

## CHAPTER 1

# What Does It Mean to Be a World-Class University?

In the past decade, the term “world-class university” has become a catch phrase, not simply for improving the quality of learning and research in tertiary education but also, more important, for developing the capacity to compete in the global tertiary education marketplace through the acquisition and creation of advanced knowledge. With students looking to attend the best possible institution that they can afford, often regardless of national borders, and with governments keen on maximizing the returns on their investments in universities, global standing is becoming an increasingly important concern for institutions around the world (Williams and Van Dyke 2007). The paradox of the world-class university, however, as Altbach has succinctly and accurately observed, is that “everyone wants one, no one knows what it is, and no one knows how to get one” (Altbach 2004).

To become a member of the exclusive group of world-class universities is not something achieved by self-declaration. This elite status is conferred by the outside world on the basis of international recognition. Until recently, the process involved a subjective qualification, mostly that of reputation. For example, Ivy League universities in the United States (U.S.), such as Harvard, Yale, or Columbia; the Universities of Oxford and Cambridge in the United Kingdom (U.K.); and the University of Tokyo

have traditionally been counted among the exclusive group of elite universities, but no direct and rigorous measure was available to substantiate their superior status in terms of training of graduates, research output, and technology transfer. Even the higher salaries captured by their graduates could be interpreted as a signaling proxy as much as the true value of their education.

With the proliferation of league tables in the past few years, however, more systematic ways of identifying and classifying world-class universities have appeared (IHEP 2007). Although most of the best-known rankings purport to categorize universities within a given country, there have also been attempts to establish international rankings. The two most comprehensive international rankings, allowing for broad benchmark comparisons of institutions across national borders, are those prepared by (a) the *Times Higher Education Supplement (THES)*, produced by QS Quacquarelli Symonds Ltd., and (b) Shanghai Jiao Tong University (SJTU). A third international ranking compiled by Webometrics, produced by the Cybermetrics Lab (a unit of the National Research Council, the main public research body in Spain), compares 4,000 world tertiary education institutions and marks them on scales from 1 to 5 across several areas that purport to measure visibility on the Internet as a proxy of the importance of the concerned institution.

To compare the international stature of institutions, these league tables are constructed by using objective or subjective data (or both) obtained from the universities themselves or from the public domain. The *THES* ranking selects the top 200 universities in the world. First presented in 2004, the methodology for this ranking focuses most heavily on international reputation, combining subjective inputs (such as peer reviews and employer recruiting surveys), quantitative data (including the numbers of international students and faculty), and the influence of the faculty (as represented by research citations).

Operating since 2003, SJTU uses a methodology that focuses on seemingly more objective indicators, such as the academic and research performance of faculty, alumni, and staff. The measures evaluated include publications, citations, and exclusive international awards (such as Nobel Prizes and Fields Medals). Shanghai's ranking is also presented slightly differently: The top 100 institutions are listed in ranked ordinal. The remaining 400 institutions are listed by clusters of approximately 50 and 100 (101–52, 153–202, 203–300, and so forth) and alphabetically within those clusters. (The detailed criteria used by each of the three world rankings are

presented in appendix A.) Table 1.1 shows the results of the 2008 SJTU and *THES* world rankings.

Notwithstanding the serious methodological limitations of any ranking exercise summarized in box 1.1, world-class universities are recognized in part for their superior outputs. They produce well-qualified graduates who are in high demand on the labor market; they conduct leading-edge research published in top scientific journals; and in the case of science-and-technology-oriented institutions, they contribute to technical innovations through patents and licenses.

Most universities recognized as world-class originate from a very small number of countries, mostly Western. In fact, the University of Tokyo is the only non-U.S., non-U.K. university among the top 20 in the SJTU ranking. If one considers that there are only between 30 and 50 world-class universities in total, according to the SJTU ranking

**Table 1.1. Top 20 Universities in *THES* and SJTU World Rankings, 2008**

<i>Rank</i>	<i>THES</i>	<i>Rank</i>	<i>SJTU</i>
1	Harvard University	1	Harvard University
2	Yale University	2	Stanford University
3	University of Cambridge	3	University of California, Berkeley
4	University of Oxford	4	University of Cambridge
5	California Institute of Technology	5	Massachusetts Institute of Technology (MIT)
6	Imperial College London	6	California Institute of Technology
7	University College London	7	Columbia University
8	University of Chicago	8	Princeton University
9	Massachusetts Institute of Technology (MIT)	9	University of Chicago
10	Columbia University	10	University of Oxford
11	University of Pennsylvania	11	Yale University
12	Princeton University	12	Cornell University
13	Duke University	13	University of California, Los Angeles
13	Johns Hopkins University	14	University of California, San Diego
15	Cornell University	15	University of Pennsylvania
16	Australian National University	16	University of Washington, Seattle
17	Stanford University	17	University of Wisconsin, Madison
18	University of Michigan	18	University of California, San Francisco
19	University of Tokyo	19	University of Tokyo
20	McGill University	20	Johns Hopkins University

Sources: *THES* 2008; SJTU 2008.

**Box 1.1****Understanding and Using Rankings to Their Best Advantage**

Just as scarcity, prestige, and having access to “the best” increasingly mark the purchase of goods such as cars, handbags, and blue jeans, the consumers of tertiary education are also looking for indicators that enhance their capacity to identify and access the best universities. In this race for “luxury” education, countries are striving to develop “world-class universities” that will spearhead the development of a knowledge-based economy. Because of the power of rankings, institutions are playing a game of innovating and investing in light of ranking methodologies, perhaps at the expense of their real strengths, financial capabilities, and institutional capacity.

Regardless of their controversial nature and methodological shortcomings, university rankings have become widespread and are unlikely to disappear. Because they define what “world-class” is to the broadest audience, they cannot be ignored by anyone interested in measuring the performance of tertiary education institutions. The following general recommendations, developed out of a recent analysis of league tables, may help clarify for policy makers, administrators, and users of tertiary education how to determine the real value of the educational opportunity offered by an institution:

- Be clear about what the ranking actually measures.
- Use a range of indicators and multiple measures, rather than a single, weighted ranking.
- Consumers should be aware of comparing similar programs or institutions.
- Institutions can use rankings for strategic planning and quality improvement purposes.
- Governments can use rankings to stimulate a culture of quality.
- Consumers of the rankings data can use the rankings as one of the instruments available to inform students, families, and employers and to fuel public debates.

*Source:* Salmi and Saroyan 2007.

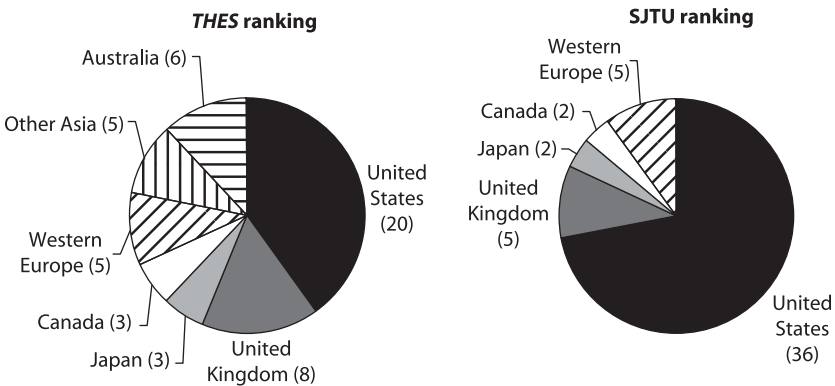
they all come from a small group of eight North American and Western European countries, Japan being again the only exception (appendix B). *THES* has a slightly wider range of countries of origin among the top 50 universities (11 countries), including Hong Kong (China), New Zealand, and Singapore besides the usual North American and

Western European nations (appendix C). Figure 1.1 shows the broad geographical distribution of the countries whose universities appear among the top 50 in the world rankings.

The few scholars who have attempted to define what world-class universities have that regular universities do not possess have identified a number of basic features, such as highly qualified faculty; excellence in research; quality teaching; high levels of government and nongovernment sources of funding; international and highly talented students; academic freedom; well-defined autonomous governance structures; and well-equipped facilities for teaching, research, administration, and (often) student life (Altbach 2004; Khoon et al. 2005; Niland 2000, 2007). Recent collaborative research on this theme between U.K. and Chinese universities (Alden and Lin 2004) has resulted in an even longer list of key attributes, ranging from the international reputation of the university to more abstract concepts such as the university’s contribution to society, both very difficult to measure in an objective manner (appendix D).

In an attempt to propose a more manageable definition of world-class universities, this report makes the case that the superior results of these institutions (highly sought graduates, leading-edge research, and technology transfer) can essentially be attributed to three complementary sets of factors at play in top universities: (a) a **high concentration of talent** (faculty and students), (b) **abundant resources** to offer a rich learning

**Figure 1.1. Geographical Distribution of World-Class Universities**  
(Top 50 in 2008)



Source: THES 2008; SJTU 2008.

environment and to conduct advanced research, and (c) **favorable governance** features that encourage strategic vision, innovation, and flexibility and that enable institutions to make decisions and to manage resources without being encumbered by bureaucracy.

### **Concentration of Talent**

The first and perhaps foremost determinant of excellence is the presence of a critical mass of top students and outstanding faculty. World-class universities are able to select the best students and attract the most qualified professors and researchers.

In the sciences, being at the right university—the one where the most state-of-the-art research is being done in the best-equipped labs by the most visible scientists—is extremely important. George Stigler describes this as a snowballing process, where an outstanding scientist gets funded to do exciting research, attracts other faculty, then the best students—until a critical mass is formed that has an irresistible appeal to any young person entering the field.

Mihaly Csikszentmihalyi (1997)

This has always been the hallmark of the Ivy League universities in the United States or the Universities of Oxford and Cambridge in the United Kingdom. And it is also a feature of the newer world-class universities, such as the National University of Singapore (NUS) or Tsinghua University in China.

Beijing's Tsinghua University said last month it would increase the number of awards this year. Students with high scores, such as champions of each province and winners of international student academic competitions, will be entitled to scholarships of up to 40,000 yuan (\$5,700), more than double that of last year.

*University World News (UWN)* (2008a)

Important factors in that respect are the ability and the privilege of these universities to select the most academically qualified students. For example, Beijing University, China's top institution of higher learning, admits the 50 best students of each province every year. Harvard University, the California Institute of Technology, the Massachusetts Institute of Technology (MIT), and Yale University are the most selective universities in the United States, as measured by the average Scholastic Assessment Test (SAT) scores of their incoming undergraduate students.

One corollary of this observation is that tertiary education institutions in countries where there is little internal mobility of students and faculty are at risk of academic inbreeding. Indeed, universities that rely principally on their own undergraduates to continue into graduate programs or that hire principally their own graduates to join the teaching staff are not likely to be at the leading edge of intellectual development. A 2007 survey of European universities found an inverse correlation between endogamy in faculty hiring and research performance: the universities with the highest degree of endogamy had the lowest research results (Aghion et al. 2008).

It is also difficult to maintain high selectivity in institutions with rapidly growing student enrollment and fairly open admission policies. The huge size of the leading universities of Latin American countries such as Mexico or Argentina—the Universidad Nacional Autónoma de México (Autonomous University of Mexico, or UNAM) has 190,418 students, and the University of Buenos Aires (UBA) has 279,306—is certainly a major factor in explaining why these universities have failed to enter the top league, despite having a few excellent departments and research centers that are undoubtedly world-class. At the other extreme, Beijing University maintained its overall enrollment at less than 20,000 until the early 2000s and even today has no more than 30,000 students.

World-class universities also tend to have a high proportion of carefully selected graduate students (as illustrated by table 1.2), reflecting their strength in research and the fact that graduate students are closely involved in the research activities of these institutions.

The international dimension is becoming increasingly important in determining the configuration of these elite institutions (box 1.2). Both the *THES* world ranking of universities and the *Newsweek* 2006 ranking of global universities weighted their rankings to favor institutions with strong international components. In most cases, world-class universities have students and faculty who are not exclusively from the country where the university operates. This enables them to attract the most talented people, no matter where they come from, and open themselves to new ideas and approaches. Harvard University, for instance, has a student population that is 19 percent international; Stanford University has 21 percent; and Columbia University, 23 percent. At the University of Cambridge, 18 percent of the students are from outside the U.K. or European Union (EU) countries. The U.S. universities ranked at the top of the global surveys also show sizable proportions of foreign academic staff. For example, the proportion of international faculty at Harvard University, including medical

**Table 1.2. Weight of Graduate Students in Selected Universities**

<i>University</i>	<i>Undergraduate students</i>	<i>Graduate students</i>	<i>Share of graduate students (percentage)</i>
Harvard <sup>a</sup>	7,002	10,094	59
Stanford <sup>b</sup>	6,442	11,325	64
MIT <sup>c</sup>	4,066	6,140	60
Oxford <sup>d</sup>	11,106	6,601	37
Cambridge <sup>e</sup>	12,284	6,649	35
London School of Economics and Political Science (LSE) <sup>f</sup>	4,254	4,386	51
Beijing <sup>g</sup>	14,662	16,666	53
Tokyo <sup>h</sup>	15,466	12,676	45

a. 2005–06 [http://vpf-web.harvard.edu/budget/factbook/current\\_facts/2006OnlineFactBook.pdf](http://vpf-web.harvard.edu/budget/factbook/current_facts/2006OnlineFactBook.pdf).

b. 2006–07 <http://www.stanford.edu/home/statistics/#enrollment>.

c. 2005–06 <http://web.mit.edu/ir/cds/2006/b.html>.

d. 2005–06 <http://www.ox.ac.uk/aboutoxford/annualreview/app2ii.shtml>.

e. 2004–05 <http://www.admin.cam.ac.uk/reporter/2004-05/special/19/studentnumbers2005.pdf>.

f. Kahn and Malingre 2007.

g. 2006–07 Beijing University Admission Office.

h. 2004 [http://www.u-tokyo.ac.jp/stu04/e08\\_02\\_e.html](http://www.u-tokyo.ac.jp/stu04/e08_02_e.html).

### Box 1.2

#### The Best of Both Worlds at the University of Oxford

The University of Oxford has nominated the Provost of Yale University, Professor Andrew Hamilton, as its next vice-chancellor. Provided the university dons approve the appointment, Hamilton will replace the current vice-chancellor, Dr. John Hood, who retires next year after his five-year appointment ends.

He is one of the few academics to be appointed to head Oxford who did not graduate from the university and is only the second—after Hood, who came from New Zealand—to be recruited from outside.

His appointment follows Oxford's announcement last month of a massive fundraising campaign of 1.25 billion pounds (£1.25 billion, or US\$2.5 billion) to attract the world's top academics, of whom the university clearly considers Hamilton to be one.

Oxford Chancellor Lord Patten chaired the nominating committee and said that Hamilton had a remarkable combination of proven academic leadership and outstanding scholarly achievement “that makes him an exceptional choice to help guide us into the second decade of the 21st century.”

*Source:* UWN 2008b.

academic staff, is approximately 30 percent. Similarly, the proportion of foreign academics at the Universities of Oxford and Cambridge is 36 and 33 percent, respectively. By contrast, only 7 percent of all researchers in France are foreign academics. Unquestionably, the world's best universities enroll and employ large numbers of foreign students and faculty in their search for the most talented.

The new patterns of knowledge generation and sharing, documented by Gibbons et al. (1994) in their groundbreaking work on the shift toward a problem-based mode of production of knowledge, are characterized by the growing importance of international knowledge networks. In this respect, the fact that world-class universities succeed in mobilizing a broadly diverse national and international academic staff is likely to maximize these institutions' knowledge-networking capacity.

### **Abundant Resources**

Abundance of resources is the second element that characterizes most world-class universities, in response to the huge costs involved in running a complex, research-intensive university. These universities have four main sources of financing: government budget funding for operational expenditures and research, contract research from public organizations and private firms, the financial returns generated by endowments and gifts, and tuition fees.

In Western Europe, public funding is by far the principal source of finance for teaching and research, although the top U.K. universities have some endowment funds, and "top-up fees" have been introduced in recent years. In Asia, the National University of Singapore, which became a private corporation in 2006, has been the most successful institution in terms of substantial endowment funding. It has managed to build up a sizable portfolio of US\$774 million through effective fund-raising, making it richer than any British university after Cambridge and Oxford. The United States and (to a lesser extent) Japan have thriving private research universities.

The sound financial base of the top U.S. universities is the result of two factors. First, they have large endowments (table 1.3), which provide budget security, comfort, and the ability to focus on medium- and long-term institutional priorities. On average, per student, the richest U.S. private universities receive more than US\$40,000 in endowment income every year, compared with a mere US\$1,000 for Canadian universities (Usher and Savino 2006). Unlike many universities in Europe, these U.S. universities are not at the short-term mercy of government funding

**Table 1.3. Comparison of U.S. and U.K. Endowment Levels**

<i>U.S. institutions</i>	<i>Endowment assets (2006, US\$ millions)</i>	<i>U.K. institutions</i>	<i>Endowment assets (2005, US\$ millions)</i>
Harvard University	28,916	University of Cambridge	6,100
Yale University	18,031	University of Oxford	3,800
Stanford University	14,085	University of Edinburgh	3,400
University of Texas	13,235	University of Glasgow	230
Princeton University	13,045	King's College London	200

*Source:* NACUBO 2006.

*Note:* US\$1 = £.53

sources or the whims of changing political priorities. Moreover, as their prestige increases, so does their ability to attract donations, as evidenced by a study of the positive correlation between ranking and the size of a university's endowment (Monks and Ehrenberg 1999).

Second, U.S. universities benefit from the success of their faculty in competing for government research funding. At least two-thirds of the research funding captured by the top U.S. research universities comes from public sources. The top-ranking Canadian universities in international league tables are also the top universities in research income (Salmi and Saroyan 2007).

A comparative analysis of the SJTU rankings of U.S. and Western European universities confirms that level of expenditures is one of the key determinants of performance. Total spending on tertiary education (public and private) represents 3.3 percent of gross domestic product (GDP) in the United States versus only 1.3 percent in the EU25 countries. Per student spending is about US\$54,000 in the United States, compared with US\$13,500 in the European Union (Aghion et al. 2008). Similarly, there are large spending variations among European universities that are correlated with the rankings results of the respective countries. The United Kingdom and Switzerland have relatively well-funded universities and achieve the highest country scores in terms of rankings, while universities from the Southern European countries, including France and Germany, have lower ranking scores associated with low levels of funding (Aghion et al. 2007).

The availability of abundant resources creates a virtuous circle that allows the concerned institutions to attract even more top professors and researchers, as is often the case among elite universities in the United States. Annual surveys of salaries indicate that private universities in the

United States pay their professors 30 percent more than public universities do, on average. The salary gap between public and private universities has increased in the past 25 years. In 1980, the average salary of full professors at doctor-of-philosophy (PhD)-granting public universities amounted to 91 percent of that at private universities. Today, the US\$106,500 average annual salary at public universities represents 78 percent of the salary at private universities (*Chronicle of Higher Education [CHE]* 2007). It is not surprising, then, that not one U.S. public institution ranks nationally in the top 20 (*U.S. News & World Report* 2009); private universities reward excellent faculty with higher salaries, so the best academics tend to seek employment there. A recent article on the University of Wisconsin (box 1.3)

### Box 1.3

#### Impact of the Talent War on the University of Wisconsin

Jon C. Pevehouse had not even finished his first year as a tenure-track professor at the University of Wisconsin at Madison in 2001 when other universities began trying to lure him away. By last year, Mr. Pevehouse decided it was time to consider the offers seriously. He quickly ended up more than doubling his salary, with a move to the University of Chicago. . . .

The problem is money. Wisconsin's stagnating state higher-education budget has forced the university to keep faculty salaries far below average. When professors get feelers from elsewhere, they learn that a move can easily mean a whopping 100 percent salary increase—sometimes more. . . .

Some people worry that the wave of faculty departures is damaging Madison's reputation as a premier public institution. From 2006 to 2007, the university dropped from No. 34 to No. 38 in *U.S. News & World Report's* rankings of national doctoral institutions. . . .

About 400 professors at Madison received job offers from other colleges in the past four years. That is double the number who received offers in the four years before that. While in some years the university has been able to hang on to as many as 80 percent of those with outside offers, the proportion slipped to 63 percent last year. . . .

Faculty turnover is expensive. Overall, across the disciplines, Madison figures that it spends an average of \$1.2 million in start-up costs for each new professor. It typically takes eight years for a professor to bring in enough research money to cover that cost. A professor who stays at Madison for 25 years after earning tenure brings in an average of about \$13 million in research money. But the university loses many professors before they even pay off the initial investment.

*Source:* Wilson 2008.

documented how years of scarce funding led to the loss of significant numbers of top faculty “raided” by other institutions and a drop in its national rankings (*CHE* 2008).

Table 1.4 shows pay averages regarding researcher salaries across the EU and a few comparator countries. As one would expect, salaries in countries with the highest numbers of institutions on the world rankings of tertiary education are the highest, while countries with little or no global tertiary education presence have the lowest salaries. It must not be mistaken as a coincidence that the best-quality research appears to be coming out of the best-paid researcher pools. In academia, the adage “you get what you pay for” appears accurate regarding better-quality work being done where salaries are relatively highest.

In the United States, an even larger remuneration gap between private and public institutions is prevalent when it comes to the pay packages of university presidents (as illustrated by table 1.5, which compares the top three best-paid presidents of both types of institutions).

The resource gap affects, in turn, the financial capacity of countries to put in place the kind of digital infrastructure enjoyed by top universities in North America and East Asia. A recent report on French universities, for example, underscores the need to catch up with more-advanced tertiary education systems, which explains the poor showing of French universities in the Webometrics rankings. In the words of the Minister of Education,

In the context of globalization of higher education, it appears that France shows a certain delay compared with other Western countries in the access it provides to online courses and in offering distance education. At the very time when mastering information and communication technologies seems increasingly to be an element of a nation’s competitiveness, this delay in the digitization of higher studies risks impeding France’s development in coming years.

Marshall (2008)

### **Appropriate Governance**

The third dimension concerns the overall regulatory framework, the competitive environment, and the degree of academic and managerial autonomy that universities enjoy. The *Economist* (2005) referred to the tertiary education system in the United States as “the best in the world” and attributed this success not only to its wealth but also to its relative independence from the state, the competitive spirit that encompasses

**Table 1.4. International Comparison of Average Salaries of Researchers**

(Total Yearly Salary Average of Researchers in EU25, Associated Countries, Australia, China, India, Japan, and the United States [2006, N=6110, all currencies in euros and in terms of PPPs])

	Remuneration average in euros	Corrective coefficient	Remuneration average in terms of PPPs
Austria	62.406	103.1	60.530
Belgium	58.462	104.4	55.998
Cyprus	45.039	89.1	50.549
Czech Republic	19.620	53.1	36.950
Denmark	61.355	140.5	43.669
Estonia	11.748	55.8	21.053
Finland	44.635	121.8	36.646
France	50.879	107.0	47.550
Germany	56.132	105.2	53.358
Greece	25.685	83.3	30.835
Hungary	15.812	57.1	27.692
Ireland	60.727	122.3	49.654
Italy	36.201	106.1	34.120
Latvia	10.488	48.6	21.580
Lithuania	13.851	46.7	29.660
Luxembourg	63.865	113.5	56.268
Malta	28.078	69.6	40.342
Netherlands	59.103	104.2	56.721
Poland	11.659	54.0	21.591
Portugal	29.001	87.0	33.334
Slovakia	9.178	50.2	18.282
Slovenia	27.756	73.1	37.970
Spain	34.908	89.8	38.873
Sweden	56.053	118.9	47.143
United Kingdom	56.048	106.2	52.776
<i>EU25 average</i>	<i>37.948 €</i>		<i>40.126€</i>
Bulgaria	3.556	36.4	9.770
Croatia	16.671	61.6	27.063
Iceland	50.803	150.3	33.801
Israel (*)	42.552	71.4	59.580
Norway	58.997	141.1	41.813
Romania	6 286	46.6	13.489
Switzerland	82.725	138.1	59.902
Turkey	16.249	61.9	26.250
<i>Associated countries</i>			
<i>average</i>	<i>34. 730 €</i>		<i>33.959 €</i>
Australia(*)	64.150	102.9	62 342
China(*)	3.150	22.9	13.755
India(*)	9.177	20.3	45.207
Japan	68.872	111.1	61.991
United States	60.156	95.8	62 793

Source: EC 2007, 19.

\* The corrective coefficients in those countries are the purchasing power parity (PPP) published by the World Bank. PPP is expressed as the local currency unit to the international dollar.

**Table 1.5. Annual Compensation: Highest Paid U.S. University Presidents, 2005–06**

	<i>Total compensation (US\$)</i>		<i>Total compensation (US\$)</i>
<i>Private universities</i>		<i>Public universities</i>	
Northeastern University	2,887,800	University of Delaware	874,700
Philadelphia University	2,557,200	University of Virginia	753,700
Johns Hopkins University	1,938,000	University of Washington	752,700

*Source:* CHE 2007.

every aspect of it, and its ability to make academic work and production relevant and useful to society. The report observed that the environment in which universities operate fosters competitiveness, unrestrained scientific inquiry, critical thinking, innovation, and creativity. Moreover, institutions that have complete autonomy are also more flexible because they are not bound by cumbersome bureaucracies and externally imposed standards, even in light of the legitimate accountability mechanisms that do bind them. As a result, they can manage their resources with agility and quickly respond to the demands of a rapidly changing global market.

The comparative study of European and U.S. universities mentioned earlier also found that governance was, along with funding, the other main determinant of rankings. “European universities suffer from poor governance, insufficient autonomy and often perverse incentives” (Aghion et al. 2007, 1). A subsequent paper reporting on a survey of European universities found that research performance was positively linked to the degree of autonomy of the universities in the sample, especially with regard to budget management, the ability to hire faculty and staff, and the freedom to set salaries (Aghion et al. 2008). With respect to the composition of university boards, the report concludes that “having significant outside representation on the board may be a necessary condition to ensure that dynamic reforms taking into account long-term institutional interests can be decided upon without undue delay.”

The autonomy elements outlined above are necessary, though not sufficient, to establish and maintain world-class universities. Other crucial governance features are needed, such as inspiring and persistent leaders; a strong strategic vision of where the institution is going; a philosophy of success and excellence; and a culture of constant reflection, organizational learning, and change.

The cases of Germany and France are interesting to discuss in this context. Despite having economies that are among the strongest in the world, their universities are hardly recognized as elite institutions. In 2003, when the first SJTU ranking was published, the best French university (the University of Paris VI) was ranked 66th, and the first German university (the University of Munich) was ranked 49th. In 2008, the best French and German universities were placed 42nd and 55th, respectively.

Benchmarking them against the three sets of criteria proposed above shows clearly why universities of these two countries do not shine in international rankings. To begin with, there is very little screening of students entering tertiary education. By law, French universities are not allowed to be selective. In most programs, having graduated from secondary school is the only prerequisite to admission, with the exception of the highly selective French engineering and professional *grandes écoles*, which have a separate status.

Another important factor is the absolute lack of competition among universities. All universities are treated equally in terms of budget and assignment of personnel, making it quite difficult, if not impossible, to mobilize the necessary resources to set up centers of excellence with a large concentration of top researchers. For both Germany and France, per student public expenditures on tertiary education are slightly below the Organisation for Economic Co-operation and Development (OECD) average and are half the level of U.S. universities. When the first SJTU ranking was published at the end of 2003, the daily paper *Le Monde* ran an article on January 24, 2004, entitled “The Great Misery of French Universities.” The university presidents and union leaders interviewed for that article argued that the lack of budgetary resources and the rigidities associated with their utilization were the main explanations for the demise of the French university system.

Finally, in both countries, universities are government entities constrained by civil service employment rules and rigid management controls. This means, in particular, that it is not possible to pay higher salaries to reward the more productive academics or to attract world-class researchers or to invest in leading-edge research facilities. For example, the salaries of French business administration professors are 20 percent lower than those of their U.S. counterparts (Egide 2007). Commenting on the 2005 initiative of the European Union to create a European Institute of Innovation and Technology (EIT) after the MIT model, the scientific magazine *Nature* noted in a March 2008 editorial that

... the very existence of the EIT concept—and its survival through the rough seas of EU politics—is an indictment of Europe’s suffocating national bureaucracies, which have made it impossible for universities and publicly funded research institutes to evolve into MITs on their own. “Elite” has too often been treated as a dirty word, and interactions with industry considered a betrayal of academic purity. In many countries, including France, Germany and Italy, it is still generally impossible to offer internationally competitive packages for top researchers. . . .

The EIT may yet surprise its critics. Either way, national efforts to boost universities are by far the best way to address the problems that the EIT is intended to solve.

*Nature* (2008)

In the case of France, two additional structural features complicate the situation further. First, according to Orivel (2004), one of the main reasons why French universities are not internationally competitive is the dual structure of the tertiary education system (box 1.4). The top engineering and professional schools (*grandes écoles*) recruit the best students through very competitive national examinations, while the universities receive the bulk of secondary school graduates who have automatic access. Because the *grandes écoles* are predominantly elite, professionally oriented schools, they conduct very little research; as a result, most doctoral students in the research universities do not come from the most academically qualified student groups. This is quite unlike the practice in more competitive university systems in the United States, the United

#### **Box 1.4**

### **Watching the Rankings: The French Experience**

Each year, when Shanghai’s Jiao Tong University publishes its world ranking of universities, France responds with a mix of indignation and consternation. Indignation, because French educators complain that the system favors “Anglo-Saxon” universities and makes no allowance for France’s unusual division into elite *grandes écoles* and mass universities. Consternation, because not a single French university makes it into the world’s top 40. Its best-placed institution—Paris VI—manages only 45th place.

*Source:* *Economist* 2006.

Kingdom, or Japan. Second, the strict separation between the research institutes affiliated with the Centre National de la Recherche Scientifique (the National Center for Scientific Research, or CNRS) and the research departments of the universities results in the dispersion of human and financial resources. The strength of world-class universities is that research is usually integrated at all levels.

### **Alignment of Success Factors**

Finally, it is important to stress that it is the combination of these three sets of features—concentration of talent, abundant funding, and appropriate governance—that makes the difference. The dynamic interaction among these three groups of factors is the distinguishing characteristic of high-ranking universities (as illustrated by figure 1.2).

The results of the recent survey of European universities confirm that funding and governance influence performance together. They indicate clearly that the higher-ranked universities tend to enjoy increased management autonomy, which, in turn, increases the efficiency of spending and results in higher research productivity.

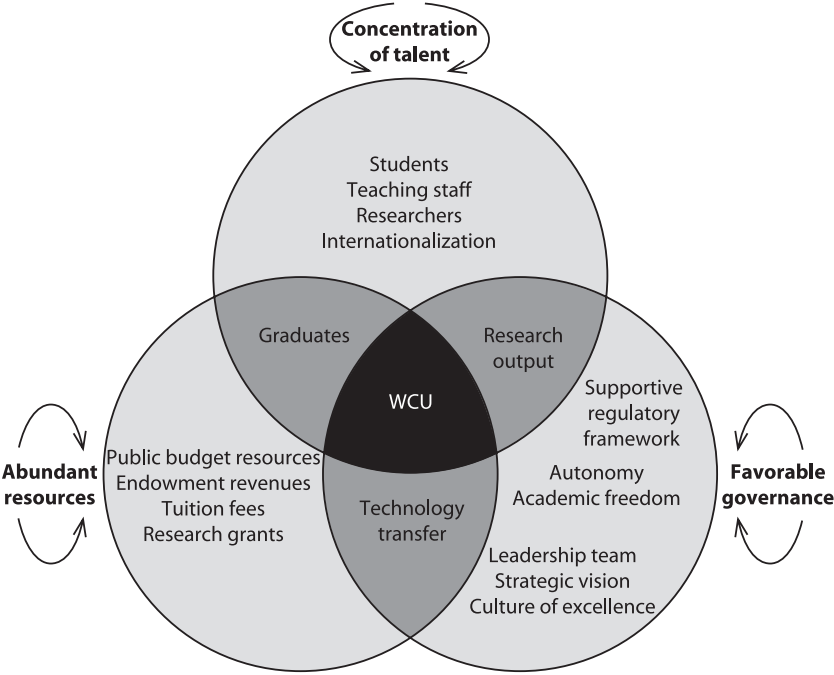
But our main result is not simply that more money or more autonomy is good for research performance. It is that more money has much more impact when it is combined with budget autonomy. To be more precise: we find that having budget autonomy doubles the effect of additional money on university research performance.

Aghion et al. (2008)

Having an appropriate governance framework without sufficient resources or the ability to attract top talent does not work either. Similarly, just investing money in an institution or making it very selective in terms of student admission is not sufficient to build a world-class university, as illustrated by the case of Brazil's top university, the University of São Paulo (USP). Brazil is the 5th most populated nation and the 10th largest economy on the planet, it is among the six largest producers of cars in the world, it has world-class companies such as Embraer and Aracruz Celulose, but there is no Brazilian university among the 100 top-ranked universities in the world.

How is it that USP, the country's foremost university, does not make it into the top group in the international rankings, despite having some of the features of world-class universities? When it was created in 1934, the USP founders and first leaders made it a point to hire only prominent

**Figure 1.2. Characteristics of a World-Class University (WCU): Alignment of Key Factors**



Source: Created by Jamil Salmi.

professors from all over Europe (Schwartzman 2005). Today, it is the most selective institution in Brazil, it has the highest number of top-rated graduate programs, and every year it produces more PhD graduates than any U.S. university.

At the same time, USP's ability to manage its resources is constrained by rigid civil service regulations, even though it is the richest university in the country. Added to this is the fact that, at USP as in other Brazilian universities, the spirit of democracy has translated into multiple representative bodies (*assembleas*) which complicates decision making and the implementation of any forward-looking reform (Durham 2008). USP has very few linkages with the international research community, and only 3 percent of its graduate students are from outside Brazil. The university is very inward looking: most students come from the state of São Paulo, and the majority of professors are USP graduates (this latter feature of endogamy being a typical feature of European universities, as

**Table 1.6. Ranking of Universities Where Professors Earn Most**

<i>University</i>	<i>Average annual salary of full professors, 2007–08 (US\$)</i>	<i>Shanghai Jiao Tong University ranking, 2008</i>
Rockefeller University	191,200	32
Harvard University	184,800	1
Stanford University	173,700	2
Princeton University	172,200	8
University of Chicago	170,800	9
Yale University	165,100	11
University of Pennsylvania	163,300	15
Columbia University	162,500	7
New York University	162,400	31
California Institute of Technology	162,200	6
Northwestern University	153,600	30
Massachusetts Institute of Technology (MIT)	151,600	5
Washington University in St. Louis	150,800	29
Boston College	149,300	Not among 100 top
Cornell University	148,200	12
Dartmouth College	147,800	Not among 100 top
Emory University	147,200	Not among 100 top
University of Maryland, Baltimore	142,700	Not among 100 top
University of Southern California	140,100	50
New Jersey Institute of Technology	139,500	Not among 100 top

*Source:* CHE 2007.

discussed earlier). Foreign students are forbidden to write a doctoral dissertation in a language other than Portuguese. According to Schwartzman (2005), the key missing element is the absence of a vision of excellence to challenge the status quo and transform the university. The lack of ambitious strategic vision can be observed as much at the national and state government levels as among the university leadership.

Financial resources data from the United States confirm that money alone is not a guarantee of excellence in teaching and research. The top U.S. universities in the world rankings all have abundant resources, but some universities with equally high spending levels achieve significantly lower results (as illustrated by table 1.6, on page 33, which shows the Shanghai Jiao Tong ranking of the top 20 universities with the highest-paid full professors).<sup>1</sup>

Along the same lines, it is interesting to note that among the five most expensive U.S. four-year institutions in terms of levels of tuition fees charged—George Washington University, Kenyon College, Bucknell University, Vassar College, and Sarah Lawrence College—only the first one is a research university, and it is not among the top 100 universities in the SJTU ranking of world universities.

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1 It is important to nuance this analysis by recognizing the influence of institutional context factors. Salary averages may be skewed by the presence of medical, business, and law faculties, for whom the pay tends to be higher than in the arts and sciences. Rockefeller University, in particular, is entirely a medical university, which impacts both the pay averages and the indicators for SJTU, which are better served by greater disciplinary diversity.