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What does the Shanghai Ranking really measure ?

Working paper

Comments and suggestions welcome

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The notion of higher education as a global market is pervasive among policymakers. Attached to it is the generalization of national and international rankings, supposed to give an “objective” measure of the performances of Higher Education Institutions (HEI), including universities, and justified as necessary to provide guidelines to families and students when making their choices. The deep influence of rankings on the organization of higher education worldwide, and more generally on how knowledge is created and distributed, has been established (1; 2; 3; 4; 5; 6). Rankings have however been criticized in academic studies which have pointed out their methodological limitations (e.g. (7; 8; 9)). In addition, social science analyses suggest that rankings favor the reproduction of elites at a global scale (10; 11; 12). This paper aims at demonstrating that these later conclusions can be supported empirically.

Gathering financial data available publicly for universities, this paper shows that performance as measured by the Academic Ranking of World Universities (ARWU, a.k.a. the Shanghai Ranking, the oldest international ranking of HEIs (13)) correlates with wealth of the institutions (expressed in terms of annual budget per student) and with the amount of tuition paid by students. For US institutions, better ranking also correlates with higher income of students parents. Hence, the ARWU ranks economic capital of HEIs and of the families attending these HEIs, in summary, the ARWU ranks “the economic eliteness” HEIs. This supports theoretical analyses which suggest that international rankings of universities consolidate the domination of economic elites at a global scale, and favor social exclusion. In addition, by promoting a model of higher education with high tuition fees, the ARWU likely contributes to the expansion of the student debt.

1 Introduction

The field of higher education has changed progressively to become a world-wide “market”, where universities are seen as corporations, competing at global scale (14; 8; 10; 15). In this competition, and in the eyes of neoliberal policymakers, international rankings play a crucial role as they standardize the criteria for evaluation of “excellence”, at a global scale. Rankings have become an obsession, in the media, and amongst policy-makers (2; 16), and administrators now spend a significant amount of energy to bring (or maintain) their institutions amongst the first 100 in international rankings, with the hope of becoming a “World Class University” (17). Rankings have a profound influence on institutions of higher education : they modify how funding is distributed (in favor of departments likely to produce better rankings), modify hiring strategies (targeting prize winners), stimulate fusions of universities etc (see the recent review provided by Espeland & Sauder (18), references there-in, and (2; 5; 6)). These strategies are also supported (or enforced) at national levels, by governments who consider that their country’s reputation is built – at least partially – on the quality of higher education (5; 19). In practice, this is often measured by how many universities on the national territory make it to the top 100 in international rankings (2; 20). Overall, it is clear that international rankings have deeply transformed the organization of higher education and it thus important to ask 1) whether the criteria in these rankings are pertinent, and 2) what this “ranking mania” (the term is taken from (16)) may produce in societies.

The oldest international ranking, which is the focus of this paper, is the Academic Ranking of World Universities (ARWU a.k.a. the Shanghai Ranking (13)). The criteria used in the ARWU rely on the awards received by professors and alumni, the citation indexes and number of publications in *Nature* and *Science*. Influential scholars use its results in analyses aiming to demonstrate a causality between “performance” of universities (as in the ARWU) and, for instance, the level of either public investment by states in higher education, “autonomy” or “governance” ((20; 21)). However, several studies have shown the shortcomings of its methodology, and in particular it is highly criticized for not taking into account the quality of education ((7; 10; 9)). In addition to critics regarding their methodology, rankings of academic institutions have been critically analyzed with the support of classical sociological concepts. In a study on rankings of US law schools, Espeland & Sauder (1) found that these institutions modify their behaviors, so as to adapt to the criteria used in league tables. Hence, according to these authors, rankings do not act as a true measure, but simply confirm expectations, and this can be rationalized as an occurrence of a “self-fulfilling prophecy” as formulated by Merton (22). This effect also extends to a global scale with international rankings : by declaring who detains prestige and power, they confer more prestige and power to already established “world

class” institutions (see (12; 11)). As such, “world class-ness” can be seen as reflection of dominance, in the economic, intellectual, and political fields (12). Rankings has also been critically analyzed (see e.g. (11; 23; 24; 25)) with the lens of Gramsci (26) and Foucault (27). In these theoretical frames they can be understood as tools which reinforce the hegemony of the dominant model (here the Anglo-American model of higher education) by issuing rewards (a good rank) and punishments (a bad rank, or no rank at all). Amstler & Bolsman consider that rankings are in fact political tools created by elites to preserve their status. This follows Bourdieu’s (28) idea of the “club effect” which consists in an effort by club members to maintain their position of dominance, by consolidating “status prestige”, here, thanks to rankings. The ARWU and other international rankings bring this strategy to a wider level : that of a “globalized field of elite power” (11).

The question addressed in this paper is whether there is a way to illustrate empirically the connections between economic dominance and performance in the Shanghai Ranking. These connections are suggested by earlier studies which have shown that countries investing more funds in tertiary education generally perform better in the ARWU (e.g. in terms of the number of institutions they place in the top 100 (11; 21; 29)). Some rankings actually use financial indicators (annual budgets) as criteria, and hence it is obvious that they at least partially measure wealth of institutions (24). Kaba & (30) shows that performance in the Times Higher Education (THE) international ranking is related to the endowment of HEIs. Some hints are also found in the literature connecting economic capital and rank in league tables : Hazelkorn (31) notes that most highly ranked institutions have annual budget above \$ 1 billion, and Salmi (19) shows that the budgets per students in several top institutions is well over \$100,000 per year. The fact that elite institutions have more students from the richest families is also well established (see e.g. (32) for the US, (33) for the UK and (34) for France), however how this relates to rankings is not documented. This paper investigates connections between economic capital and rank in the ARWU empirically in several ways :

- Is there a direct relationship between annual budget / student of HEIs and their performance in rankings ?
- Are HEIs with highest tuitions fees those performing best ?
- Are institutions with children from richest families those which perform the best in ARWU?

In the first section, the data collected for this study is presented. This is followed by a description of the general results derived from the data analysis. The connection between economic capital and rank is discussed in Sect. ???. The following section discusses the role of the Shanghai ranking in the Anglo-American hegemony of HEIs and on the global student debt.

2 Data

2.1 Collected variables

The first objective of this paper is to compare economic capital and performance indicators given in the ARWU. The performance indicators in the ARWU are the *score* and the *rank* obtained by a university. These two figures are linked as universities are ranked by score. The score results from the concatenation of various “objective” parameters such as the number of publications in *Science* or *Nature*, the number of Nobel Prizes etc.

In order to capture economic capital, we have collected four variables. The first variable is the annual budget (or annual operating expenses) of HEIs reflecting the absolute financial means of the institution. Of course, when comparing an university against another, one must bear in mind that the number of students may vary significantly, and hence it may be more accurate to consider the normalized budget per student as indicator. This implies to obtain for each institution the number of students, which is the second variable we have collected. The third variable we have considered is the annual amount of tuition fee paid annually by students. Finally, we have included in this study the average annual income of parents of students within each institution, when available.

In summary, the variables we have collected are, for each HEI is:

- The rank in ARWU
- The score in ARWU
- The number of students
- The total budget
- The tuition fees
- The income of the parents.

2.2 Data collection

We have limited the collection of data to the first 100 HEIs of the ARWU. This choice is motivated by several reasons : i) the top 100 is considered as a reference in terms of objective and assessment of quality by policymakers (2), ii) the score is given only for the top 100 universities in the ARWU, and the ranks are grouped in clusters of 50 beyond rank 100, iii) for less renowned universities it is often more difficult to obtain detailed financial information.

For the top 100 universities, the rank and scores in ARWU are directly available from the 2007 Shanghai Ranking website. The other three variables (number of students, total budget, tuition fees) were collected from official documents of the universities, mostly annual reports and financial statements.

The number of student is relatively easy to find for any university. This is generally found on the institution’s website, or annual report.

Finding the total budget requires more effort. For universities in the UK, US, Canada, Australia, the data can generally be found either from the institutions financial statements or annual reports. Some of these universities have rather complex budget which includes assets etc. The figure we have taken is the “operating budget”, or the “net expenses”. When not available we have used the net revenue (which most often is very close to the net expenses in the universities we have studied). For most European and Asian institutions the data can be found on their websites (“facts and figures”) or in their annual reports (sometimes not in English). Chinese universities do not provide the numbers directly, hence the data mainly comes from the press or indirect sources. French institutions do not publish their financial statements, however the data can be found in other official documents. Overall, for the vast majority of the top 100 institutions it has been possible to find reliable sources of information to obtain their annual budget. Four “universities” are however problematic, because of their peculiarity. These are medical schools in the US, which have a small number of students, and whose budget dedicated higher education activities cannot be separated from their activity as an hospital. These are: The University of California San Francisco (~ 3000 students), The Rockefeller University (~ 200 students), The Medical Center at Dallas (~ 5000 students), and the Mayo Medical School (~ 200 students). Therefore, they have not been considered in the analysis presented in the section below, although they are reported in Table 1 for completeness.

Tuition fees are relatively easy to find for most institutions as this information is made available for prospective students on the institution websites. We have always taken the values applied to resident (i.e. non-foreign) students. For US universities this means that we have collected the tuition fee applied to in-state students. The fees are those applied to undergraduate students for full-time enrollment. In some cases, the tuition fees depend on the chosen program. In these (rare) cases we use the average value.

The conversion of currency to US dollars was done with the rate of the day when collecting the data i.e. in winter-spring 2018. The variations of exchange rate over this period are minor, and therefore this does not affect our results. We note that the data we have used is *not* corrected for purchasing power parity. This is done intentionally : in the context of globalization of higher education we have considered that it is more relevant to use the raw values.

The resulting data is presented in Table 1 and the data itself with the direct links to the sources for each university is provided as supplementary information.

Regarding the income of the parents, the data is available only for the US institutions. It was collected as part of The Equality of Opportunity

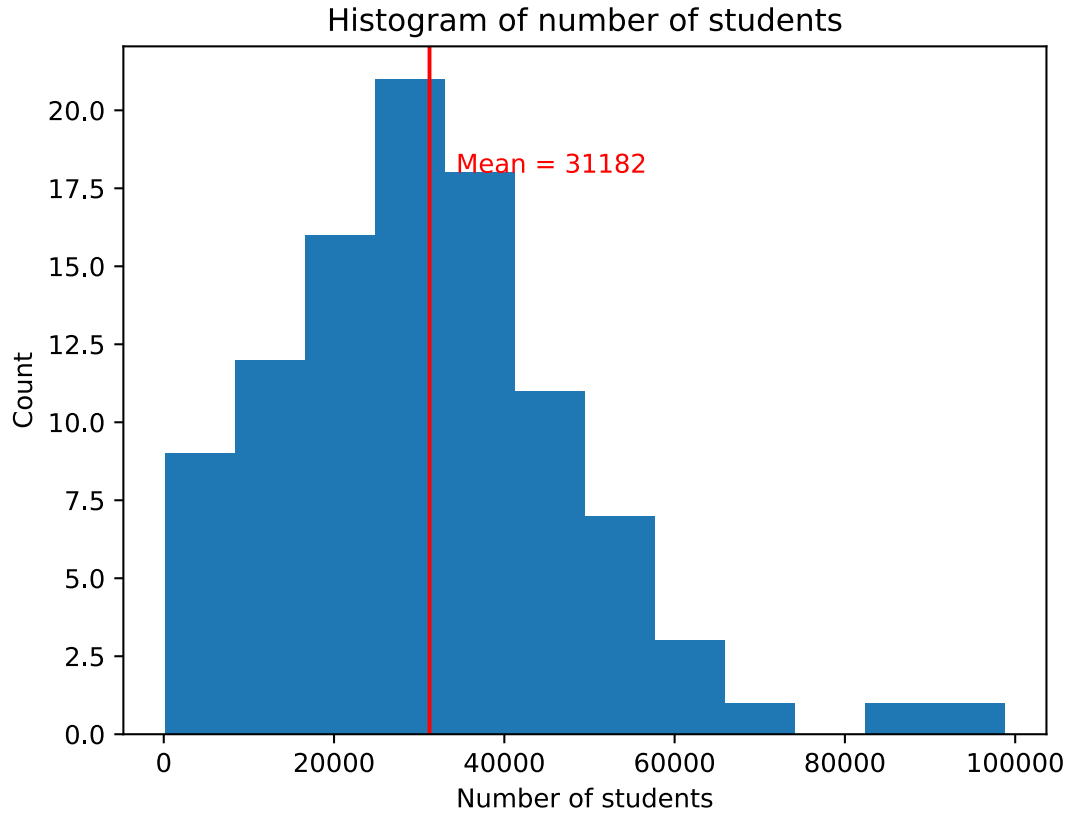


Figure 1: Histogram of the number of students, in universities of the top 100 in the ARWU.

Project¹ from a large sample of anonymous tax fillings and tuition records. Unfortunately such data is not available for the other countries represented in the top 100 of the Shanghai ranking. For the 42 US universities in the top 100, we have gathered the data and it is presented in Table 2.

3 Results

3.1 General results

A general investigation of the economic and ARWU performance variables is instructive. For instance, the total budget for the first 100 universities in ARWU is \$213 billion, comparable to the GDP of New Zealand. The average number of students in universities is around 31,000, with a standard deviation of $\sim 17\,500$ (see Figure 1 for details). It must be noted that there

¹<http://www.equality-of-opportunity.org>

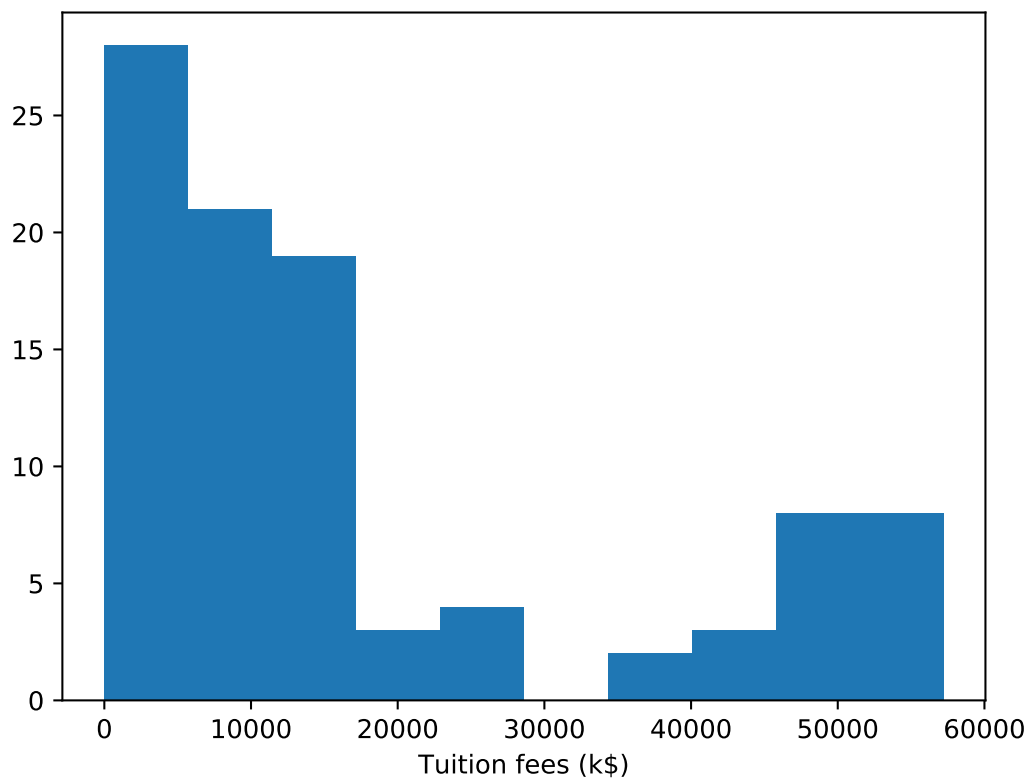


Figure 2: Histogram of the tuition fees, in universities of the top 100 in the ARWU

is no correlation between the number of students and score in Shanghai (correlation coefficient of -0.22) : bigger is *not* better. The average annual budget per student in the top 100 is $\sim \$84,000$. The distribution of tuition fees (see Fig. 2) is bimodal, with peaks on the minimal and maximal fee bins (respectively \$0 - 10k and \$50-60k per year), with minimal fees found in continental Europe and maximal fees in the United States.

3.2 ARWU and economic capital

This section focuses on the links between economic capital and performance of HEI in the ARWU. We use three indicators of economic capital :

- **The annual budget per student of each HEI** as an indicator of the economic capital of individual HEI. We ignore the endowment, assets, immovable capital and other part of the total capital of HEIs;
- **The tuitions fees of each HEI**, as an indicator of the capital of the families of students attending individual HEIs;
- **The average income of parents of students of US HEIs** as a indirect measure of the capital of the families of students, in the United States.

We first present these raw indicators and compare them to the ARWU variables in Sect. 3.2.1, and we then study the trends of these indicators when compared to groups of rank in ARWU in Sect. 3.2.2.

For clarity in the following sections, let us write the score for a university of rank j $g(j)$, the annual budget for a university as $b(j)$, the number of students as $s(j)$, and the tuition fees as $t(j)$. The annual budget per student is $k(j) = b(j)/s(j)$. We label the average income of parents of students attending a university of rank j $I(j)$.

3.2.1 Inspection of raw data

Fig. 3 compares the tuition and annual budget per student in a scatter plot. Information regarding the geographical location of HEIs is also labeled, as well as the rank of the top 10 universities, and the Ivy League institutions are identified. First, it should be noted that there is a moderate yet significant correlation between fees and budget per student (correlation coefficient of 0.68). This indicates that tuitions fees play a significant role in the funding of higher education in the top 100 universities of the ARWU. In this graph, the lower left corner, corresponding to low or zero tuition fees and low to moderate annual budgets per students is filled *exclusively* by European universities. Instead, the upper right corner (high tuitions and high budgets) is filled with US institutions *only*. Countries other than the US and EU are *all* located in the space between these two poles. This segmentation will

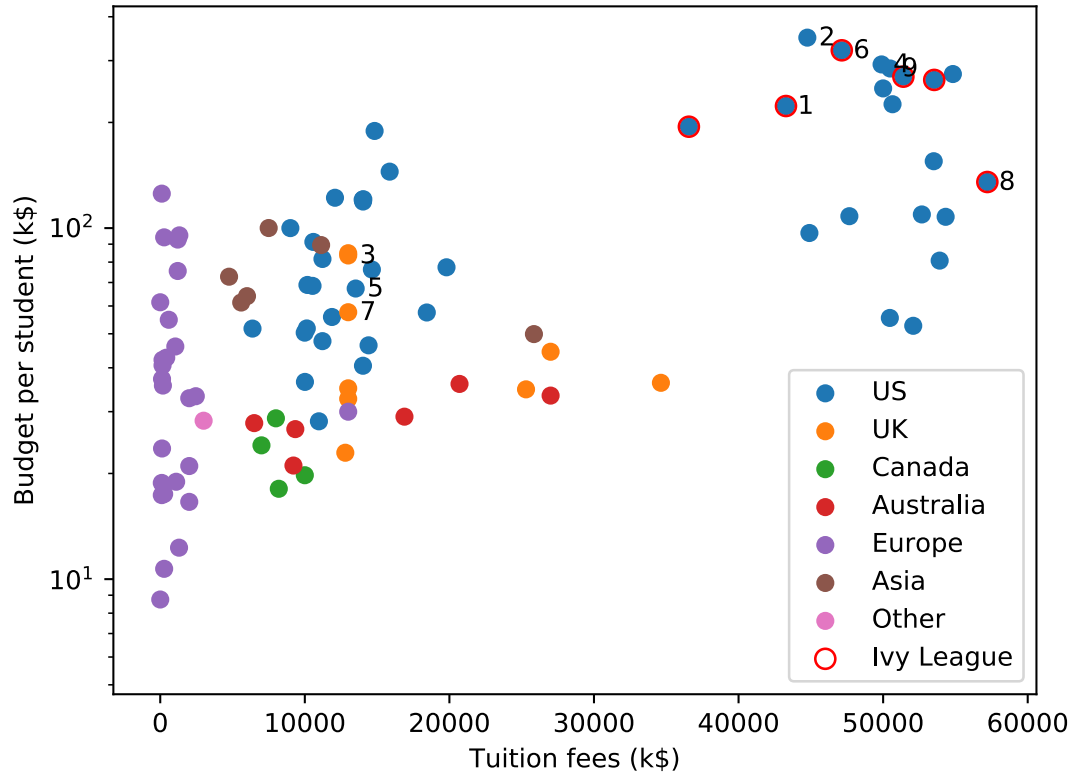


Figure 3: Budget per student and tuition fees in the Top 100 universities of the ARWU. Digit labels are the ranks in ARWU, for the top 10 universities, namely and in order Harvard, Stanford, Cambridge, MIT, Bekeley, Princeton, Oxford, Columbia, Caltech and University of Chicago.

be discussed in more details in Sect. 4.1 when addressing the hegemony of Anglo-American HEIs.

Fig. 4 compares the score obtained by HEIs, in the ARWU and their annual budget per student. There is a correlation between score and average annual budget per students (correlation coefficient of 0.65). This indicates that the score obtained in the ARWU is somehow indirectly connected to the budget of HEIs, since budget is not a criteria for calculating the score in this Ranking.

3.2.2 Average trends in ranks vs economic capital

In order to asses the potential links between economic capital and performance in the ARWU, the three variables of economic capital will be compared to 5 groups within the ARWU. These groups are defines as follows :

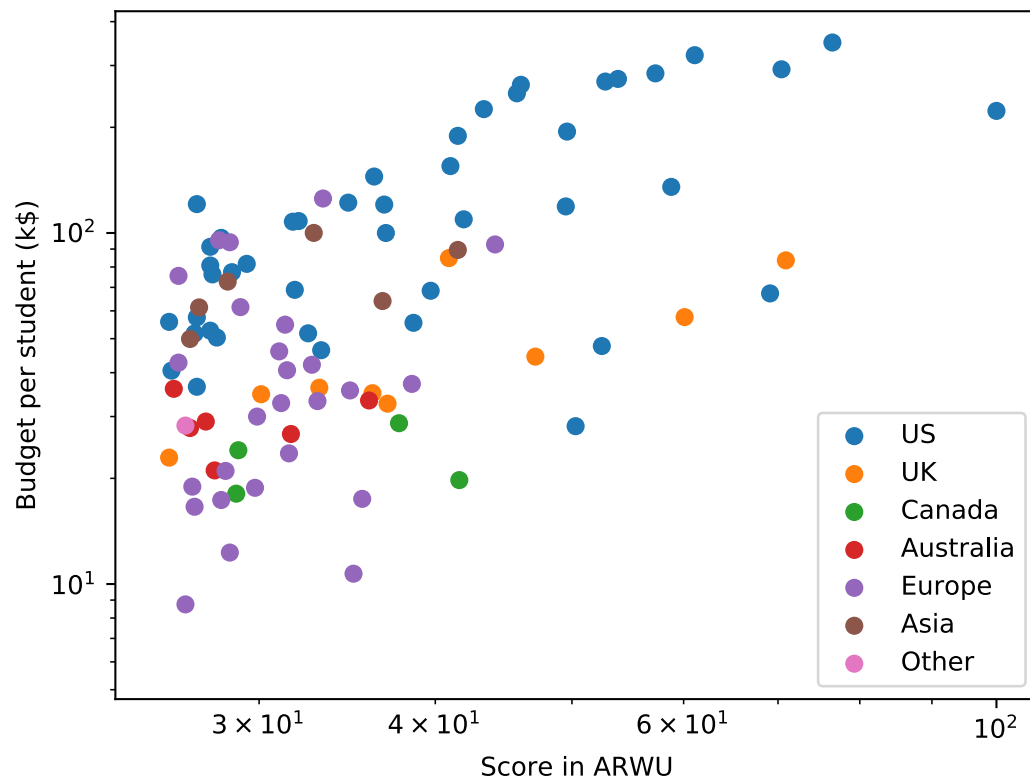


Figure 4: Score of universities in the ARWU 2017 versus their annual budget per student.

the groups containing the best 20, 40, 60, 80 and 100 universities. For each group, we derive average value for the three indicators of economic capital. The first indicator is the average budget per student $x(i)$, calculated for each group i , with $i = 1 - 5$. The second indicator is the average tuition fee $x_2(i)$, calculated for each group i . Finally, we also compute the average income of parents of students in universities of each group i , $x_3(i)$. It must be noted that, for each derivation, the averages are computed ignoring the 4 medical schools mentioned above, and for the income of parents, ignoring the universities for which there is no data (non-US). The calculated x_1 , x_2 and x_3 are displayed for each group i in Figs. 5, 6 and 7, respectively.

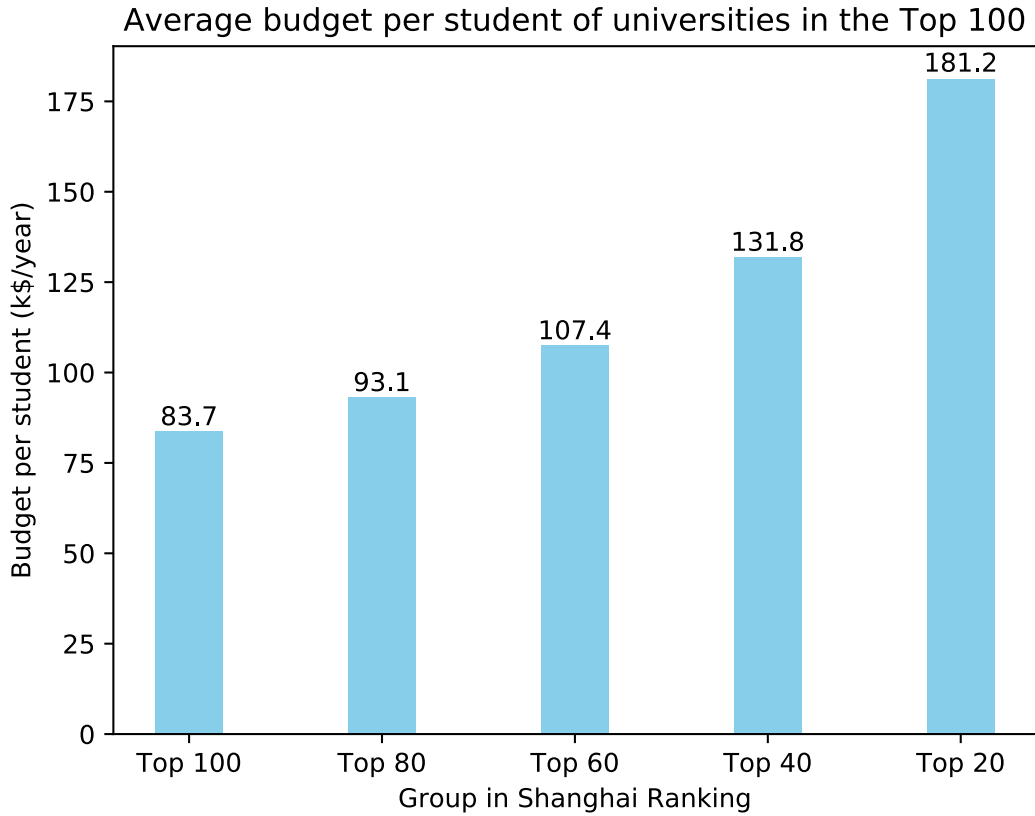


Figure 5: Averaged per-student annual budgets in top universities of the Shanghai ranking. The averages are derived for the top 100, 60, 40 etc. universities in the ranking. e.g. the average annual budget per students in universities of the Top 20 is 181.2 k\$.

Inspection of Fig. 5 shows that universities with largest budget per student belong to the groups with the best ranks, hence that “performance” in the Shanghai Ranking is related to budget per student. The best universities,

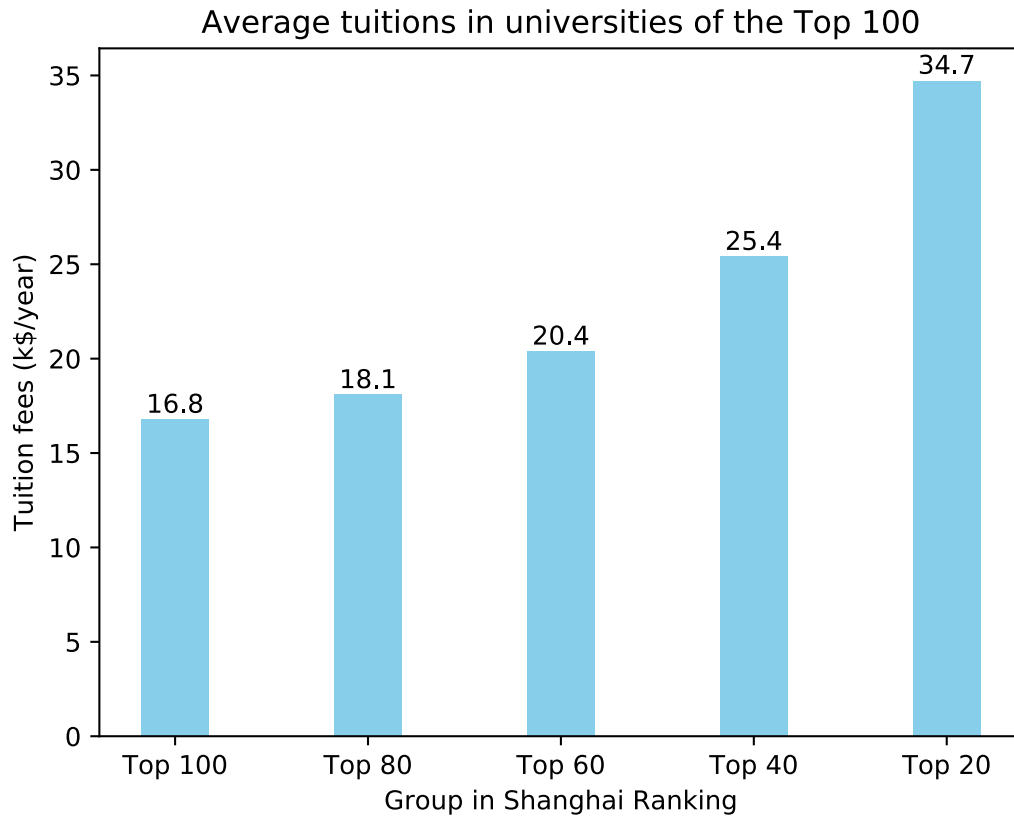


Figure 6: Averaged tuitions fees in top universities of the Shanghai ranking. The averages are derived for the top 100, 60, 40 etc. universities in the ranking. e.g. the average tuition fees in universities of the Top 20 is 34.7 k\$.

in the top 20, spend over twice as much per student as compared to the universities in the top 100. Fig. 6 shows that the average value of tuition fees increases for groups obtaining the best ranks. The average tuition in universities of the Top 20 is twice that of tuitions in the Top 100. Finally, Fig. 7 shows that best ranked universities are also those, in average, where students parents have the highest incomes. These results therefore suggest that performance in the ARWU is related to the economic capital of HEIs, and of the families of the students attending these institutions.

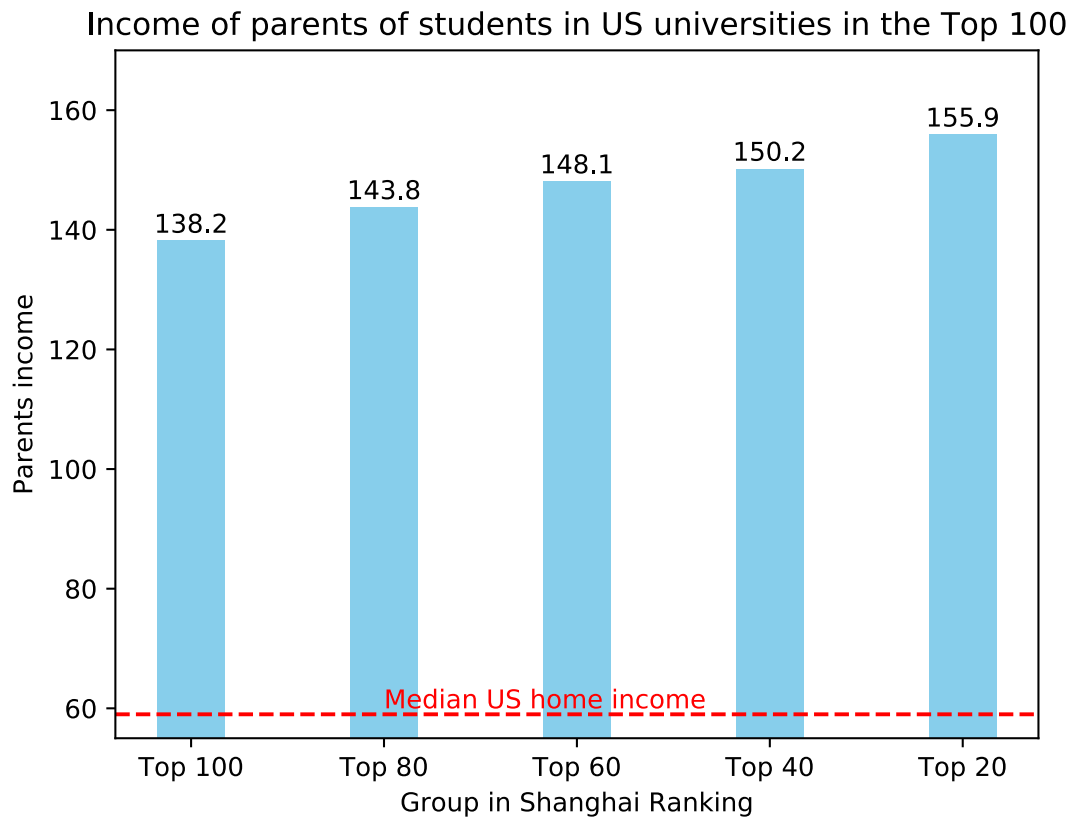


Figure 7: Averaged income of parents in top US universities of the Shanghai ranking. The averages are derived for the top 100, 60, 40 etc. universities in the ranking. e.g. the average annual income of parents of students in universities of the Top 20 is 155.9 k\$. The median US home income for 2017 is indicated.

4 Discussion

4.1 ARWU and the hegemony of the Anglo-America model

As discussed in the introduction, several authors refer to the position of US, and more generally Anglo-American universities, as “hegemonic”, and it can be argued that rankings reinforce this hegemony (11; 30; 24; 25). The “Anglo-American” model of HEI is relatively merely defined and sometimes referred to as the “Anglo-Saxon” model (e.g.(25)). In fact, Marginson (10) argues that this model does not exist in reality, and is an idealized view of HEIs in the minds of policymakers. Nevertheless, he provides some hints of what these Anglo-American HEI are : “centrally focused on knowledge

production; emphasizing research and graduate studies; excellence and prestige; tied to business and knowledge economy; competitive for students and fund; internationally oriented” to which he adds and is particularly interesting when studying the economic capital of HEIs as here : “achieving greater autonomy via financial diversity, including tuitions [...]”. Marginson notes that “the US Ivy League private universities are closest to this model in the real world”, and obviously Harvard is the canonical example. Obviously, Anglo-American HEIs are also tied to English speaking countries. Hegemony is in this paper understood as in the classical definition of Gramsci (26) : “ ‘spontaneous’ consent given by the great masses of the population to the general direction imposed on social life by the dominant fundamental group”. Hegemony of the Anglo-American model of higher education, and the action of the ARWU to support this hegemony, can here be investigated in the frame of this definition and with the data presented in the previous sections.

The ARWU top 10 universities are indicated in Fig 3 which displays the tuitions of HEIs vs their budget per student. 7 of them are in the upper right hand corner (high tuitions and high budget per student) and 3 are in the middle range (medium tuitions and medium budget per student). None are in the lower left hand corner (low tuitions and low budget per student) where all continental Europe HEIs lay. The Ivy League universities are also indicated in this Figure. They are all in the upper right hand corner. Here the “dominant fundamental group” is thus well identified : it is the one occupying the upper right part of the figure, and the institutions found there correspond well to the definition of Anglo-American HEI discussed above : English speaking, Ivy-League and “achieving greater autonomy via financial diversity, including tuitions”. The direction given by this group, is the one of expensive and rich institutions, and the ‘spontaneous’ consent is obtained thanks to the publicity of the ARWU in the media. In conclusion, the hegemony of the Anglo-American model is well illustrated here by merging ARWU and economical data of individual institutions.

4.2 ARWU and social exclusion

Amsler & Bolsmann (12) suggest that rankings are tools of economical policy, which are used by the economical elite to exclude non-members of this elite from top HEIs, so as to preserve social reproduction. We can investigate this proposal with the data presented in the above sections.

Figs. 5,6, 7 indicate that there is a relationship between economic capital and performance in the Shanghai ranking. In practice, this could be seen as anecdotal, or even useful as anyone could then use the ARWU as a useful scale to measure “economic capita”, or “power” (24). However, this is not the *advertised* aim of the ARWU, and it is therefore never understood as such by the thousands of academics, parents, prospective students etc. who consult

its results. Who are those who advertise rankings ? Mostly administrators and policymakers, in other terms elite members. And these administrators and policymakers, perhaps unconsciously, promote rankings not as measure of economic eliteness, but as a certification of the quality of education and research activities. It is thus fair to conclude, as proposed by Amsler & Bolsmann (12), that the ARWU (and likely other international rankings) are used as tools of social exclusion, at a global scale.

4.3 ARWU and the funding of higher education

Another aspect which is perhaps less discussed in the literature is the effect of international rankings on funding of higher education and student debt. In the worldwide competition to obtain the “world class university” label which translates into a good rank in the ARWU (17), the Ranking can be seen as an incentive pushing institutions and/or governments to increase the budget per student. There are several ways to increase the budget per student in universities, but for a large majority of the institutions this has been materialized by increasing the share of private funding (35) mostly through the increase of tuition fees. It is however noticeable that some countries, in particular in Latin America, have decided to express resistance against this dominant (hegemonic, Sect. 4.1) paradigm of expensive education (25). For many others, reforms have resulted in a rise of tuitions and of the national the student debts (36; 37; 38; 39). Because the rank in the ARWU has turned from a reference “measure” to an “objective” for many governments, and because those rich universities costing more to parents are those performing best in the ARWU as we have seen above, it is likely that the model favoring high tuition fees will continue to spread. Therefore, the student debt is likely to become global, as well as the issues related to its growth (36).

5 Conclusions

Using financial data available publicly, it is shown in this study that the Shanghai Ranking is mostly a ranking of economic capital of HEIs and of the families of students attending the HEIs. Overall, the ARWU can be seen as a ranking of economic eliteness. The ARWU can be considered as a tool acting at the global level which 1) helps reinforcing the hegemony of the Anglo-American model of expensive research universities which is likely to promote the rise of the global student debt, and 2) as a tool used by elites to exclude non-elite members from their club, i.e. as a tool of social exclusion.

References

- [1] W. Espeland and M. Sauder, “Rankings and reactivity: How public measures recreate social worlds,” *American Journal of Sociology*, vol. 113, no. 1, pp. 1–40, 2007. [Online]. Available: <http://www.jstor.org/stable/10.1086/517897>
- [2] E. Hazelkorn, “The impact of league tables and ranking systems on higher education decision making,” *Higher education management and policy*, vol. 19, no. 2, pp. 1–24, 2007.
- [3] S. Lindblad and R. F. Lindblad, “Transnational governance of higher education: On globalization and international university ranking lists,” *Yearbook of the National Society for the Study of Education*, vol. 108, no. 2, pp. 180–202, 2009.
- [4] H. Ellen, “Reflections on a decade of global rankings: what we’ve learned and outstanding issues,” *European Journal of Education*, vol. 49, no. 1, pp. 12–28. [Online]. Available: <https://onlinelibrary.wiley.com/doi/abs/10.1111/ejed.12059>
- [5] E. Hazelkorn, “Impact of global rankings on higher education research and the production of knowledge,” 2009.
- [6] ———, *Rankings and the reshaping of higher education: The battle for world-class excellence*. Springer, 2015.
- [7] N. C. Liu and Y. Cheng, “The academic ranking of world universities,” *Higher Education in Europe*, vol. 30, no. 2, pp. 127–136, 2005. [Online]. Available: <https://doi.org/10.1080/03797720500260116>
- [8] S. Marginson and M. v. d. Wende, “Globalisation and higher education,” 2007.
- [9] J.-C. Billaut, D. Bouyssou, and P. Vincke, “Should you believe in the shanghai ranking?” *Scientometrics*, vol. 84, no. 1, pp. 237–263, Jul 2010. [Online]. Available: <https://doi.org/10.1007/s11192-009-0115-x>
- [10] S. Marginson, “Global university rankings,” 2007.
- [11] ———, “Global field and global imagining: Bourdieu and worldwide higher education,” *British Journal of Sociology of Education*, vol. 29, no. 3, pp. 303–315, 2008.
- [12] S. S. Amsler and C. Bolsmann, “University ranking as social exclusion,” *British journal of sociology of education*, vol. 33, no. 2, pp. 283–301, 2012.

- [13] L. N. Cai, “The story of academic ranking of world universities,” *International Higher Education*, vol. 54, pp. 2–3, 2009.
- [14] C. Musselin, *Le marché des universitaires: France, Allemagne, États-Unis*. Presses de Sciences Po, 2005.
- [15] B. Stensaker, *Strategy, Identity and Branding: Re-inventing Higher Education Institutions A Paper Presented to the City Higher Education Seminar Series (CHESS)*., 2005.
- [16] R. A. Rhoads, S. Li, and L. Ilano, “The global quest to build world-class universities: Toward a social justice agenda,” *New Directions for Higher Education*, vol. 2014, no. 168, pp. 27–39, 2014.
- [17] R. Deem, K. H. Mok, and L. Lucas, “Transforming higher education in whose image? exploring the concept of the world-class university in europe and asia,” *Higher education policy*, vol. 21, no. 1, pp. 83–97, 2008.
- [18] W. N. Espeland and M. Sauder, *Engines of anxiety: Academic rankings, reputation, and accountability*. Russell Sage Foundation, 2016.
- [19] J. Salmi, *The challenge of establishing world class universities*. The World Bank, 2009.
- [20] P. Aghion, M. Dewatripont, C. Hoxby, A. Mas-Colell, A. Sapir, and B. Jacobs, “The governance and performance of universities: evidence from europe and the us [with discussion],” *Economic Policy*, vol. 25, no. 61, pp. 7–59, 2010. [Online]. Available: <http://www.jstor.org/stable/40603192>
- [21] P. Aghion, M. Dewatripont, C. Hoxby, A. Mas-Colell, A. Sapir *et al.*, “Why reform europe’s universities?” *Bruegel Policy Brief*, vol. 04, 2007.
- [22] R. K. Merton and R. K. Merton, *Social theory and social structure*. Simon and Schuster, 1968.
- [23] S. Marginson and I. Ordorika, “el central volumen de la fuerza. global hegemony in higher education and research,” *Knowledge matters: The public mission of the research university*, pp. 67–129, 2011.
- [24] B. Pusser and S. Marginson, “University rankings in critical perspective,” *The Journal of Higher Education*, vol. 84, no. 4, pp. 544–568, 2013.
- [25] I. Ordorika and M. Lloyd, “International rankings and the contest for university hegemony,” *Journal of Education Policy*, vol. 30, no. 3, pp. 385–405, 2015.

- [26] A. Gramsci, Q. Hoare *et al.*, *Selections from the prison notebooks*. Lawrence and Wishart London, 1971, vol. 294.
- [27] M. Foucault, *Surveiller et punir. Naissance de la prison*. Editions Gallimard, 1975.
- [28] P. Bourdieu, *The weight of the world: Social suffering in contemporary society*. Alhoda UK, 1999.
- [29] M. Li, S. Shankar, and K. K. Tang, “Why does the usa dominate university league tables?” *Studies in Higher Education*, vol. 36, no. 8, pp. 923–937, 2011.
- [30] A. J. Kaba, “Analyzing the anglo-american hegemony in the” times higher education” rankings.” *education policy analysis archives*, vol. 20, no. 21, p. n21, 2012.
- [31] E. Hazelkorn, “Learning to live with league tables and ranking: The experience of institutional leaders,” *Higher Education Policy*, vol. 21, no. 2, pp. 193–215, 2008.
- [32] G. J. Duncan and R. J. Murnane, *Whither opportunity?: Rising inequality, schools, and children’s life chances*. Russell Sage Foundation, 2011.
- [33] J. Jerrim, “Family background and access to high status universities,” 2014.
- [34] V. Albouy and T. Wanecq, “Les inégalités sociales d’accès aux grandes écoles suivi d’un commentaire de louis-andré vallet,” *Économie et statistique*, vol. 361, no. 1, pp. 27–52, 2003.
- [35] V. Carpentier, “Public-private substitution in higher education: Has cost-sharing gone too far?” *Higher Education Quarterly*, vol. 66, no. 4, pp. 363–390, 2012.
- [36] J. E. Stiglitz, “Student debt and the crushing of the american dream,” *The New York Times*, 2013.
- [37] P. Bolton, “Student loan statistics,” *Student Loan Statistics - House of Commons Briefing paper*, no. 1079, 2018.
- [38] “Student loan statistics,” *Student Loan Statistics - Australian Parliamentary Budget Office*, no. 02/2016, 2017.
- [39] B.-S. Han, H.-G. Kang, and S.-G. Jun, “Student loan and credit risk in korea,” *Economics Letters*, vol. 135, pp. 121 – 125, 2015. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S016517651500333X>

Table 1: For the first 100 universities in the ARWU 2017, the 6 variables used in this study, i.e. rank j , score, number of students $s(j)$, annual budget $b(j)$, tuition fees $t(j)$ and income of parents $I(j)$.

	Rank	Score	N students	Budget (M\$)	Tuition fees (\$)	Parental income (k\$)
Harvard University	1	100.0	22000	4900	43280	169
Stanford University	2	76.5	16914	5900	44757	168
University of Cambridge	3	70.9	19660	1643	13000	-
Massachusetts Institute of Technology (MIT)	4	70.4	11446	3349	49892	137
University of California, Berkeley	5	69.1	41900	2819	13518	112
Princeton University	6	61.1	6000	1926	47140	186
University of Oxford	7	60.1	23195	1336	13000	-
Columbia University	8	58.8	32429	4388	57208	151
California Institute of Technology	9	57.3	2250	641	50487	146
University of Chicago	10	53.9	16016	4400	54825	135
Yale University	11	52.8	12458	3364	51400	193
University of California, Los Angeles	12	52.5	43301	2063	11220	105
University of Washington	13	50.3	46165	1300	10974	113
Cornell University	14	49.6	21904	4260	36564	152
University of California, San Diego	15	49.5	36400	4333	14028	82
University College London	16	47.1	41539	1846	27000	-
University of Pennsylvania	17	46.0	21563	5700	53534	196
Johns Hopkins University	18	45.7	20000	5000	50000	177
Swiss Federal Institute of Technology Zurich	19	44.1	19233	1784	1210	-
Washington University in St. Louis	20	43.3	13312	3000	50650	272
University of California, San Francisco	21	42.4	3121	6200	1000	-
Northwestern University	22	41.9	21842	2389	52678	171
University of Toronto	23	41.6	88766	1755	10000	-
The University of Tokyo	24	41.5	27449	2456	11126	-
University of Michigan-Ann Arbor	24	41.5	46000	8700	14826	154
Duke University	26	41.0	14832	2300	53500	187
Imperial College London	27	40.9	16282	1381	13000	-
University of Wisconsin - Madison	28	39.7	43820	3000	10533	96
New York University	29	38.6	59000	3273	50464	149
University of Copenhagen	30	38.5	38615	1435	123	-
University of British Columbia	31	37.7	61113	1755	8000	-
The University of Edinburgh	32	37.0	39669	1295	13000	-
University of North Carolina at Chapel Hill	33	36.9	30000	3000	9000	135
University of Minnesota, Twin Cities	34	36.8	31535	3800	14000	110
Kyoto University	35	36.7	22657	1450	6000	-
Rockefeller University	36	36.6	216	370	25000	-
University of Illinois at Urbana-Champaign	37	36.2	44880	6500	15868	109
The University of Manchester	38	36.1	39700	1388	13000	-
The University of Melbourne	39	35.9	48000	1600	27000	-
Pierre and Marie Curie University - Paris 6	40	35.5	31000	542	270	-
University of Paris-Sud (Paris 11)	41	35.0	31400	336	270	-
Heidelberg University	42	34.8	29689	1057	184	-
University of Colorado at Boulder	43	34.7	33681	4110	12086	134
Karolinska Institute	44	33.3	6062	760	107	-
University of California, Santa Barbara	45	33.2	21574	1000	14409	106
King's College London	46	33.1	29600	1073	34630	-
Utrecht University	47	33.0	30000	996	2459	-
The University of Texas SW Medical Center Dallas	48	32.8	4590	1800	6070	-
Tsinghua University	48	32.8	36300	3632	7500	-
Technical University Munich	50	32.7	40841	1721	158	-

	Rank	Score	N students	Budget (M\$)	Tuition fees (\$)	Parental income (k\$)
The University of Texas at Austin	51	32.5	51331	2658	10136	124
Vanderbilt University	52	32.0	11782	1274	47664	205
University of Maryland, College Park	53	31.8	28472	1961	10180	108
University of Southern California	54	31.7	45500	4900	54323	161
The University of Queensland	55	31.6	52329	1400	9342	-
University of Helsinki	56	31.5	36500	860	124	-
University of Munich	57	31.4	51420	2090	158	-
University of Zurich	58	31.3	25542	1400	590	-
University of Groningen	59	31.1	30000	983	2006	-
University of Geneva	60	31.0	16935	779	1042	-
University of Bristol	61	30.1	25024	869	25300	-
University of Oslo	62	29.9	28007	840	13000	-
Uppsala University	63	29.8	42559	800	107	-
University of California, Irvine	64	29.4	35985	2939	11220	99
Aarhus University	65	29.1	34497	2121	-	-
McMaster University	66	29.0	31265	752	7000	-
McGill University	67	28.9	35710	646	8200	-
University of Pittsburgh, Pittsburgh Campus	68	28.7	26935	2083	19800	112
Ecole Normale Supérieure - Paris	69	28.6	1700	160	270	-
Ghent University	69	28.6	41000	504	1300	-
Mayo Medical School	71	28.5	186	750	49900	-
Peking University	71	28.5	24000	1745	4760	-
Erasmus University Rotterdam	73	28.4	28000	588	2006	-
Rice University	74	28.2	7022	680	44900	-
Stockholm University	74	28.2	34000	590	107	-
Swiss Federal Institute of Technology Lausanne	76	28.1	19800	1888	1320	-
Purdue University - West Lafayette	77	28.0	41573	2094	9992	118
Monash University	78	27.9	73807	1555	9213	-
Rutgers, The State University of New Jersey	79	27.8	50146	3822	14638	104
Boston University	80	27.7	33119	1745	52082	141
Carnegie Mellon University	80	27.7	13961	1128	53910	155
The Ohio State University - Columbus	80	27.7	59837	5465	10591	104
University of Sydney	83	27.5	56700	1646	16891	-
Nagoya University	84	27.2	16439	1009	5600	-
Georgia Institute of Technology	85	27.1	29369	1071	10008	130
Pennsylvania State University - University Park	85	27.1	98743	5677	18436	102
University of California, Davis	85	27.1	36441	4404	14046	95
Leiden University	88	27.0	28130	467	2006	-
University of Florida	88	27.0	55862	2890	6381	-
KU Leuven	90	26.9	55484	1051	1100	-
National University of Singapore	91	26.8	40000	1996	25847	-
The University of Western Australia	91	26.8	24327	677	6500	-
Moscow State University	93	26.6	40000	350	-	-
Technion-Israel Institute of Technology	93	26.6	14538	411	3000	-
University of Basel	95	26.3	10095	762	1209	-
University of Goettingen	95	26.3	31500	1346	414	-
The Australian National University	97	26.1	23761	855	20700	-
University of California, Santa Cruz	98	26.0	16328	662	14022	105
Cardiff University	99	25.9	31597	724	12800	-
University of Arizona	99	25.9	34072	1902	11877	105