records than most other Japanese schools. And finally, there are the two Croesuses among the 10, UR and EPFL. However, there are qualifications here. Evidently, our indicator, revenue per student, has a bias: smaller schools need more money per student for infrastructure and teaching requirements. In addition, one has to consider the local context in which they act. In 2014, UR had a revenue of US$ 101,800 per student. It is the best figure in our sample. But what looks very high in our group of 10 is not excessive in the US context. As shown above, more than US$ 100,000 is common (NYU is just the exception that proves the rule). In other words, UR's funding level does not allow conclusions about what to expect performance wise; the school is not damned to fail nor expected to do wonders for this specific reason. And the same is true for EPFL. Its US$ 92,300 per student is the second highest of the sample, but taking into account Switzerland's cost of living, the sum is equivalent to US$ 62,400 in the USA (ppp, 2.9.2015). Certainly, purchasing power parity–adjusted sums do not tell the real story either, and the cost of living in New York is certainly not a third lower than in Lausanne. But the difference with NYU and the other universities of the sample (except UR) is certainly much smaller than the diagram in Fig. 6.1 suggests. EPFL is in a financially fine but not outstanding situation; money alone does not explain its splendid record since 2004,

especially as its revenue/student ratio has slightly decreased over this period (−4%).

In short: the differences in the funding of universities that are deemed to play in the highest league—as a reminder, we are talking about universities that made it into the top 200 of THE-QS's 2004 rankings—are amazingly pronounced. For two public European universities, Vienna and Göttingen, inadequate funding is a sufficient disqualifier. Other schools, above all KCL and NYU, demonstrate that a university is able to gain ground with a relatively low budget in a high cost environment. And yes: a more appropriate term for the financial condition for making it in the highest league of universities that we stated originally, "abundant", may be "sufficient". Eight more or less qualify, two definitely don't.

World-Class Faculty

When is a faculty good enough to be called "world class"? The answer looks simple and straightforward. World-class faculties produce world-class research, and world-class research can be measured. One possibility, the purest form, is to simply consider the average impact of the total publications produced by a specific institution. It is an indicator used in the ranking of the Centre for Science and Technology Studies of the University of Leiden, CWST Leiden, based on Web of Science data and prepared in a methodologically sophisticated and convincing way, controlling for size of institution to calculate the number and the percentage of a university's publications that, compared with other publications in the same field and in the same year, are in the top 10% most frequently cited (http://www.leidenranking.com). Number one on the 2015 list is Rockefeller University in New York City, with close to 30%; the last (750th) institution on the list, Nihon University in Japan, has 2.3% articles in top journals.

Appendix F shows the respective figures for the 10 universities in our sample based on 2010–2013 data. The variation is considerable, with EPFL leading the group (18.2%)—number two in Europe and 15th in the world—and Kyoto last (8.3%)—well behind in the world count, at 423rd. Even considering the well known bias linked to citation analysis (Moed 2005), one can hardly question the "world-class" research output of universities like EPFL, NYU and KCL, which feature faculties that place one out of five publications in the category of the 10% most cited. And we could even risk making another step, lowering the barrier for "world class" to 12%, which creates a group of 170 institutions, including three others

in our sample, UR, Göttingen and SBU. Which would leave question marks for four, Vienna and, interestingly, all three Asian universities in the sample. And it is this result, the amazingly bad record of Asian institutions, that calls for a prudent interpretation of research impact figures based on citation analysis: the data they produce may present a valuable criterion for judging the research quality of universities in a specific region but have obvious limits when applied on a global scale. Some of the amazing results produced by Leiden can be explained by language and resulting regional publication patterns, with a high percentage of publications being in non-English journals with relatively low citation impact. Unsurprisingly, Asia's best ranked schools impact wise are Nanyang Technological University Singapore and HKU S&T, i.e. institutions from Asian regions, where English in teaching and research is common practice. But even those do not shine in the Leiden league table and are behind Western schools they largely "beat" in rankings that are less directly research impact driven and that consider additional factors such as reputation. Thus, there must be additional reasons; the most obvious, of course, is the one put forward by Kyoto's President in the interview (and, less directly, what KAIST hints at in its questionnaire): discriminatory patterns against non-mainstream, i.e. imperfectly GHE adapted approaches to the selection of research topics and the way to study them. It most certainly hits the strongest player in Asia, Japan, the most severely. There is hardly another country where traditional cultural elements are so highly valued and omnipresent in all spheres of society, higher education being no exception. Contrary to China, where science had to be reinvented after decades of standing still in the second part of the twentieth century, Japan's science flourished and developed a critical mass, self-consciousness and an identity that resulted in genuine Japanese solutions and products. Robots developed in Japan are distinguishably Japanese. China, on the other hand, did what was most opportune and expedient in its attempts to get back on track: it jumped on the American train. Its education and science system is much less locally and culturally coloured than the one in Japan. We will get back to this specific aspect of comparing research output across "science world regions" in Chaps. 7 and 8.

In other words: what looks like a straightforward indicator for faculty quality, standard citation analysis by Leiden or others using Web of Science data or alternative bases such as Scopus, does not tell the whole story; the reality is more complex. The Leiden figures in Appendix F do a good job signalling different performance levels among the seven Western

universities but fail to do the same for the whole sample. How to proceed from here? One possibility is to consider the potential of a faculty by taking into account the presence of prestigious faculty members, such as Nobel laureates and Fields Medal winners. This is done in the Shanghai ranking, of course. And indeed, here, Japanese universities are positioned where they probably belong: among the best in the world. But we shouldn't draw on a data source we used for selecting the 10 case studies to make our point.[1] Another possibility is methodologically and conceptually more appropriate: to take into account a dynamic aspect of "world-class faculty", the possibilities (and limits) a school has to recruit and retain high quality scholars. Contrary to other properties of a university, faculties can be relatively quickly improved by replacing members who retire with successors better adapted to the new demands of GHE. Ten years of wise recruiting can change a lot. What motivates world-class scientists to go to one rather than another school? High performance in their own and related fields and the impression that the school in question wants to continue to do world-class research are certainly the two most crucial motives. But there are others. One not to be overlooked is money, a professor's salary. Column six in Appendix D displays the average annual salary of a full professor. The list is tricky for two reasons. Firstly, as already pointed out, when comparing revenue, one has to take into consideration the different costs of living. EPFL pays the highest salaries in our sample of 10, but the resultant enthusiasm of the newly recruited is quickly checked when confronting the family budget after the first couple of months of residence in Switzerland. Appendix D also shows the purchasing power parity (PPP) adapted salary figures. Secondly, average salaries are one thing, top salaries something else. All 10 universities, no matter their host country and legal status, have the possibility of attracting top-notch scientists with exceptional salaries beyond the school's standard salary scheme. The question is to what level. And here, generally, a rich private school in the USA with a high endowment is most certainly in a better position than a public school in continental Europe. Kyoto, the university at the other end of the list is public, but has some areas of autonomy and instruments at its disposal that give the school a "private" touch. To what extent it can offer above standard salaries, President Yawagima wouldn't say. If this ability is restricted, we may have found an additional cause of the lack of multiculturalism on its campus. As we have seen above, Kyoto doesn't strive for a world record number of foreign faculty members. But even if it did, the

chances of bringing brilliant foreign scientists to its campus are severely curtailed by an uncompetitive salary scale.

I asked my interview partners to come up with the names of the three most prominent scholars the school was able to hire in the last five years. Not surprisingly in view of the above, there are only Japanese scholars on Kyoto's list, all of them from other Japanese schools. Of course, at least for large science systems such as Japan's, this does not imply anything regarding the quality of the recruited, but limiting the pool to nationals strongly decreases the possibility of finding the right person at the right time. In this respect, the University of Kyoto is not alone; many others also show surprisingly "national" recruitment patterns, albeit for different reasons. One cause for the all-Korean list in the case of KAIST may be its unattractive location, whereas the hiring of one Austrian and two Germans in the case of Vienna reflects what I have already discussed: "foreign", in this case, mainly means from another German-speaking country. Still another case is the USA. Its science community is so large and the quality level so high that "looking elsewhere" is simply less necessary.

Considering the above—the limited value of single research impact figures as indicators for faculty quality in the global perspective, a (coy) look at the ranking system with the most comprehensive approach to faculty quality, Shanghai, and a short analysis of the universities' potential to recruit and retain world-class researchers—did I come upon universities that do not have at their disposal a faculty potentially able to compete among the best in the world? There are question marks for three, Vienna, SBU and KAIST. SBU and KAIST are the only two schools in our sample that don't make it into the top 200 of the 2014 Shanghai rankings, which I consider the most relevant for global evaluation of research performance and faculty quality. Both are relatively young schools, and having no Nobel Laureates in their faculty is certainly an important reason for their low rankings. Location may be another. More serious is the case of the University of Vienna, the only Western university with a count below the 12% mark (the admittedly arbitrary minimum for world class). I didn't want to introduce output quantity in a discussion on research quality. But comparing the number of published documents with the number of its academic staff, Vienna stands so far apart that it points to a different feature of faculty: research intensity. Vienna, with an academic staff of more than 7000, produced fewer than 3000 scientific documents in 2014 (Appendix F); KCL, with just two thirds of Vienna's staff, almost doubled this number. Again, this is not a quality judgement but much more a

hint at the extremely difficult situation the university is confronted with. Vienna's 7000 staff have to handle 70,000 students (plus an additional 20,000 in other student categories), three times the number of colleagues at KCL. Is it also a matter of efficiency? I do not have solid information to prove the case. What is certain, however, and what I discuss in Chap. 4 and in the case studies on KCL and Vienna, is the fact that the type of funding system, the level of national competition and elements of the cultural environment result in different pressures on the scientists in these two countries to perform at high efficiency levels. One lesson of an EC sponsored study on the relationship between country characteristics and research performance in Europe and the USA is that competition for basic research funding makes universities more productive (Aghion et al. 2010).

Finally, here, but not for the last time, the discussion of one of the elements critical to making it as a WCRU, in this case world-class faculty, has brought us back to funding. Obviously, schools with a high reputation have a better chance to recruit the best; schools that have lost ground regarding their research performance, on the other hand, need money to improve. With one exception, UR, they are also those that suffer in this regard. It is the old story again: the haves have better cards than the have nots.

High Quality Students

Even more difficult to compare from a global perspective than faculties are student communities. The ways in which universities select students, structure their curricula and apply mid-term performance tests and graduation exams makes quality judgements very questionable. QS tries to get a sense of this via its recruiter survey. But considering the huge differences in economic contexts in which universities act and the fact that recruiters grade a very specific quality aspect, the utility of graduates for their business, these data are also of limited power for a general assessment. The present study fails to add empirical evidence to existing differences among the quality levels of enrolling and graduating students in the 10 case studies (and even less in the 171 universities looked at in the quantitative analysis). But it allows a couple of observations that permit some prudent conclusions.

I found no evident relationship between a specific type of entrance selection and other relevant indicators of university performance. There are different ways to the top. Comparing two universities undoubtedly

on the rise, NYU and EPFL, NYU works the well known US way, with entrance levels based on records from nationwide standardized testing: the higher a school's reputation, the higher the hurdle. EPFL, on the other hand, must accept any who pass Swiss high school graduation. The selection occurs later, during the first year of undergraduate studies: half of the first year students do not make it to the second year. It is obviously a logistically more demanding and (almost irresponsibly) costly procedure but one with probably equally good results. Problems arrive if a university with "open doors" does not apply strict selections after a first trial phase, which seems to be the case at the University of Vienna. (The fact that in addition to Austrian applicants it must absorb any potential candidate from other EU member states aggravates the problem).

At the postgraduate level, quality is the result of previous selection patterns and what a school is able to offer to its undergraduates. Increasingly more important, however, is how successful it is in attracting brilliant master's and specifically doctoral students from other campuses, nationally and internationally, and how it organizes the doctoral curriculum. It is at that stage where competition really starts to count. One indicator, also not a pure and proper student quality measure but a good indicator of the attractiveness of a school for postgraduate studies and for its research potential, is the ratio between postgraduates and undergraduates (Appendix C). The differences among the 10 universities are not enormous, as Fig. 6.2 shows, but they are significant because they perfectly correlate with what the rankings tell us about the general strengths of the universities in the sample.

The five schools with the highest percentage of postgraduates are the five schools "on the rise". With 41 %, KCL is the lowest of the five. In the

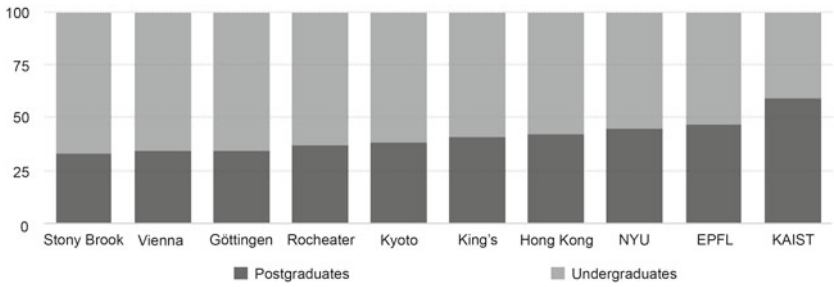

Fig. 6.2 Percentage of postgraduates (masters and PhDs)

interview, KCL's President called it a clear signal that structurally, KCL is not yet optimized. For Ed Byrne and many of his colleagues, ideally, in a WCRU, the number of postgraduates should be higher than the number of undergraduates. KAIST is the only one that meets this criterion (59%). It also had the easiest task to get there—it started as a postgraduate school only, 40 years ago. Kyoto has the lowest negative change index of the five "on the fall" and the corresponding place in the diagram: between the two groupings.

One final comment on the attractiveness of a university to potential students: I am convinced that a specific areal dimension of local context, the locality of the school, becomes increasingly important. It includes the campus, of course, and housing, cultural events, etc. but also the city and region that host the school. In this regard, the University of Vienna, KCL, NYU, HKU, Kyoto University and EPFL have better cards than the University of Göttingen, SBU, UR and, most distinctively, KAIST Daejeon. It may be an additional reason why one sees so many Asian students on the campuses of UR and SBU. What counts for them is to go to a good school in the promised land of science, rather than the excitement of New York City.

A Research Portfolio Adapted to the Major (Global) Challenges of the Twenty-first Century

Whether we like it or not, the universities best equipped for making it in GHE are those that foster disciplines with a high potential of being directly (or seemingly directly) useful for mastering the problems of a globalized world. It is this "utility" and "usefulness" that politics and the economic sector mostly demand and are prepared to pay for (and because the same areas promise solid professional careers, high tuition fee–paying students and parents are in agreement). What is useful in the eyes of the funders and potential users of advanced scientific knowledge? Well, firstly, basic sciences like physics, mathematics, chemistry and biology that present the basis for what follows. Secondly, technology fields, advanced engineering, IT, material sciences, biotechnology and so on that lead to technological breakthroughs and winning products but also to solutions for the most challenging of today's problems, such as climate change, water shortages and renewable energy. And, thirdly, the different disciplines of the life sciences that contribute to the controlling of diseases and improved public health, the medical sciences and their associates, macro- and microbiology,

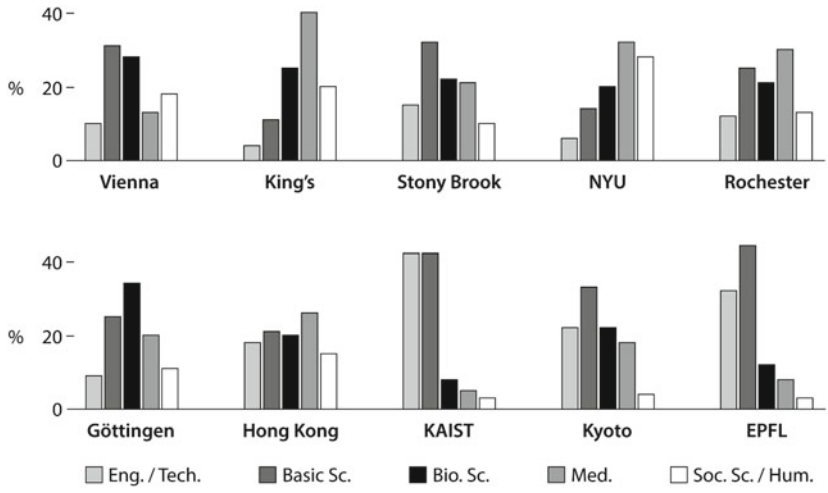

Fig. 6.3 Research profiles

pharmacology, neurosciences and so on. This list defines not the optimal research portfolio but a condition to be met when an university wants to compete in the highest leagues: besides basic science, it must at least focus on one of the two other pillars, engineering/technology or medical sciences, or, even better, both. The extent to which our 10 universities meet this condition is shown in Fig. 6.3. It presents the share of publications in five fields, engineering/technology, basic sciences, biological sciences, medical sciences and social sciences/humanities, based on the data disseminated by Scopus for the 10 schools. Appendix G shows how the five categories were compiled out of a multitude of disciplines analysed by Scopus (Scopus, 19 August, 2015).

KAIST and EPFL are the two technology giants of the sample. Engineering/technology and the basic sciences are clearly in the centre and count for three quarters (EPFL) and four fifths (KAIST) of the research output in the five fields. Both schools have no medical faculty as such but have life science departments with strong links to engineering, the one at EPFL better developed, with 20% of its publications against only 13% at the South Korean school, by far the lowest percentage among the 10 case studies (See Appendix G, Bio.Sc plus Med.). KAIST's portfolio is striking one dimensional, certainly a reason behind its disappointing

position in rankings that mainly consider research performance, such as Shanghai and Leiden. Not surprisingly, both schools have low figures for the social sciences and humanities. It does not mean that they do not value their importance, but activities in these areas are more restricted to teaching, with obligatory weekly courses at the bachelor's and master's levels and very selective small research areas, like industrial design at KAIST and financial economics and digital humanities at EPFL.

At the other end of the spectrum, with specifically strong engagements in the medical sector, are KCL and NYU. NYU has more than half of its publications in medical science and other life science disciplines, KCL close to two thirds. They are at the same time the two schools with the highest engagement in the social sciences and humanities, KCL by drawing on them in its interdisciplinary fields organized around diseases (psychology, sociology, social history), NYU more in fields tackling business and economic problems. Both, together with the University of Vienna, also produce an above average number of publications in the arts and humanities, reflecting the environment in which they act; culturally rich world cities. Finally, as shown in the reports, KCL and NYU both make efforts to increase their presence in the technological fields. Successful universities not only keep a successful profile; they are also aware of their weaknesses (and act accordingly). The research profile of a third group of universities, UR, Göttingen, Kyoto, HKU and SBU, is also dominated by the life sciences. Like KCL and NYU, they have close links to neighbouring associated hospitals. But they are less specialized, with a more "classic" comprehensive look. Except for HKU, they engage relatively strongly in the basic sciences—physics, chemistry and mathematics—albeit, as we have seen in former chapters, with rather disappointing results considering their glorious past in these fields (Göttingen) or the presence of world leading physics installations in the neighbourhood (Brookhaven National Laboratory at SBU). Of the other two, UR is closest to the bioscience/medicine profiled NYU and KCL, but obviously, as discussed in Chap. 5, with less convincing results. Since the mid-1990s, the life sciences have partially replaced technical fields. It underlines the hypothesis that the deep structural crises the city of Rochester was hit by in the early years of the twenty-first century indeed had a much stronger impact than UR's Provost believes. HKU and Kyoto University, finally, show very balanced portfolios alongside the dominating bioscience part, with slightly more of a science and technology orientation at the latter.

The school with the least favourable profile in the light of what GHE demands of "its" WCRUs is the University of Vienna. Together with KCL and NYU, it produces the highest percentage of scientific documents in the humanities and social sciences. But contrary to the KCL and NYU, it doesn't complement them with at least one of the two disciplinary groups most relevant for competitiveness in GHE, engineering and medical sciences. As discussed in the specific report, Vienna never featured engineering, which has always been the centrepiece of the Technical University of Vienna. Much worse was the loss of the other key field of WCRUs, the medical sciences, in the early years of the twenty-first century, when the government decided to set up a specialized University of Medical Sciences attached to a major local hospital. Although not acknowledged by my interview partners, it was an extremely damaging move for the school (and maybe for Austria's science as well). Thus, what has its unquestionable merits (and the reporter's sympathy), offering its students a very broad spectrum of courses, including "exotic" ones in the humanities, is poison in the context of GHE. Not only does it come at the cost of more ranking friendly fields, specifically in a school with such a low budget, it also hinders the establishment of internal crossovers between the "soft" sciences and engineering and medicine.

The comparison of research profiles with research performance as measured in the rankings clearly shows that specialization helps. Few schools in the world have the critical mass, the reputation and the money to cover the spectrum of science and perform at a world-class level in all parts of it. Four of the five universities on the rise have developed strengths in one of the two fields we have rated as key disciplines of modern science: engineering/technology or medicine, combined with other life sciences. Only HKU is not clearly following this path (which may be one of the reasons behind its faltering performance in the last couple of years, as discussed in Chap. 5). And there is another pattern: the most successful are those that have intelligently adapted specialization to the tradition and the characteristic features of the locality in which they act. KCL neighbours strong, research-intensive hospitals and a campus located at the cultural-artistic centre of the city. NYU has built up a world-class business faculty and is about to do the same in urbanism. EPFL has supplemented its traditional science and engineering profile with the life sciences, partially in view of contributing to the development of the Lake Geneva region (Arc Lémanique) into Switzerland's "health valley". Kyoto University has built up a centre specializing in supporting Kyoto on a variety of problems

the city is confronted with. HKU is about to strengthen research fields with close links to Chinese culture. On-going or planned initiatives in other universities of the sample are less convincing in this regard. Whether computer science and big data bring Rochester back on track remains to be seen. Interestingly, it is not really a field in which Rochester has shined in the past, and I do not see local characteristics that particularly call for this kind of specialization. Will new facilities at Brookhaven National Laboratory be good enough to re-launch SBU research endeavour? These are serious question marks. To profit from possible local convergences was obviously also the basic idea of the University of Göttingen's *Zukunftsvision*; it was most certainly not the idea as such but doubts as to whether the main actor would be up to the task that was behind the negative verdict of the expert group on keeping Göttingen in the prestigious group of German elite universities.

Structure and Governance

I haven't stumbled upon weaknesses regarding structure and governance that would allow me to call them a really critical factor in explaining rise or fall. It would seem the triumphal march of new public management has not stopped at the campus gates. Governance looks quite equal among the 10, with some minor variations to do with legal status or country specificities. In some countries, mainly those with a long history of a strong public sector, the "modernization" came later than in the neo-liberal USA and UK. But it came, and in the meantime it is mostly digested. Whether the way universities are structured and governed in modern higher education is adequate or not is another question (and worth another book). What counts in the framework of the present study is that they are run more or less according to the same schemes, to their benefits and to their costs. There are, however, two notable exceptions. The first is that some of the traditional schools in continental Europe, but also in Hong Kong and Kyoto, still radiate a somewhat out-dated "structural mood", from small things such as how the different hierarchical layers cooperate and deal with each other to fundamental career concepts like giving young scientists greater autonomy at earlier stages of their careers. But the question of transforming a university into a more merit-based institution is a highly complex affair, and I have not looked into it deeply enough in the framework of this study to elaborate further. The second is the presence of a real board of trustees with functional specifications, common in the USA and

in hybrid private/public systems like those found in the UK and, to some extent, Japan. A group of high profile personalities from academia, politics, industry and business act as strategic governors and auditors, providing much greater budget flexibility than universities in continental Europe but also in Hong Kong or South Korea enjoy.[2] Chief among their roles, besides strategic planning and the nursing and fostering of links between the on-campus and off-campus stakeholders, is fundraising. It is this and the resulting endowments, money reserves that allow quick reaction to new developments and efficient management of change, that may be the most important features that differentiate the structure and governance among universities in GHE. As demonstrated by some universities in our sample, one can successfully compete without an endowment, but having one certainly makes life much easier.

Excellent Leadership

"Excellent leadership" calls for a clear definition, and similarly to "world-class faculty", there is no convincing definition at hand. Leadership is well studied, of course, but the research field mostly ignores the uniqueness of the higher education context and treats universities if they were commercial businesses (Lumby 2013). The lack of empirical evidence out of comparative studies hinting at common characteristics—profile, attitudes and actual behaviour—of successful university leaders is striking. Despite this discouraging introductory remark and an admittedly equally thin empirical arsenal, I don't hesitate to call leadership the second most important single factor in the development of a university after funding. The verdict is based on what I have learned about measures taken by former and current presidents in the last decade as reported in official documents and, most importantly, in my discussions with their present leaders. Not a very solid empirical base, I agree. But it is the only logistically reasonable way a study like the present one can attempt to shed some light on the topic. Spending a couple of years on each campus observing and gathering information, as I did at EPFL, is not a very realistic proposition for a sample of 10.[3]

I met with personalities whose capacities to lead a university were evident. But there were also the others, where I had my doubts. Reading the lines of my 10 reports and between the lines tells the reader who, in my opinion, belongs to one or the other category. The task of successfully leading a WCRU is enormously demanding. It is the rector or president

who has to translate the potential of a university—its reputation based on its past, a supportive context and sufficient funding—into world-class performance and resulting prestige. It is he or she who makes sure that a university's (research) portfolio meets the conditions of modern science and at the same time fits into the local environment; it is he or she who brings the world-class faculty and the brilliant master's and PhD students on board; it is he or she who is responsible for key aspects of the university's structure and inner life, such as replacing old hierarchies and strong dependencies of the young generation of scientists on the moods and caprices of the established system with a system that is strictly merit based. And it is he or she who creates an internal climate of collegiality—not easy in an institution in which the key actors, faculty members, are under so much pressure to perform—or, as we discuss in the next section, "global spirit".

Of course, university heads get support (sometimes so much that they are not aware of the more mundane problems of the daily life of the university, sheltered from their eyes in the privileged environment of top floors, but that is another story). They are counselled by a board of trustees or another body with experts from off campus reflecting on strategic matters, a couple of vice-presidents, a provost, a secretary-general and so on, and many of the tasks that used to be part of their scope are now in the hands of the faculties that today enjoy more autonomy than in the past (at least in GHE-adapted institutions). But not only is delegation a double-edged sword (and achieving the famous "confidence instead of control" is easier said than done), but counselled or not, it is finally the CEO who runs the show. And contrary to ordinary CEOs in the business world, university bosses are seldom trained for the task. They are, or should be, primarily brilliant scientists. The rest, leadership, is supposed to come from training on the job. It would be a wonder if it worked all the time and everywhere. Who determines the quality of a university president? The body formally in charge of the appointment, of course, a board of trustees or similar body. But are these bodies really up to the job? Do they have the necessary information to efficiently and wisely guide? Are they bold enough to take tough decisions? There are schools—and here I don't suggest any in our sample—where the students, professors and administrators are all convinced that the leader is not really up to the task and this situation continues over years and years without consequences. Contrary to the private sector, where the business figures tell all, or almost all, there are no similar indicators for performance over time. Except the rankings, of course, but here we are on thin ice (again).

In a nutshell: based on observations and findings from the 10 case studies and from my own professional career, I consider leadership to be extremely relevant to how universities develop. Its importance contrasts with the absence of means and instruments to control it; universities' abilities to handle obvious erroneous appointments are very restricted. All five universities "on the rise" according to our change index are well led in my opinion; for some of the five "on the fall" I have serious doubts in this regard.

Global Spirit

"Global spirit is hard to define", I wrote at the beginning of the relevant paragraph in Chap. 2. Ten case studies later, there is no reason to revise the remark. On the contrary, it is a mindset, and to capture it one needs to get "the feeling of the place". Like other dimensions, "global spirit" is hard to measure. It's in the air and not in hard facts. You get closer to it by walking on the campus, talking to students and interviewing the president than by looking at statistics such as the percentage of foreign students on campus. Actually, these can be highly misleading if not well chosen and qualified; they tell the reader a couple of things, but "global spirit" is not necessarily one of them.

Close to half of UR's postgraduate students are from overseas, against one sixth at Kyoto; in addition, UR acts in a country known for its openness, whereas Japan has the reputation of being very much an inward-looking nation. Does this mean UR has more of a global spirit? Not really, because the reason for the high percentage of foreigners in its case is mainly financial, in my opinion: they bring in money via tuition fees. If, rather, the reason was to make the campus more international and allow domestic students to become more familiar with other cultures, as explained by UR's Provost in the interview, the campus would look much less like a branch of Tsinghua or Peking University. Kyoto, on the other side, has a very prudent and well reflected culture-consciousness approach. The university is interested in foreign students, and very much so, but it understands them as a real contribution to multiculturalism and cultural understanding. Foreign students are welcomed, but as we learned in the interview, they have to make an effort. Are the two thirds of foreign postgraduates at EPFL a solid sign of global spirit? They could be, but not necessarily so. With a population of just eight million, Switzerland is a very small country. To play in the world league, it is forced to recruit on the international market. The only

host country in our sample in a similar situation is Austria, and its percentage of foreign students is indeed also clearly above average. Thus, as in the case of Rochester but for another reason—tuition fees in Switzerland are too low to account for it, and foreigners pay the same as domestic students—the impressive figures for EPFL and the University of Vienna in Appendix E do not prove a case. More revealing, although in the other direction, is the case of Göttingen. In line with one of the main characteristics of GHE, high mobility (Chap. 2), all universities in the sample have increased their proportion of foreign postgraduates over the last 10 years except Göttingen. The development is dramatic: its percentage in 2014 (20%) is one third lower than in 2004 (31%).

Are there optional bases for attributing "global spirit" to a university other than the part foreign students and faculty play or the impressions gathered when visiting the institution? Is the percentage of shared authorship with non-domestic scholars a valuable indicator? Like the number of foreign students on the campus, it is also a characteristic of small science systems and is of limited significance. What about a university's presence abroad? Not surprisingly, NYU, with its president's pet issue, global universities, leads the field, followed by KCL and, amazingly, Kyoto (another reason to not prematurely accuse the Japanese of splendid isolationism). But as we have discussed (and guessed) in the case of SBU, going overseas may aim at the same pragmatic and mundane goal of exploiting foreign money sources as attracting students to its campus at home. And the same may also be partially behind KCL's and NYU's strong presences abroad.[4] Kyoto, on the other hand, seems to pursue another goal: it wants to contribute to a better visibility of Japanese science, and specific Japanese ways to produce scientific knowledge, in the world. Could the MOOCs be a sign or symbol, with EPFL holding a relatively large lead against the nine others (Appendix E)? It is too early to tell. Some presidents told me that they are interested and may jump on the train but first want to see where the journey leads. So EPFL's engagement may just be a symbol of a high degree of risk taking by its president. But then, risk taking may very well be a sub-category of global spirit.

All in all: which ones of the 10 campuses I visited came closest to what I mean by "global spirit" judging by what I found by just walking around, observing the school and talking to the person in charge? EPFL comes immediately to my mind, but of course, in an approach where impressions count, my personal opinion on my own school does not count. NYU, KCL and HKU follow, the latter two with presidents from abroad. Which

ones are at the opposite end of the spectrum? Just one: Göttingen, clearly, one of the most international universities in the first part of the twentieth century. One final observation before we move to the next criterion. "Global spirit" in the framework of the present study refers to the culture and mood of institutions and less to those of countries. But looking at it from this perspective, the country with the most students who have a global spirit—or the government that makes the biggest efforts to send them abroad—seems to be China. It is a big country, of course, but the number of Chinese students on foreign campuses, particularly foreign English-speaking campuses, is nevertheless amazing. Learning from others is a Chinese tradition. This is pragmatic and rational, of course, but there is something else: the notion of global spirit, at least if linked to the notion of learning from others, contains a pinch of humbleness, and humbleness is (still) a striking characteristic of the Chinese (in my humble opinion).

Excellent Links to Off-Campus Stakeholders

I had two questions about off-campus links in my questionnaire: the number of chairs financed by third parties in 2014 and the number of start-ups since 2004. Not surprisingly, there is a high correlation between industry links and the research profiles discussed above. The two technical schools, EPFL and KAIST, did an excellent job in helping their advanced students and faculty to establish start-ups. The numbers I got from KAIST are somewhat questionable because of a probably too liberal interpretation of how I defined the conditions for linking a start-up to a university in my questionnaire, but "between 200 and 300" from 2004–2014 seems a safe enough guess for comparing KAIST with the other nine (Appendix F). It is impressive, and so are the 143 start-ups at EPFL, a university that contrary to KAIST was not established in an existing industrial park but had to develop one next door. It has attracted powerful partners in the last couple of years, among them Nestlé, Merck Serono and Logitech.

Looking at the data provided by the other two schools with impressive performances in the last decade, NYU and KCL—unfortunately, those from the fifth, HKU, are missing—there is no clear pattern. Neither is a giant in engineering, and a lower number of start-ups at both than at KAIST and EPFL does not surprise. NYU's above average record in this domain is the result of the recent merger with Brooklyn Polytech mentioned in the case study and of a generally very business-like attitude,

with a well developed, efficient technology transfer unit, looking for opportunities in all sectors covered by the university. Its strength in economics and business administration is well reflected in the composition of the 12 chairs financed by third parties: practically all are in business and economics. KCL, on the other hand, disinvested in engineering and only lately started to turn the wheel and build up new strengths in modern engineering. Its main off-campus partners, however, are not from industry but from the health sector. Not just the health sector, actually, but a world leading, research-intensive conglomerate of hospitals and private and public research centres. It is this excellence in the partners that distinguishes KCL from the other universities of our sample, which also feature medical centres and strong links to hospitals but with much less convincing outcomes. Here an important dimension of context, locality, comes in again. A world-class research public health facility in the neighbourhood is simply not the same as a regional hospital. Rochester, for instance, runs a good but not really leading medical school; the number of grants from the National Institute of Health is satisfactory but not more than that, and not one of the members of its medical faculty belongs to the distinguished group of 300 Howard Hughes Medical Institute investigators (HHMI 2014).

Similarly to the way observations regarding the limited power of the number of foreign students on a campus as an indicator for "global spirit", blunt figures like the number of start-ups or industry sponsored chairs do not tell the whole story. They need to be qualified: Links to whom and with what effects? Do the partners really matter in their field—industry, economy or public health? A chair in food technology sponsored by a multinational company is obviously not the same as a chair in creative writing paid for by a local private citizen. Both are important contributions from off campus, but they have very different implications regarding a university's capacity to attract the interest of private parties, to build bridges to more applied research fields and possibly to support resulting commercialization. Through this prism, the rather impressive figures for SBU may not present the right picture. But if we take them as real and ignore the fact that we are missing the corresponding data from UR, Göttingen and HKU, there seems to be only one clear under achiever when it comes to relevant off-campus links in our sample: the University of Vienna. The university reports three privately sponsored chairs and the absence of data regarding start-ups; no data "on record" is likely a poor sign of a good record.[5]

Efficient Reputation Management

Universities' main windows to off-campus stakeholders are their websites. All the universities in our sample seem to be very well aware of this and present good to excellent products. I'm not a specialist in the art of communication and selling and do not want to classify further. The most progress was obviously made on the Asian side, where just a couple of years ago one had to be very lucky to find what one wanted to find. The fact that Kyoto still today does not tell you how to contact its president, not even indirectly, may be an artifact of Japanese institutional organization: different from the West but not necessarily less clever.

How do the ten universities treat the most important, most used and at the same time most controversial indicator for reputation in GHE: their position in major rankings? Not really well, actually, manifesting a certain unease regarding how to cope with the issue. I will analyse their attitudes and positions regarding the phenomenon of rankings more deeply in Chap. 7. What is of interest right here is how they handle the phenomenon on their home pages and in publicly assessable documents cited online. Interestingly, the university that mostly tabooed the question in the interview, the University of Rochester, is not at all shy in this regard. Its home page leads very directly to rankings. Bold, one is tempted to say, considering its recent positioning. But boldness is relative: Rochester underlines those league tables in which it does relatively well, among them rather obscure sources like a rarely considered Saudi Arabia–based consulting organization, the Centre for World University Rankings, and it hides the fact that it has constantly lost ground in the last couple of years. But in this regard, Rochester is not alone, of course.

Does how the 10 universities reacted to my investigations serve as an indicator for how they manage reputation? I must be careful not to overestimate the importance of my study: why should a proud university worry what someone not even known in the rankings business will write in a book? On the other hand: would a well organized, reputation conscious school not at least be concerned to provide the author with whom it has agreed to participate in a case study and interview with a completed questionnaire? Eight of the 10 did, among them Göttingen, but only "half-way", with very rudimentary information; two didn't: Rochester for unknown reasons and HKU probably in view of the current sensitive political climate. The highest interest, manifested in elaborate comments, came from KCL, NYU and KAIST; the other four just did their job. (EPFL, of course, can't be judged accordingly.)

What else is there to say regarding the topic of reputation management? Not much, despite its importance, I'm afraid to say. There are the official documents, mid-term strategies and the like, but they are little read. The best reputation manager is progress in rankings and the media response. Good connections of the university's press officer with the local and regional media are important in this regard. And there is the university's boss again, of course, who not only needs a good head for internal affairs but must also engage in prestigious events around the world, well covered by the media. Finally, there are the MOOCs. Even if not developed for this specific reason, I consider them an extremely important instrument for branding and with that, reputation building. If other scholars should repeat the present exercise in 2025 and look back at developments over the last 10 years, they will have to look very closely at how MOOCs developed and the role they acquired in GHE.

Ranking the Factors

Did the discussion of the 10 dimensions we defined as important for being successful in GHE and for making it as a WCRU among other WCRUs confirm their relevance? Based on the data gathered in the quantitative analysis of the development of 171 universities over a 10-year period and a closer look at 10 universities, can we classify them and identify the most important? And this despite the empirical limits of what can be achieved in a monograph like the present one (which I hope to have sufficiently stressed in the empirical parts of the book)? I think we can. Not surprisingly, not all 10 criteria we sorted out qualify as good indicators for success or failure if applied as unique criteria. But applied as a package, they do. Using them as a checklist gives a pretty clear idea regarding a university's potential to compete in GHE. And they most certainly indicate whether some basic conditions are or are not met.

The three basic conditions are context, funding and leadership. If a university fails in one of these, it is practically out of the race. Context wise, in order to flourish, a school needs political authorities that create and defend a legal and financial environment that allows its institutions of higher learning to compete on the international stage, potential off-campus partners interested in close collaboration with strong basic research–driven academic institutions and a local culture that fosters innovation and appeals to the science community. The importance of these three dimensions of context, politics, economy and culture, varies among countries and

their university systems—political goodwill is obviously more important for public universities in continental Europe than for private institutions in the USA—but without decent conditions in all of them, universities will struggle. And they will certainly fail if the second key criterion strongly linked to the first, funding, is below a sufficient level. Whether sufficient funding is enough or abundant funding is in order depends on the third crucial criterion for success: leadership. Supporting context and "sufficient" funding—a term we introduced to replace "abundant", which we used when defining the 10 criteria in Chap. 2—are necessary but not sufficient conditions. The context must be intelligently put to the use of the institution and the money wisely invested. All the other factors we have defined as important characteristics of WCRUs, most notably the ideal research portfolio mix along with the building, retaining and constant improving of a world-class faculty; the ability to attract high-class students, specifically PhDs but also those with global spirit; links to off-campus stakeholders; and adequate structure, governance and reputation management, are to a large degree in the hands of the universities' governance and leaders, particularly its CEO, president or rector. It is for them to turn context and funding into performance and reputation…and what the rankings tell the world about their university.

Which brings us to the last part of the book: the interpretation of the results of the present study for the instrument we used at its start for the quantitative analysis of the rise and fall of universities and for their selection for the case studies; rankings. What lessons do our findings teach us regarding rankings? And might they even be helpful for the rankers?

Notes

1. It's an ever present dilemma in this study. To complement my direct observations made during visits and what I learned in the interviews I use data, collected via the questionnaires or otherwise, that are partially also used in rankings. The only way out of this is to at least refrain from using direct ranking scores. I'm aware of the fact that I am skating on thin ice, but there is no real alternative. Rankings and what we try to show, the reasons behind the rise and fall of universities, are just too interwovento be properly separated in all constellations.
2. There are "board of trustees" like bodies in other countries than the USA, of course, such as the University Council at the University of Vienna or the ETH-Board of the two Federal Institutes of Technology, ETHZ and EPFL, in Switzerland, bringing in off-campus knowledge and network connections.

But they lack the decisive properties of the US type: complete financial sovereignty and an instrument to fully exploit it; an endowment.

3. I was at first thinking of a second questionnaire, pooling different categories of on- and off-campus stakeholders, but had to give up on the idea for logistical and financial reasons. The question of university leadership would have had to be and should be studied in a separate project.
4. I have asked the 10 universities to evaluate the importance of rankings in specific aspects of the university's life on a scale from 1 to 10. One aspect out of eight I proposed was "attracting international postgraduate students as a money source". Stony Brook ranked it at slightly over its institutional mean (6/6), KCL at equal its mean (6/6) and NYU at far below (1/7). Unfortunately, I don't have "questionnaire based" answers from Rochester, but my question in the interview to Provost Lennie about whether money was a reason for attracting foreign students was vehemently denied. I further discuss this aspect in Chap. 7 in the section Rankings and the Ranked.
5. Vienna did provide some information to U-Multirank, EC's multidimensional university ranking tool, however (regarding U-Multirank, see also Note 5, Chap. 7). They confirm its weak performance in knowledge transfer. Unfortunately, spin-off data are missing for a couple of the universities in our sample, but among the ones that delivered them, Vienna has the lowest number. I looked up U-Multirank to fill other data blanks, particularly for the universities that did not return their questionnaire. It is an interesting experience. Definitions of the data I asked the universities to provide (Appendices B–G), such as spin-offs, don't correspond to the ones in U-Multirank. And when they did correspond, I got different data for the same year or time period than U-Multirank. It seems that information not only differs because of different definitions of the data sets one is interested in but also depending on who exactly one asks at a university.

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