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"THE CITATION MERIT OF SCIENTIFIC PUBLICATIONS"

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Abstract

We propose a new method to assess the merit of any set of scientific papers in a given field based on the citations they receive. Given a citation indicator, such as the mean citation or the *h*-index, we identify the merit of a given set of *n* articles with the probability that a randomly drawn sample of *n* articles from a reference set of articles in that field presents a lower citation index. The method allows for comparisons between research units of different sizes and fields. Using a dataset acquired from Thomson Scientific that contains the articles published in the periodical literature in the period 1998-2007, we show that the novel approach yields rankings of research units different from those obtained by a direct application of the mean citation or the *h*-index.

Keywords: Citation analysis; citation merit; mean citation; *h*-index

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I. INTRODUCTION

The scientific performance of a research unit (a university department, research institute, laboratory, region, or country) is often identified with its publications and the citations they receive. There are a variety of citations-based specific indices for assessing the impact of a set of articles. Among the most prominent are the mean citation and the *h*-index, but there are many other possibilities. Regardless of the citation impact indicator used, the difficulty of comparing units that produce a different number of papers –even within a well-defined homogenous field– must be recognized. To better visualize the problem consider a concrete example. Suppose that we use a size-invariant indicator, such as the mean citation. Consider the articles published in Mathematics in 1998 and the citations they receive until 2007. The mean citation of papers published in Germany and Slovenia are 5.5 and 6.4, respectively. However, Germany produced 1,718 articles and Slovenia only 62. According to the mean citation criterion the set of Slovenian articles has greater impact than the German set. We will see, however, that according to the novel proposal introduced in this paper the performance exhibited by Germany has greater merit than that of Slovenia. No doubt this is an extreme example, but highlights a general difficulty that is present when comparing research units producing a different number of papers in the same field. This difficulty is even more apparent for citation impact indicators that are size dependent, such as the *h*-index.

Comparisons across fields are even more problematic. Because of large differences in publication and citation practices, the numbers of citations received by articles in any two fields are not directly comparable. Of course, this is the problem originally addressed by relative indicators recommended by many authors (Moed *et al.*, 1985, 1995, van Raan, 2004, Schubert *et al.*, 1983, 1988, Braun *et al.*, 1985, Schubert and Braun, 1986, Glänzel *et al.*, 2002, and Vinkler, 1986, 2003). A convenient relative impact indicator is the ratio between the unit's observed mean citation and the mean citation for the field as a whole. Thus, after normalization, mean citations of research units in heterogeneous fields become comparable. However, we argue that, as in the previous example of

Germany and Slovenia, comparisons using normalized mean citations do not capture the citation merit of different research units.

The main aim of this paper is to propose a method to measure the *citation merit* of a research unit, in terms of the merit attributed to the set of articles the unit publishes in a homogeneous field over a certain period. It should be clarified at the outset that the merit is conditional on the indicator used (mean, *h*-index, median, percentage of highly cited papers, etc.) and on the set of articles used as reference (usually all the world articles published in a field in a given period). Thus, a given research unit in a certain field and time period may have different merit depending on the citation impact indicator used. Given a citation impact indicator, our method allows for comparisons between units of different sizes and fields. Thus, we will be able to make statements like "The scientific publications of Department *X* in field *A* have a greater citation merit than the publications of Department *Y* in field *B*."

Our method is based on a very simple and intuitive idea. Given a field and a citation impact indicator, the merit of a given set of *n* articles is identified with the probability that a randomly drawn sample of *n* articles from a given pool of articles in that field has a lower citation impact according to the indicator in question. Suppose, for example, that the impact indicator is the mean citation, and that the reference set is equal to all articles published in the world in a certain period in that field. In this case, the merit of a given set of *n* papers is given by the percentile in which its observed mean citation lies on the distribution of mean citation values corresponding to all possible random samples of *n* articles in that field. Note that, since the merit of a research unit is associated with a probability (or a percentile), it is possible to compare two such probabilities for research units of different sizes working in different fields.

This method resembles that used in other areas such as, for example, Pediatrics where the growth status of a child is given by the percentile in which his/her weight lies within the weight distribution for children of the same age. In our case "same age" is equivalent to "same number of articles". There is, however, an essential difference: in our case we do not compare the

performance of a given research unit with the performance of other existing research units with a similar number of articles, but with the distribution generated by random sampling from a given pool of articles.

The idea of distinguishing between citation impact and citation merit can also be found in Bornman and Leydersdorff's (2011) contribution to the evaluation of scientific excellence in geographical regions or cities. The citation impact indicator they use is the percentage of articles in a city that belong to the top-10% most-highly cited papers in the world. As they say "*the number of highly-cited papers for a city should be assessed statistically given the number of publications in total*." Thus, the scientific excellence of a city depends on the comparison between its observed and its expected number of highly cited papers.

In order to implement our method, a large dataset with information about world citation distributions in different homogeneous fields is required. In most of this paper, we use a dataset acquired from Thomson Scientific, consisting of all articles published in 1998-2007, and the citations they received during this period. We show that our approach yields rankings of research units quite different from those obtained by a direct application of the mean citation and the *h*-index.

The rest of this paper is organized in three Sections. Section II introduces the problem we face and the solution we suggest. Section III is devoted to a number of empirical applications of our approach, while Section IV concludes with a discussion of the above issues. To save space, a number of empirical results are relegated to an Appendix.

II. THE GENERAL PROBLEM

Consider a homogeneous scientific field (for example, Nuclear Physics, Molecular Biology, etc.) and certain research units (for example, university departments) in a given period. Suppose that we want to compare the relative merit of a set of articles written by the members of unit X and a set of articles written by the members of unit Y. Denote by $x = \{x_1,..., x_n\}$ the vector of

citations received by the n articles in the X unit, and by $y = \{y_1,..., y_m\}$ the corresponding vector for the m articles in unit Y. Denote by W the set of articles used as a "reference set", and by $w = \{w_1,..., w_N\}$ the vector of citations of the N articles in W. We require that $X, Y \in W$. In most applications in the paper we take W as the set of all articles published in the world in that field.

We next need some citation impact indicator $g(.)$ such as, for example, the mean citation or the h-index. The mean citation is perhaps the most often-used indicator, but recently the h-index has also become popular because it can be seen as capturing both quantity and quality (the original proposal by Hirsch 2005 was designed for the evaluation of individual researchers, but it can be easily extended to research units). These indicators directly evaluate the impact of a set of papers according to some criteria.[1] Our method is silent about which is the most appropriate citation impact indicator. Given an index, we could compare x and y's impact by comparing the numbers $g(x)$ and $g(y)$. As indicated in the Introduction, such a direct comparison has important drawbacks and is often misleading. Thus, we propose a way to compare the merit of any two vectors of citations using the information $g(x), g(y), n, m,$ and w.

Denote by $G_n(z)$ the probability that a random sample of n articles from W has a vector of citations $r = \{r_1,..., r_n\}$such that $g(r) < z$.

Definition. *The citation merit of a set of papers* $x = \{x_1,...,x_n\}$ *is given by* $G_n(g(x))$. *We write* $q_n(x) = G_n(g(x))$.

Thus, we associate the citation merit of $x = \{x_1,..., x_n\}$ with the percentile in which the number $g(x)$ lies in the distribution G_n.

In many cases we know the parameters of the citation distribution w, and we can find analytically the function $G_n(z)$. In other cases, however, the analytical expression of $G_n(z)$ is unknown and a re-sampling method might be necessary. In this case, take r random draws of size n from the set W. The number of draws should be large (in our empirical applications at least 1,000).

[1] For different axiomatic characterizations of the h-index, see Woeginger (2008a, b) and Quesada (2009, 2010); for a characterization of the ranking induced by the h-index, see Marchant (2009), and for a recent survey of the h-index and its applications, see Alonso *et al.* (2009).

Let $x^i = \{x^i_1,..., x^i_n\}$, $i = 1,..., r,$ be the vector of citations obtained in the *ith* draw. Apply the impact indicator to each of these r samples and denote by $g_n = \{g(x^1),..., g(x^r)\}$ the resulting vector. Let G_n be the distribution function associated to such vector, so that $G_n(z)$ gives the percentage of components in vector g_n with a value equal or less than z. Given a large database, this is a feasible and simple approach to approximate the probability $q_n(x)$.

To further motivate our method, think of the following hypothetical example. Suppose that the research unit is a university department and that each of its n papers has been written by one of the n faculty members of the department, obtaining a citation impact level equal to $g(x)$. Suppose that instead of the actual department composition the chair could hire n persons from the pool of world researchers who have written a paper in the same field, and let x' be the corresponding vector of citations. Assume that the chair of the department hires these n people in a random way (so there is no difference from what a monkey would do). What would the probability be that $g(x')$, the citation impact level associated with such hypothetical random hiring, is lower than the actual value $g(x)$? Such probability is our citation merit value $q_n(x)$.

Coming back to the example presented in the Introduction, according to their mean citation the 62 papers published in the field of Mathematics during 1998 in Slovenia have a greater citation impact than the 1,718 papers from Germany (judging by their mean citation of 6.3 and 5.5, respectively). However, the merit values we obtain for these two countries are 85.3 and 97, respectively. The probability that a set of 62 papers have by chance a mean lower than 6.3 is 85.3%, whereas the probability that a set of 1,718 papers have a mean lower than 5.5 is 97%. Thus, although the mean citation for Slovenia is higher than the mean citation for Germany, its merit is lower.

Given a citation impact indicator and a reference set, the method just introduced allows us to compare sets of articles in the same field, and rank all of them in a unique way. Moreover, since the merit definition is associated with a percentile in a certain distribution, we can also make meaningful merit comparisons of sets of articles from different fields.

III. EMPIRICAL RESULTS

We use a dataset acquired from Thomson Scientific, consisting of all publications in the periodical literature appearing in 1998-2007, and the citations they received during this period. Since we wish to address a homogeneous population, in this paper only research articles are studied. After disregarding review articles, notes, and articles with missing information about Web of Science category or scientific field, we are left with 8,470,666 articles. For each article, the dataset contains information about the number of citations received from the year of publication until 2007 (see Albarran *et al.*, 2011a, for a more detailed description of this database).

As already indicated, we only consider two citation impact indicators: the mean citation, and the *h*-index. In the case of the *h*-index, our merit function $G_n(z)$ can be calculated analytically as described in equations A3 and A6 in Molinari and Molinari (2008, p. 173). Note that to compute such function we only need to know the vector of citations in the reference set, $w = \{w_1,..., w_N\}$, but not its precise analytical distribution. Since the mean and the standard deviation of W are known, when the citation impact index is the mean citation one could approximate $G_n(z)$ using the Central Limit Theorem, at least for research units with large numbers of articles. However, for all scientific fields the distribution of w is heavily skewed (see *inter alia* Seglen, 1992, Shubert *et al.*, 1987, Glänzel, 2007, Albarrán and Ruiz-Castillo, 2011, and Albarrán *et al.*, 2011a), and the underlying distribution might not have a finite variance, so that the Central Limit Theorem could fail even for research units with a large number of articles. For this reason we approximate $G_n(z)$ using the re-sampling approach explained above.[2]

III.1. Countries

In a first exercise, research units are countries, and the homogeneous fields are identified with the broad fields distinguished by Thomson Scientific. The latter choice should be clarified at the outset. Naturally, the smaller the set of closely linked journals used to define a given research

[2] We have indeed checked that for the scientific fields used in the paper the distribution of the means of random samples is far from a normal distribution.

field, the greater the homogeneity of citation patterns among the articles included must be. Therefore, ideally one should always work at the lowest aggregation level that the data allows. In our case, this may mean the 219 Web of Science categories, or sub-fields distinguished by Thomson Scientific. However, articles are assigned to sub-fields through the assignment of the journals where they have been published. Many journals are unambiguously assigned to one specific category, but many others typically receive a multiple assignment. As a result, only about 58% of the total number of articles published in 1998-2007 is assigned to a single sub-field (see Albarrán *et al.*, 2011a). On the other hand, Thomson Scientific distinguishes between 20 broad fields for the natural sciences and two for the social sciences. Although this firm does not provide a link between the 219 sub-fields and the 22 broad fields, Thomson Scientific assigns each article in our dataset to a single broad field. Therefore, as in Albarrán *et al.* (2010, 2011b, c), given the illustrative nature of our work homogeneous fields are identified with these broad fields (for a discussion of the alternative strategies to deal with the problem raised by the multiple assignments of articles to Web of Science categories, see Herranz and Ruiz-Castillo, 2011).

In an international context we must confront the problem raised by cooperation between countries: what should be done with articles written by authors belonging to two or more countries? Although this old issue admits different solutions (see *inter alia* Anderson *et al.*, 1988, and Aksnes *et al.*, 2012 for a discussion), in this paper we side with many other authors in following a multiplicative strategy (see the influential contributions by May, 1997, and King, 2004, as well as the references in Section II in Albarrán *et al.*, 2010). Thus, in every internationally co-authored article a whole count is credited to each contributing area.

Excluding the Multidisciplinary category, for each of the remaining 21 fields we compute the citation merit of each country according to the mean citation and the *h*-index, taking as a reference set all papers published in the world in the corresponding field. Figure 1 illustrates an example of our methodology when citation impact is measured by the *h*-index for the articles published in 1998 in the field of Biology, their citations until 2007, and a selection of countries. For each

different value of n, Figure 1 shows the value of the h-index corresponding to percentiles 10, 25, 50, 75 and 90 of the corresponding distribution G_n, as well as the number of articles published by each country and its associated h-index.

Figure 1 around here

Note that by just observing the h-index of, for example, Japan, France, Germany, and Canada, it is difficult to assess their relative merit. The reason, of course, is that the h-index is highly dependent on the number of articles. Thus, since Japan (5,614 articles), France (3,240), and Germany (3,845) produce more articles than Canada (2,074), they also have a higher h-index. However, with our method we are able to compare these countries using $q_n(x)$, the percentile where the observed h-index lies. It turns out that obtaining by chance an h-index as high as the one of Canada –with 2,074 papers– is a much more "unlikely" event than obtaining the h-index of any of the other three countries with their corresponding number of articles. Thus, our method assigns more merit to Canada (percentile 94.8) than to Japan (percentile 0), France (percentile 10.5), and Germany (percentile 43.8). Figure 1 also shows that the U.S. produces the largest number of articles, has the highest h-index and, according to our methodology, basically reaches the 100 percentile. This is a feature that appears in most of the 22 fields that we have analyzed. Figure 2 – where, for clarity, the U.S. have been omitted– is similar to Figure 1 but for the field of Physics (to save space, the figures for the remaining fields are available upon request).

Tables 1 and 2 continue with the case of articles published in Biology and Physics in 1998 (to save space, the information about the remaining 19 fields is included in the Appendix). For the forty countries with the largest production, the tables provide the h-index, the mean citation, and the corresponding $q_n(x)$ values. Column 5 shows the position in the ranking according to our methodology, i.e. according to $q_n(x)$. Column 6 provides the change in position from the original h-index ranking to the position in the $q_n(x)$ ranking. Columns 9 and 10 show the same type of information for the case in which citation impact is measured by the mean citation. For example, France has an h-index of 97 in Biology, the fifth highest value in our sample. But if we look at the

merit index $q_n(x)$, it falls to the sixteenth position. It is observed that any of the two impact indices and its corresponding merit index q_n produce different rankings. There are many examples where the discrepancy between the two is very large. Thus, our methodology delivers outcomes that are quite different from those obtained by the direct use of the mean citation or the *h*-index criterion.

Tables 1 and 2 around here

In some cases our methodology cannot discriminate enough between countries with very high merit indices. Consider for example the case of Clinical Medicine in Table 3, where Column 3 shows the merit index for a selection of countries when the citation impact is measured by the *h*-index. All these countries, except Germany, have a very similar merit index close to 100%. The reason for this result is that we are using as a reference set all articles published in the world, and the quality of the articles published by this selection of countries is much higher than that of the rest of the world. Therefore, it is extremely unlikely to obtain random samples with citation impact as high as those observed in the countries in question. One possible way to discriminate among these "very high quality" countries is to take as reference set, *W**, only articles published in these countries. Column 5 in Table 3 shows the citation merit index in this case. Notice that when *W* contains all the papers published in the world France reaches the 99.4% percentile. However, in the case of *W** –a set of papers of a much higher quality than the *W* set– basically about half of all random samples of size 13,822 have an *h*-index higher than the one of France (140). Thus, in this case France's percentile is 55.3%.[3]

Table 3 around here

To illustrate the possibility of comparing research units in different fields, we focus in two European countries of different size by way of example: a large one, Spain, and a small one, Denmark. The results deserve the following comments. Firstly, in Clinical Medicine and six other

[3] Notice that changing the reference set might produce a re-ranking of the citation merit. When *W* is used, England obtains a higher citation merit than Belgium. However, the opposite is the case when the reference set is *W**. This possibility of re-ranking is not surprising since our notion of merit is based on the comparison of the observed *h*-index with the probability of obtaining random samples with lower *h*-indices. Such probability depends on the distribution function associated to the reference set. On the other hand, re-rankings can also appear when using a different citation indicator as, for example, the mean citation.

Life Sciences the Spanish performance is very poor: the index of merit according to both indicators is always practically zero. The exception is Pharmacology and Toxicology whose percentiles are 36.8 and 60.0 according to the mean citation and the *h*-index, respectively. On the contrary, except in Immunology, Denmark's performance in the remaining seven Life Sciences is excellent, with Clinical Medicine and Pharmacology & Toxicology in the high nineties according to both indicators. Secondly, in the Spanish case there are four groups of natural sciences with different degrees of success: (i) Physics and Engineering do very well indeed; (ii) Agricultural Sciences, Plant and Animal Sciences, and Materials Science do well at least according to one of the indicators; (iii) Geoscience, Environment end Ecology, and Mathematics reach above the 35th percentile in one of the two cases, (iv) while Space Science shows a bad performance. The case of Chemistry is interesting: Spain reaches the 94th percentile according to the mean citation, but only 0.6 according to the *h*-index. Denmark's performance in the natural sciences is again exceptional with eight sciences in the high nineties, and only Computer Science and Mathematics slightly below. Thirdly, Spain's performance in the Social Sciences' performance is poor, and that of Denmark's slightly better.

III.2. Changes Over Time

We have applied our method to the papers published in year 1998 and the citations received until 2007. One could, of course, choose a period of different length or focus on the evolution of our merit indicator over time. Figure 3 shows for the field of Molecular Biology and some selected countries the evolution of the merit index $q_n(x)$ according to the *h*-index and the mean citation. We compute the indices $q_n(x)$ for years 1998 through 2002 considering the citations received until year 2007. For a small number of articles our merit index might present large fluctuations, mainly in the case of the *h*-index. Thus, in the year 2000 Belgium has a $q_n(x)$ of 2 whereas in the year 2001 such index gets as high as 79.7. However, this volatility is not always present among all sets of articles of a small size: Israel produces a number of articles in Molecular Biology which is very similar to that of Belgium, and its $q_n(x)$ is quite stable over this time period.

Figure 3 around here

III.3. University Departments and Laboratories

It could be argued that the broad fields so far analyzed are, in effect, too heterogeneous, a fact that may well diminish the value of our results. In this subsection we present comparisons of the merit of some selected university departments and laboratories in two more homogeneous scientific sub-fields. Tables 4 and 5 show the performance of some institutions in the sub-fields of Neuroscience and Economics, respectively.[4] The tables show the number of papers, the *h*-index, the mean citation, and the corresponding $q_n(x)$.

Tables 4 and 5 around here

As before, there are significant discrepancies between the ranking according to the direct citation impact indicator (*h*-index or mean citation) and our merit function $q_n(x)$. Notice that many departments get a value of $q_n(x)$ equal or very close to 100%. As already explained in the case of Clinical Medicine in Table 3, this is not surprising since all of them are top departments and the probability that we obtain articles with such a high mean citation, or *h*-index, by chance from the set of world papers must be close to zero. As before, this lack of discrimination among top departments can be fixed by considering a different reference set W^*.

In addition, for the case of the mean citation we can increase the number of random samples used to estimate $q_n(x)$. So far, in our empirical results we have always drawn 1,000 random samples (for each n). This might be more than enough for intermediate percentiles but not for percentiles close to 100. Consider for example the case of Neurosciences reported in Table 4. The total number of articles published in 1998 in Neuroscience, which constitutes the original reference set W, is 21,876. However, Yale published only 209 articles. There are 8.2×10^{510} different ways of choosing 209 articles from the pool of 21,876 articles. For such large number of possibilities our 1,000 samples might not be enough to get reliable results.

[4] The data on the papers published by members of these departments has been obtained from the Web of Science of Thomson Scientific

IV. DISCUSSION

In this paper we have proposed a new simple and intuitive method to assess the citation merit of any set of scientific papers in any field. One advantage of our approach is that it can be applied to a variety of problems. For example, it might be applied to rank scientific journals. The merit of a given journal that publishes *n* articles a year in a given field would be given by the probability that a random sample of *n* articles in that field are of lower quality according to some criterion as the mean citation or the *h*-index.[5] A second advantage is the possibility of comparisons of the scientific merit of research units in different fields. This can be done because the merit of each research unit is associated with a probability (or percentile) that might be reasonable to compare across different fields.

As far as the international cooperation is concerned, it is well known that domestic and international publications are characterized by very different citation rates. Therefore, using whole counts as we have done in this paper, or following Aksnes *et al.*'s (2012) recommendation in favor of using fractionalized counts to calculate citation indicators at the national level, might make a significant difference that it would be convenient to investigate. In any case, for the sake of robustness the methods advocated in this paper should be tried out with larger and different samples.

In the empirical application of the method we have used two well-known and vastly different citation impact indicators: the mean citation and the *h*-index. However, recall that, given their high skewness, the upper and lower parts of citation distributions are typically very different. Consequently, average-based indicators –such as the mean citation– may not adequately summarize these distributions. On the other hand, both the *h*-index and many of the indicators of the same family have been shown to have some rather undesirable properties that may make them inappropriate for certain evaluation exercises (see Marchant, 2009, Bouyssou and Marchant, 2011a,

[5] Note that the merit of a journal is not the same as the merit of the authors who publish in the journal.

and Waltman and van Nees, 2011). As a result, new citation indicators are rapidly being suggested (see *inter alia* Albarrán et al., 2011b, Ravallion and Wagstaff, 2011, Bouyssou and Marchant, 2011b, Leydesdorff and Bornmann, 2011, and Leydesdorff *et al.*, 2011, as well as Rousseau, 2011). Therefore, it may be worthwhile to study the merit of research units according to some of these new indicators.

It is important to note that our approach is not trying to make any inference on the underlying model explaining the scientific output of the different units. For an overall assessment of the relative merit or performance of a research unit we should take into account many other variables, such as the budget, number of researchers, etc. Two research units with the same merit according to a set of citation indicators as understood in this paper may vastly differ in the productivity of its research staff or, more generally, in the efficiency with which scientific results are obtained from a complex input vector. Thus, we only provide a method to assess a research unit's performance in a certain dimension, quite independently of the underlying model explaining why different units produce scientific publications of different citation impact and citation merit.

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Figure 1

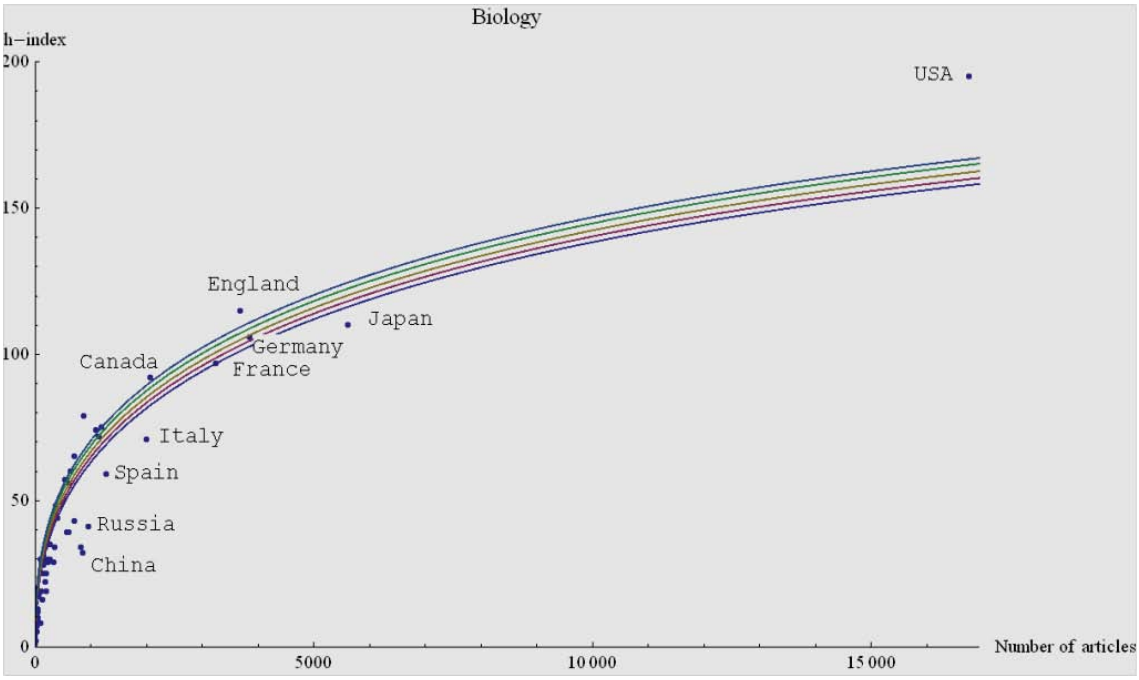

Figure 2

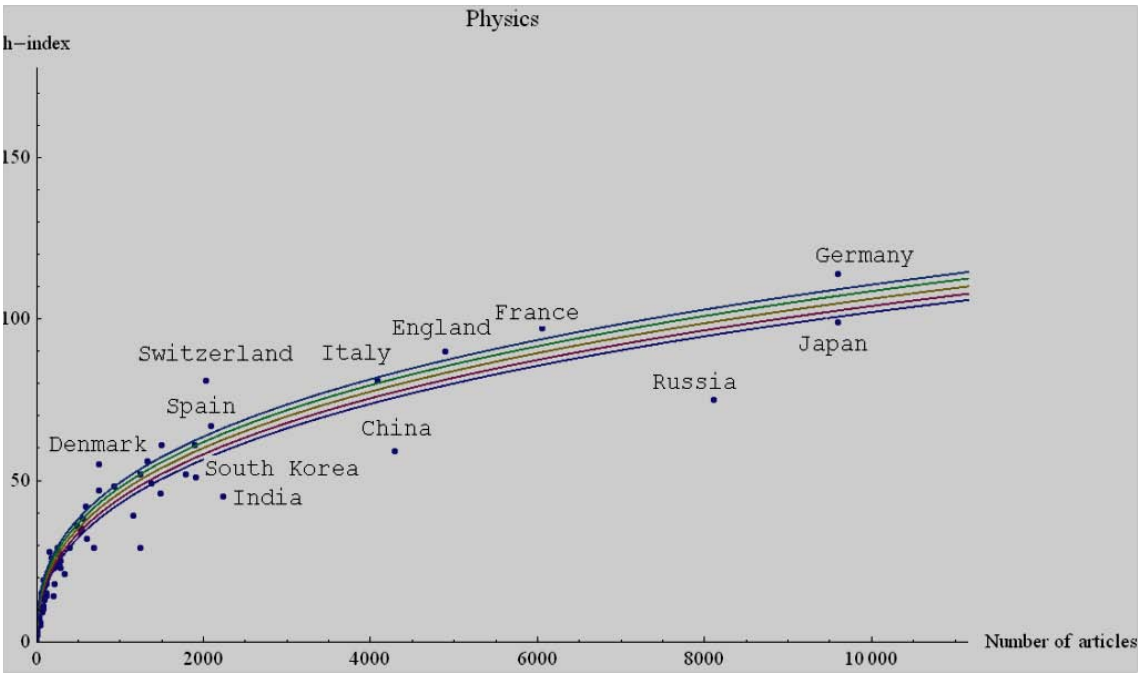

Table 1

Biology. Papers published in 1998 and their citations until 2007.

		h-index				*Mean citation*			
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Country	***Articles (n)***	***h-index***	***Percentile (q_n)***	***r***	***Δ***	***Mean citation***	***Percentile (q_n)***	***r***	***Δ***
USA	16743	195	100	1	0	32,74	100	1	1
JAPAN	5614	110	0	22	-19	20,03	0	22	-3
GERMANY	3845	106	43.8	13	-9	27,48	99.55	3	3
ENGLAND	3681	115	99.9	3	-1	27,22	99.31	4	4
FRANCE	3240	97	10.5	16	-11	25,71	93.38	10	0
CANADA	2074	92	94.8	6	0	27,70	96.47	9	-5
ITALY	1998	71	0	23	-12	17,57	0	23	-1
SPAIN	1274	59	0	24	-10	18,14	0	24	-3
SWEDEN	1201	75	86.1	7	1	26,97	97.41	8	1
AUSTRALIA	1147	72	66.3	11	-1	24,13	72.79	13	0
NETHERLANDS	1085	74	94.9	5	4	27,60	97.45	7	-2
RUSSIA	962	41	0	25	-5	10,32	0	25	10
SWITZERLAND	872	79	100	2	5	31,49	98.26	5	-2
CHINA	857	32	0	26	1	7,64	0	26	12
INDIA	817	34	0	27	-3	8,16	0	27	10
SOUTH KOREA	710	43	0	28	-9	12,95	0	28	0
SCOTLAND	698	65	97.4	4	8	27,41	97.93	6	1
BELGIUM	640	60	79.9	9	4	24,10	68.7	14	0
POLAND	606	39	0	29	-8	10,42	0	29	5
DENMARK	600	56	45.1	12	4	25,14	85.45	11	0
BRAZIL	574	39	0	30	-8	11,48	0	30	2
ISRAEL	545	57	83.8	8	7	23,12	43.33	15	0
AUSTRIA	409	44	2.8	18	0	21,04	8.12	18	-1
FINLAND	371	48	68.1	10	7	24,64	73.96	12	0
TAIWAN	348	34	0	31	-6	14,63	0	31	-6
ARGENTINA	339	29	0	32	0	12,60	0	32	-3
CZECH REP.	274	30	0	33	-4	13,83	0	33	-6
NORWAY	273	35	0.3	20	3	18,30	0.26	19	1
HUNGARY	251	30	0	34	-4	13,98	0	34	-8
MEXICO	241	29	0	35	-2	11,13	0	35	-2
SLOVAKIA	204	19	0	36	2	7,41	0	36	3
GREECE	200	25	0	37	-2	12,21	0	37	-7
NEW ZEALAND	190	34	27.2	15	11	20,76	13.99	17	1
IRELAND	184	30	1.3	19	12	76,94	99.58	2	-1
TURKEY	178	22	0	38	-1	9,92	0	38	-2
WALES	147	31	39.9	14	14	21,60	27.27	16	0
PORTUGAL	145	28	5.8	17	17	16,34	0.13	20	4
SOUTH AFRICA	144	25	0.1	21	15	16,46	0.08	21	2
BULGARIA	135	16	0	39	1	7,24	0	39	1
CHILE	114	19	0	40	-1	11,71	0	40	-9

Column (5)r= ranking according to column (4); Column (6) ***Δ*=**Change in the ranking according to (3) and the ranking according to (4); Column (9) r= ranking according to column (8); Column (10) ***Δ*=**Change in the ranking according to column (7) and the ranking according to column (8). For each country the merit index q_n is obtained using as *W* the total set of papers published in the World in Biology in 1998 (45718 papers) and their citations received until 2007. For the h-index the value q_n is computed analytically and for the mean citation q_n is approximated using the Central Limit Theorem and the mean and variance of W. The figures have been rounded up to two decimal places.

Table 2

Physics. Papers published in 1998 and their citations until 2007.

		h-index				*Mean citation*			
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Country	***Articles (n)***	***h-index***	***Percentile (q_n)***	***r***	***Δ***	***Mean citation***	***Percentile (q_n)***	***r***	***Δ***
USA	18267	173	100	1	0	19,52	100	1	2
JAPAN	9600	99	5,4	24	-21	11,96	31.46	22	-1
GERMANY	9598	114	99,9	4	-2	15,54	100	2	6
RUSSIA	8116	75	0	31	-23	7,49	0	32	6
FRANCE	6056	97	99	7	-3	15,10	100	3	8
ENGLAND	4890	90	99,3	5	0	14,68	100	4	9
CHINA	4294	59	0	32	-20	7,80	0	33	2
ITALY	4086	81	87,7	12	-6	14,40	99.96	7	8
INDIA	2239	45	0	33	-11	8,40	0	34	0
SPAIN	2089	67	98,4	8	1	15,15	99.96	8	2
SWITZERLAND	2028	81	100	2	5	21,96	100	5	-4
SOUTH KOREA	1911	51	0	34	-17	9,77	0	35	-7
CANADA	1895	61	76,4	15	-5	14,98	99.84	10	2
POLAND	1794	52	0,9	27	-12	12,12	53.76	20	0
NETHERLANDS	1504	61	99,3	6	5	14,60	99.12	13	1
BRAZIL	1481	46	0	35	-14	9,42	0	36	-5
AUSTRALIA	1373	49	6,8	22	-4	11,69	32.5	21	1
ISRAEL	1330	56	94,9	10	3	15,19	99.62	12	-3
SWEDEN	1250	52	68,1	16	0	15,72	99.83	11	-4
UKRAINE	1250	29	0	36	-6	4,97	0	37	3
TAIWAN	1160	39	0	37	-13	7,74	0	38	-2
BELGIUM	933	48	82,8	14	5	14,01	94.42	16	0
AUSTRIA	751	47	98	9	11	16,00	99.11	14	-8
DENMARK	746	55	100	3	11	19,58	100	6	-4
MEXICO	692	29	0	38	-7	7,65	0	39	-2
CZECH REPUBLIC	599	32	0,2	29	0	9,26	0.1	31	1
SCOTLAND	597	42	94,6	11	12	18,47	99.91	9	-5
FINLAND	558	38	65,8	28	-3	16,64	99.06	15	-10
GREECE	546	35	22,7	19	8	12,75	73.84	17	0
ARGENTINA	526	34	0	39	-11	10,53	8.76	26	-1
HUNGARY	483	36	67,7	17	**9**	12,41	64.66	18	0
ROMANIA	394	29	6,2	23	**9**	9,56	1.69	29	1
BELARUS	340	21	0	40	0	5,84	0	40	-1
PORTUGAL	296	25	3,7	25	11	10,36	12.75	25	1
TURKEY	296	23	0,2	30	8	9,09	1.39	30	3
SLOVAKIA	293	27	22,7	20	14	10,82	23.9	24	0
BULGARIA	280	24	2,6	26	11	9,84	6.03	27	0
SINGAPORE	278	27	32,8	18	17	9,75	5.34	28	1
NORWAY	248	29	87,4	13	20	12,29	60.63	19	0
SOUTH AFRICA	217	23	16,3	21	18	10,89	28.89	23	0

Column (5)r= ranking according to column (4); Column (6) ***Δ*=**Change in the ranking according to (3) and the ranking according to (4); Column (9) r= ranking according to column (8); Column (10) ***Δ*=**Change in the ranking according to column (7) and the ranking according to column (8). For each country the merit index q_n is obtained using as *W* the total set of papers published in the World in Physics in 1998 (72976 papers) and their citations received until 2007. For the h-index the value q_n is computed analytically and for the mean citation q_n is approximated using the Central Limit Theorem and the mean and variance of W. The figures have been rounded up to two decimal places.

Figure3.a
Molecular Biology. Merit based on the h-index

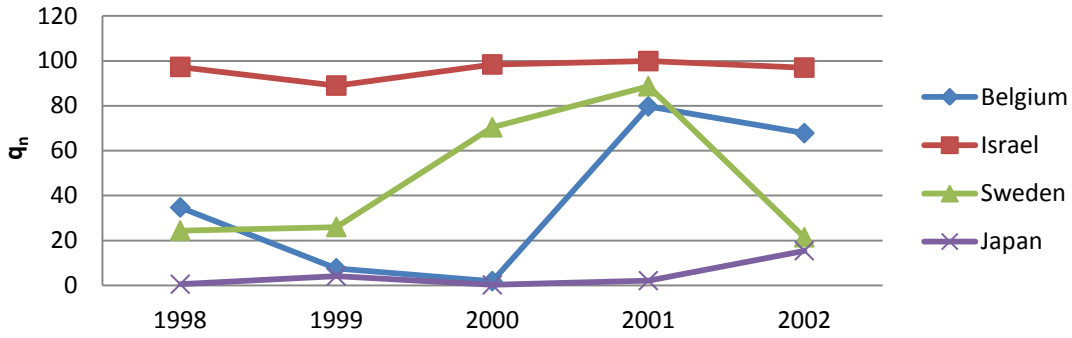

Figure 3.b
Molecular Biology. Merit based on mean citation

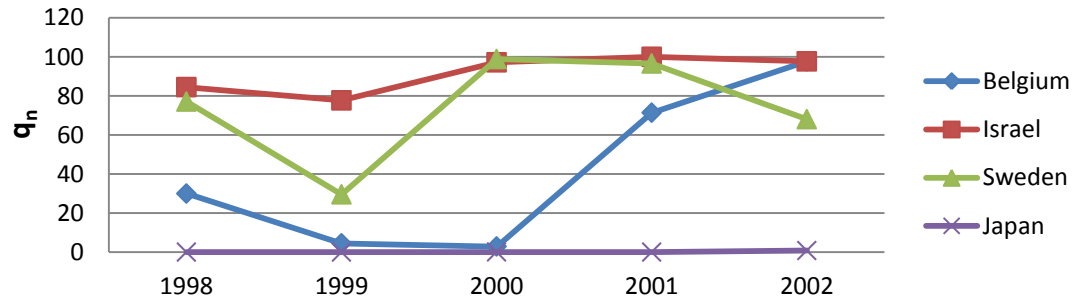

Table 3

Clinical Medicine. Papers published in 1998 and their citations until 2007.

			W= 155.178	*W*=119.390*
(1) ***Country***	*(2)* ***Articles (n)***	*(3)* ***h-index***	*(4)* ***Percentile*** (q_n)	*(5)* ***Percentile*** (q_n)
USA	56463	284	100,00	100,00
GERMANY	13822	144	16,68	0,00
ENGLAND	13243	162	99,99	92,03
FRANCE	9556	140	99,45	55,40
ITALY	7471	140	100,00	99,89
CANADA	6297	143	100,00	100,00
NETHERLANDS	4789	123	100,00	99,96
AUSTRALIA	4081	107	99,53	71,14
SWEDEN	4030	114	100,00	99,56
SWITZERLAND	3080	105	100,00	99,80
BELGIUM	2470	94	99,98	96,82
SCOTLAND	2016	90	100,00	99,47
FINLAND	1946	92	100,00	99,97
DENMARK	1841	86	99,99	98,43
NORWAY	1187	71	99,76	90,80

Column (4): the merit index q_n is obtained using as *W* the total set of papers published in the World in Clinical Medicine in 1998 (155.178 papers) and their citations received until 2007. Column (5): the merit index q_n is obtained using as *W** the total set of papers published in these 15 countries in Clinical Medicine in 1998 (119.390 papers) and their citations received until 2007.

Table 4

Neurosciences. Papers published in 1998 and their citations until 2007

		H-index		Mean Citation	
(1)	(2)	(3)	(4)	(5)	(6)
Institution	***Articles***	***h-index***	***Percentile*** (q_n)	***Mean Citation***	***Percentile*** (q_n)
Yale	209	53	100,00	48,01	100,00
Massachusetts Gen Hosp	186	62	100,00	69,26	100,00
Howard Hughes Med Inst	172	76	100,00	90,58	100,00
Stanford University	133	43	100,00	55,29	100,00
Rockefeller University	73	35	100,00	49,32	100,00
MIT	64	31	99,99	57,05	100,00
Salk Inst Biol Studies	59	34	100,00	78,34	100,00
Brigham & Womens Hosp	44	23	99,77	39,09	97,90
National Insitute of Aging (NIA)	40	19	89,50	32,95	89,90
Amgen	29	19	99,89	62,28	100,00
Smithkline Beecham Pharmaceut	24	17	99,86	52,75	99,40
Rush Presbytherian St Lukes Med	24	14	86,79	32,33	83,40
University Fribourg	20	13	92,49	46,55	98,10
Princeton	20	14	98,32	43,05	97,00
Beth Israel Med Ctr	19	12	84,81	40,74	94,40
Natl Inst Med Res	18	12	90,67	46,94	97,70
Mayo Clin Jacksonville	16	14	99,98	43,56	94,70
Max Delbruck Ctr Mol Med	16	13	99,69	34,38	85,00
Cold Spring Harbor Lab	12	10	98,14	56,33	98,20

For each institution the merit index q_n is obtained taking *W* as the total set of papers published in the World in Neuroscience in 1998 (21876 papers) and their citations received until 2007. For the h-index the value q_n is computed analytically and for the mean citation each q_n is approximated using the non-parametric approach described in the paper with 10,000 random samples. The figures have been rounded up to three decimal places.

Table 5

Economics. Papers published in 1998 and their citations until 2007

		H-index		Mean Citation	
(1)	(2)	(3)	(4)	(5)	(6)
Institution	***Articles***	***h-index***	***Percentile (q_n)***	***Mean Citation***	***Percentile (q_n)***
Chicago Univ	77	27	100,00	45,90	100.00
Berkeley Univ	70	17	99,82	20,27	99.80
Penn Univ	67	23	100,00	21,70	99.90
Northwestern Univ	65	17	99,92	17,37	99.40
MIT	62	31	100,00	38,73	100.00
Univ Maryland	62	15	98,71	14,21	97.40
Stanford	57	21	100,00	24,12	99.90
Univ Minnesota	42	14	99,87	13,40	94.00
Princeton	36	18	100,00	34,61	100.00
Duke Univ	28	12	99,94	16,46	97.00
Univ Virginia	26	9	92,45	17,85	97.80
Univ Carlos III Madrid	26	7	47,40	5,84	21,09
Boston Univ	22	13	99,99	34,27	99.90
Univ Iowa	22	8	89,53	9,95	72.90
Boston Col	20	10	99,86	9,10	64.50
Univ Oklahoma	18	6	61,28	5,17	17.20
Univ Pompeu Fabra	17	8	98,11	11,88	82.20
Univ Texas Austin	15	9	99,94	17,87	95.90
Insead	14	8	99,65	24,79	98.60
Univ Miami	10	5	87,45	11,50	81.40

For each institution the merit index q_n is obtained taking W as the total set of papers published in the World in Economics in 1998 (7542 papers) and their citations received until 2007. For the h-index the value q_n is computed analytically and for the mean citation each q_n is approximated using the non-parametric approach described in the paper with 10,000 random samples. The figures have been rounded up to three decimal places.

APPENDIX

Columns:

1) Country

2) Number of papers: Number of scientific articles published in 1998.

3) *h*-index: The value of the h-index for the corresponding set of articles.

4) Percentile h: The citation merit, q_h, when the citation impact indicator is the h-index.

5) Mean citation: The mean citation received until year 2007.

6) Percentile Mean: The citation merit, q_m, when the citation impact indicator is the mean citation.

Table 1. Biology & Biochemistry

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	16743	195	100,00	32,74	100,00
JAPAN	5614	110	0,00	20,03	0,00
GERMANY	3845	106	43,81	27,48	99,70
ENGLAND	3681	115	99,92	27,22	99,60
FRANCE	3240	97	10,54	25,71	94,80
CANADA	2074	92	94,85	27,70	97,50
ITALY	1998	71	0,00	17,57	0,00
SPAIN	1274	59	0,00	18,14	0,00
SWEDEN	1201	75	86,12	26,97	98,00
AUSTRALIA	1147	72	66,39	24,13	80,00
NETHERLANDS	1085	74	94,05	27,60	97,50
RUSSIA	962	41	0,00	10,32	0,00
SWITZERLAND	872	79	100,00	31,49	97,80
CHINA	857	32	0,00	7,64	0,00
INDIA	817	34	0,00	8,16	0,00
SOUTH KOREA	710	43	0,00	12,95	0,00
SCOTLAND	698	65	97,45	27,41	98,20
BELGIUM	640	60	79,99	24,10	73,90
POLAND	606	39	0,00	10,42	0,00
DENMARK	600	56	45,11	25,14	88,60
BRAZIL	574	39	0,00	11,48	0,00
ISRAEL	545	57	83,83	23,12	49,90
AUSTRIA	409	44	2,88	21,04	10,30
FINLAND	371	48	68,16	24,64	77,30
TAIWAN	348	34	0,00	14,63	0,00
ARGENTINA	339	29	0,00	12,60	0,00
CZECH REPUBLIC	274	30	0,00	13,83	0,00
NORWAY	273	35	0,33	18,30	0,30
HUNGARY	251	30	0,00	13,98	0,00
MEXICO	241	29	0,00	11,13	0,00
SLOVAKIA	204	19	0,00	7,41	0,00
GREECE	200	25	0,00	12,21	0,00
NEW ZEALAND	190	34	27,20	20,76	15,00
IRELAND	184	30	0,00	76,94	99,50
TURKEY	178	22	0,00	9,92	0,00
WALES	147	31	0,00	21,60	29,40
PORTUGAL	145	28	5,89	16,34	0,20
SOUTH AFRICA	144	25	0,15	16,46	0,20
BULGARIA	135	16	0,00	7,24	0,00
CHILE	114	19	0,00	11,71	0,00

Table 2.Molecular Biology & Genetics

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	9296	263	100,00	53,87	100,00
JAPAN	2216	123	0,54	33,10	0,00
GERMANY	2084	137	96,58	43,50	98,40
ENGLAND	1783	137	99,99	49,74	100,00
FRANCE	1598	117	48,61	41,48	81,50
CANADA	1085	114	99,97	45,93	99,60
ITALY	897	82	0,33	33,16	0,20
NETHERLANDS	587	79	78,21	42,40	81,90
RUSSIA	523	36	0,00	9,53	0,00
SPAIN	520	57	0,00	26,60	0,00
SWITZERLAND	513	84	99,95	54,82	100,00
AUSTRALIA	513	63	0,36	33,78	2,60
SWEDEN	441	65	24,42	42,02	77,10
SCOTLAND	334	70	99,94	52,14	99,30
BELGIUM	310	56	34,78	37,49	30,10
ISRAEL	295	62	97,32	44,13	84,50
BRAZIL	257	29	0,00	13,26	0,00
DENMARK	208	50	83,20	39,98	56,30
INDIA	199	25	0,00	12,73	0,00
FINLAND	199	50	90,45	46,21	89,60
AUSTRIA	175	46	83,48	43,02	74,80
CHINA	145	29	0,00	21,21	0,00
ARGENTINA	141	20	0,00	10,66	0,00
SOUTH KOREA	131	25	0,00	16,89	0,00
POLAND	131	26	0,00	19,96	0,00
NORWAY	125	36	46,91	34,27	22,60
TAIWAN	118	26	0,01	25,55	0,20
MEXICO	91	23	0,07	19,03	0,00
HUNGARY	85	22	0,07	23,35	0,10
CZECH REPUBLIC	79	24	3,77	24,89	1,50
WALES	68	25	36,77	33,57	25,90
NEW ZEALAND	65	24	31,20	25,05	2,10
GREECE	60	22	18,20	28,97	12,60
SOUTH AFRICA	56	16	0,02	18,36	0,10
TURKEY	53	19	5,88	22,64	1,20
CHILE	45	16	1,57	16,96	0,10
SINGAPORE	44	21	72,17	61,73	95,90
PORTUGAL	44	19	33,89	30,64	21,70
SLOVAKIA	39	14	0,76	14,90	0,00
IRELAND	35	20	93,39	33,57	34,90

Table 3. Pharmacology & Toxicology

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	3493	88	100,00	19	100,00
JAPAN	1803	51	0,00	12	0,00
GERMANY	1171	55	93,95	14	57,90
ENGLAND	908	55	99,96	19	100,00
FRANCE	805	49	94,62	15	87,60
ITALY	668	42	28,90	14	29,40
CANADA	456	40	85,53	15	76,10
SPAIN	328	34	59,99	14	36,80
NETHERLANDS	317	35	81,74	16	96,90
SOUTH KOREA	299	27	0,33	11	0,30
SWEDEN	297	39	99,94	20	100,00
AUSTRALIA	296	31	27,86	15	68,90
CHINA	293	19	0,00	6	0,00
INDIA	248	21	0,00	9	0,00
SWITZERLAND	221	41	100,00	25	100,00
BRAZIL	196	26	25,83	13	34,50
POLAND	184	19	0,00	9	0,00
TAIWAN	178	21	0,35	10	0,40
BELGIUM	177	23	5,61	13	23,90
TURKEY	153	17	0,00	9	0,00
FINLAND	138	23	42,63	15	73,20
SCOTLAND	133	31	99,99	21	100,00
DENMARK	122	26	97,40	19	99,60
HUNGARY	110	19	13,08	10	1,20
AUSTRIA	89	22	93,87	14	45,40
EGYPT	88	13	0,01	7	0,00
MEXICO	74	14	1,41	12	16,60
NEW ZEALAND	70	24	99,99	23	100,00
ARGENTINA	69	14	3,30	12	17,50
NORWAY	63	15	22,66	12	16,50
CZECH REPUBLIC	60	12	0,68	7	0,00
ISRAEL	59	22	99,98	22	99,80
GREECE	55	14	23,26	14	44,20
SOUTH AFRICA	44	14	61,98	13,25	41,60
BULGARIA	41	8	0,01	5	0,00
SAUDI ARABIA	40	11	10,55	8,3	1,00
NIGERIA	39	7	0,00	4	0,00
IRELAND	37	15	95,57	18	90,00
SINGAPORE	37	10	5,35	6	0,00
THAILAND	37	12	41,94	12	23,70

Table 4. Immunology

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	4543	136	100,00	35,34	100,00
JAPAN	932	63	0,00	24,44	0,00
ENGLAND	926	78	94,91	31,49	94,70
GERMANY	817	74	87,64	32,50	97,30
FRANCE	716	71	88,58	29,86	68,10
ITALY	490	61	76,33	28,50	39,60
CANADA	439	62	97,63	31,60	88,30
SWEDEN	416	45	0,00	22,53	0,00
NETHERLANDS	408	53	27,75	26,91	14,10
AUSTRALIA	347	54	85,42	33,28	95,80
SWITZERLAND	320	61	100,00	41,74	100,00
SPAIN	244	39	1,54	22,00	0,00
BELGIUM	169	40	83,29	30,19	66,30
DENMARK	148	32	6,22	21,47	0,40
ISRAEL	140	33	24,19	27,49	33,90
SCOTLAND	130	33	42,52	25,12	12,00
FINLAND	122	30	13,33	25,91	21,80
AUSTRIA	121	31	27,58	23,09	3,80
BRAZIL	116	29	11,15	21,66	1,50
NORWAY	107	27	5,47	21,82	1,80
INDIA	84	17	0,00	11,17	0,00
CHINA	76	21	0,86	18,36	0,30
SOUTH KOREA	69	18	0,03	14,65	0,00
ARGENTINA	65	16	0,00	16,15	0,00
POLAND	51	15	0,05	13,06	0,00
MEXICO	50	21	59,10	23,30	16,10
GREECE	48	20	47,71	23,46	16,70
TAIWAN	47	16	1,39	18,66	1,50
THAILAND	45	20	62,93	25,16	29,30
IRELAND	44	21	84,14	37,77	91,60
HUNGARY	42	17	17,33	24,02	23,60
RUSSIA	39	14	1,03	18,77	3,00
SOUTH AFRICA	39	19	73,13	26,46	39,00
CZECH REPUBLIC	34	15	19,23	16,59	1,50
NEW ZEALAND	33	16	45,21	25,55	34,80
WALES	26	13	27,23	22,88	24,10
KENYA	26	18	99,36	37,00	86,40
TURKEY	23	9	0,40	12,78	0,20
CUBA	21	11	22,30	23,57	27,00
PORTUGAL	20	13	81,09	20,35	14,00

Table 5. Clinical Medicine

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	56463	284	100,00	24,71	100,00
JAPAN	14699	124	0,00	14,49	0,00
GERMANY	13822	144	16,68	16,74	0,00
ENGLAND	13243	162	99,99	22,22	100,00
FRANCE	9556	140	99,45	17,76	37,60
ITALY	7471	140	100,00	21,12	100,00
CANADA	6297	143	100,00	26,05	100,00
NETHERLANDS	4789	123	100,00	25,52	100,00
SPAIN	4093	91	1,54	14,97	0,00
AUSTRALIA	4081	107	99,53	21,88	100,00
SWEDEN	4030	114	100,00	24,90	100,00
SWITZERLAND	3080	105	100,00	23,82	100,00
BELGIUM	2470	94	99,98	21,92	99,70
AUSTRIA	2100	73	8,44	16,84	11,40
SCOTLAND	2016	90	100,00	24,97	100,00
ISRAEL	1961	71	7,55	17,48	33,90
FINLAND	1946	92	100,00	27,27	100,00
DENMARK	1841	86	99,99	24,75	100,00
CHINA	1833	57	0,00	14,12	0,00
TAIWAN	1616	52	0,00	12,47	0,00
TURKEY	1582	34	0,00	7,36	0,00
INDIA	1410	38	0,00	9,57	0,00
BRAZIL	1300	51	0,00	13,30	0,00
NORWAY	1187	71	99,76	23,73	99,80
RUSSIA	1141	32	0,00	3,85	0,00
GREECE	1037	49	0,00	14,09	0,00
SOUTH KOREA	1001	47	0,00	14,09	0,00
NEW ZEALAND	712	53	77,20	25,77	99,90
SOUTH AFRICA	694	40	0,00	14,67	0,60
WALES	629	55	99,69	23,68	99,20
POLAND	614	36	0,00	12,93	0,00
SAUDI ARABIA	605	26	0,00	5,71	0,00
IRELAND	575	47	47,37	18,25	65,50
ARGENTINA	563	39	0,07	14,93	2,00
MEXICO	485	35	0,00	13,29	0,10
NORTH IRELAND	384	44	94,16	28,26	99,70
HUNGARY	384	36	5,40	16,42	24,10
SINGAPORE	333	33	2,50	16,52	28,80
CHILE	323	32	1,80	22,50	95,00
CZECH REPUBLIC	290	30	0,06	13,78	1,50

Table 6. Microbiology

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	3926	113	100,00	30,92	100,00
GERMANY	1274	75	99,53	26,04	100,00
JAPAN	1165	51	0,00	16,64	0,00
ENGLAND	1009	67	91,74	25,15	98,90
FRANCE	975	65	83,24	24,27	94,90
SPAIN	489	44	0,56	19,06	0,10
CANADA	472	52	92,33	23,11	66,20
AUSTRALIA	422	45	17,84	20,88	14,70
ITALY	410	40	0,11	16,63	0,00
NETHERLANDS	378	50	98,41	27,38	99,20
RUSSIA	360	28	0,00	6,93	0,00
SWITZERLAND	268	52	100,00	39,16	100,00
SCOTLAND	258	42	89,15	23,49	74,10
SOUTH KOREA	250	23	0,00	9,23	0,00
SWEDEN	249	41	85,12	24,11	80,10
BELGIUM	220	41	96,90	26,87	96,60
BRAZIL	217	26	0,00	12,78	0,00
DENMARK	195	37	82,46	24,71	83,90
INDIA	172	18	0,00	10,01	0,00
MEXICO	109	22	0,23	15,49	0,10
ISRAEL	109	27	41,86	23,33	66,20
FINLAND	98	34	99,99	29,62	96,50
TAIWAN	96	19	0,01	13,24	0,00
CZECH REPUBLIC	93	18	0,00	11,10	0,00
AUSTRIA	90	26	67,70	23,29	63,10
ARGENTINA	85	20	1,00	14,80	0,20
CHINA	79	22	20,38	17,58	7,00
SOUTH AFRICA	72	19	3,08	14,36	0,40
NORWAY	68	26	98,19	24,09	70,00
SLOVAKIA	67	14	0,00	10,69	0,00
POLAND	66	14	0,00	14,50	0,30
NEW ZEALAND	65	20	23,46	17,26	7,50
WALES	63	20	29,35	23,62	66,30
IRELAND	57	25	99,54	29,42	93,30
HUNGARY	56	16	1,65	13,00	0,10
THAILAND	41	14	5,29	15,56	5,20
SINGAPORE	37	16	56,48	15,86	5,20
NORTH IRELAND	33	16	78,15	25,94	79,10
PORTUGAL	33	12	4,47	16,06	9,10
EGYPT	32	7	0,00	8,22	0,00

Table 7. Neuroscience & Behavior

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	9548	181	100,00	34,79	100,00
JAPAN	2291	76	0,00	19,61	0,00
GERMANY	2155	94	30,72	27,56	89,10
ENGLAND	1821	109	100,00	33,81	100,00
FRANCE	1474	81	14,40	24,56	1,70
CANADA	1388	89	98,63	29,45	99,50
ITALY	1320	66	0,00	20,51	0,00
SWEDEN	675	63	55,84	27,83	82,80
SPAIN	626	48	0,00	19,60	0,00
NETHERLANDS	620	59	27,74	24,95	13,80
AUSTRALIA	525	49	0,12	23,27	2,20
SWITZERLAND	486	57	73,71	31,43	99,30
BRAZIL	301	30	0,00	11,71	0,00
ISRAEL	298	46	60,93	25,99	41,50
SCOTLAND	282	46	75,24	27,90	74,80
BELGIUM	260	41	23,25	22,18	2,30
FINLAND	247	44	80,71	29,15	85,70
AUSTRIA	225	44	93,60	29,17	85,20
DENMARK	214	40	61,09	25,87	42,70
INDIA	196	21	0,00	8,05	0,00
RUSSIA	192	26	0,00	11,99	0,00
POLAND	188	22	0,00	11,31	0,00
CHINA	185	32	1,25	18,32	0,00
HUNGARY	170	33	11,90	22,10	4,30
SOUTH KOREA	134	30	17,05	20,95	2,70
TAIWAN	129	26	0,44	16,18	0,00
NORWAY	112	34	97,67	34,53	97,50
MEXICO	106	23	0,24	14,50	0,00
ARGENTINA	98	22	0,23	17,73	0,10
NEW ZEALAND	87	27	66,26	21,46	8,80
WALES	84	29	94,23	29,01	75,90
TURKEY	77	19	0,16	13,79	0,00
CZECH REPUBLIC	58	19	11,34	19,43	6,60
IRELAND	55	21	57,30	25,42	44,70
UKRAINE	54	10	0,00	4,44	0,00
GREECE	49	15	0,57	16,29	0,70
CHILE	48	17	11,17	27,90	63,00
PORTUGAL	47	16	4,50	22,70	26,10
BULGARIA	36	14	8,27	14,42	0,60
NORTH IRELAND	33	15	38,59	17,33	4,80

Table 8. Psychiatry & Psychology

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	9881	130	100,00	18,07	100,00
ENGLAND	1754	77	99,98	18,70	100,00
CANADA	1297	66	98,18	17,40	99,40
GERMANY	1184	51	0,05	10,80	0,00
AUSTRALIA	704	49	53,56	15,90	71,50
NETHERLANDS	600	51	97,78	19,99	100,00
FRANCE	476	37	2,66	11,92	0,00
JAPAN	366	23	0,00	6,37	0,00
ISRAEL	294	30	3,91	13,41	8,10
ITALY	278	35	77,90	18,41	96,90
SWEDEN	276	31	17,65	13,23	7,30
SPAIN	232	26	1,41	9,22	0,00
SWITZERLAND	195	28	41,93	15,12	50,50
FINLAND	188	29	68,69	17,98	91,90
SCOTLAND	183	31	93,75	18,68	95,70
BELGIUM	158	29	92,92	16,91	77,90
CHINA	158	23	8,51	12,45	7,90
NEW ZEALAND	151	30	98,58	18,05	89,30
NORWAY	140	22	12,08	10,88	1,80
RUSSIA	128	7	0,00	1,70	0,00
WALES	126	26	91,00	19,88	95,80
SOUTH AFRICA	101	13	0,00	7,97	0,00
IRELAND	99	18	8,66	10,34	1,60
AUSTRIA	98	22	77,34	14,04	33,00
DENMARK	97	22	78,90	14,77	45,40
MEXICO	88	9	0,00	7,27	0,00
CZECH REPUBLIC	58	7	0,00	5,71	0,00
INDIA	56	13	8,33	10,54	5,50
BRAZIL	51	16	78,68	15,04	50,90
GREECE	50	12	7,18	9,70	2,90
NORTH IRELAND	49	11	2,30	9,45	2,80
TAIWAN	43	12	22,12	11,56	16,30
SLOVAKIA	32	3	0,00	1,53	0,00
TURKEY	32	12	70,30	8,94	4,30
SINGAPORE	28	10	43,16	14,79	50,20
POLAND	24	7	4,91	10,08	14,60
PORTUGAL	23	11	90,28	13,30	40,30
SOUTH KOREA	21	10	84,43	11,38	26,00
HUNGARY	19	8	50,69	18,63	76,70
ARGENTINA	18	6	9,37	6,17	1,10

Table 9. Space Science

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	3477	100	100,00	25,88	100,00
GERMANY	1233	70	99,96	21,65	97,90
ENGLAND	1105	70	100,00	25,85	100,00
FRANCE	1030	60	75,83	18,25	72,50
ITALY	772	56	92,80	18,04	67,20
RUSSIA	721	35	0,00	8,08	0,00
JAPAN	649	44	1,73	14,41	0,50
SPAIN	427	38	6,11	15,75	12,80
NETHERLANDS	364	47	99,95	21,32	92,70
CANADA	346	48	100,00	24,49	96,00
AUSTRALIA	317	45	99,97	22,20	93,80
INDIA	219	22	0,00	8,67	0,00
CHINA	208	26	0,97	10,68	0,00
BRAZIL	174	28	41,53	15,17	18,10
POLAND	164	29	73,23	15,84	32,00
MEXICO	159	24	4,26	16,93	48,10
SWEDEN	154	30	92,53	20,29	85,20
SCOTLAND	148	28	76,86	17,28	54,30
SWITZERLAND	145	33	99,89	25,66	96,70
DENMARK	124	34	100,00	27,15	98,00
BELGIUM	120	23	28,18	16,13	37,50
FINLAND	120	25	66,07	16,66	46,10
CHILE	117	30	99,85	23,04	93,70
UKRAINE	111	17	0,03	10,56	0,10
AUSTRIA	99	18	1,38	10,83	0,40
ISRAEL	85	22	78,89	22,05	90,40
SOUTH AFRICA	85	23	90,30	18,54	70,30
ARGENTINA	80	21	72,06	17,64	61,40
CZECH REPUBLIC	77	16	2,42	11,34	2,00
NORWAY	67	21	93,27	19,30	75,40
GREECE	60	16	25,15	14,03	21,80
NORTH IRELAND	60	15	10,58	11,90	6,90
HUNGARY	52	17	72,91	13,98	23,80
SOUTH KOREA	48	14	24,88	12,79	14,40
WALES	46	18	96,08	17,50	59,90
BULGARIA	38	8	0,03	4,74	0,00
IRELAND	34	15	93,28	17,09	58,20
NEW ZEALAND	33	12	44,98	13,79	26,90
PORTUGAL	24	11	73,86	15,54	46,20
SERBIA & MONTENEGRO	23	7	3,01	5,43	0,10

Table 10. Physics

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	18267	173	100,00	19,52	100,00
JAPAN	9600	99	5,40	11,96	36,40
GERMANY	9598	114	99,90	15,54	100,00
RUSSIA	8116	75	0,00	7,49	0,00
FRANCE	6056	97	99,00	15,10	100,00
ENGLAND	4890	90	99,30	14,68	100,00
CHINA	4294	59	0,00	7,80	0,00
ITALY	4086	81	87,70	14,40	100,00
INDIA	2239	45	0,00	8,40	0,00
SPAIN	2089	67	98,40	15,15	100,00
SWITZERLAND	2028	81	100,00	21,96	100,00
SOUTH KOREA	1911	51	0,00	9,77	0,00
CANADA	1895	61	76,40	14,98	99,90
POLAND	1794	52	0,90	12,12	59,30
NETHERLANDS	1504	61	99,30	14,60	99,60
BRAZIL	1481	46	0,00	9,42	0,00
AUSTRALIA	1373	49	6,80	11,69	35,00
ISRAEL	1330	56	94,90	15,19	99,60
SWEDEN	1250	52	68,10	15,72	99,70
UKRAINE	1250	29	0,00	4,97	0,00
TAIWAN	1160	39	0,00	7,74	0,00
BELGIUM	933	48	82,80	14,01	95,10
AUSTRIA	751	47	98,00	16,00	99,00
DENMARK	746	55	100,00	19,58	99,90
MEXICO	692	29	0,00	7,65	0,00
CZECH REPUBLIC	599	32	0,20	9,26	0,20
SCOTLAND	597	42	94,60	18,47	99,90
FINLAND	558	38	65,80	16,64	98,80
GREECE	546	35	22,70	12,75	75,30
ARGENTINA	526	34	0,00	10,53	8,40
HUNGARY	483	36	67,70	12,41	64,90
ROMANIA	394	29	6,20	9,56	1,50
BELARUS	340	21	0,00	5,84	0,00
PORTUGAL	296	25	3,70	10,36	12,10
TURKEY	296	23	0,20	9,09	1,20
SLOVAKIA	293	27	22,70	10,82	26,80
BULGARIA	280	24	2,60	9,84	5,50
SINGAPORE	278	27	32,80	9,75	6,60
NORWAY	248	29	87,40	12,29	60,30
SOUTH AFRICA	217	23	16,3	10,89	30,80

Table 11. Chemistry

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	18791	154	100,00	21,55	100,00
JAPAN	10925	98	8,98	13,87	68,30
GERMANY	9382	103	97,96	15,83	99,70
FRANCE	6251	82	4,61	15,44	98,00
RUSSIA	5407	48	0,00	4,68	0,00
ENGLAND	5266	93	100,00	17,69	99,90
CHINA	4520	63	0,00	9,27	0,00
INDIA	3612	52	0,00	8,11	0,00
SPAIN	3327	65	0,61	14,83	94,20
ITALY	3318	71	51,16	15,50	95,70
CANADA	2598	73	99,78	21,35	100,00
POLAND	2060	43	0,00	8,73	0,00
SOUTH KOREA	2021	47	0,00	9,61	0,00
NETHERLANDS	1647	67	100,00	25,93	100,00
SWITZERLAND	1542	64	99,96	21,73	100,00
AUSTRALIA	1539	56	56,45	15,25	95,30
SWEDEN	1289	60	99,89	19,57	98,40
TAIWAN	1204	41	0,00	10,86	0,00
BELGIUM	1038	54	98,47	15,71	97,50
BRAZIL	959	37	0,00	10,80	0,00
CZECH REPUBLIC	889	34	0,00	8,85	0,00
UKRAINE	859	27	0,00	4,95	0,00
HUNGARY	787	39	0,41	11,30	0,20
ISRAEL	723	50	99,82	16,64	98,90
AUSTRIA	664	43	68,47	15,26	92,50
DENMARK	655	51	100,00	20,59	99,20
SCOTLAND	649	40	21,62	13,64	54,50
EGYPT	585	19	0,00	5,34	0,00
ROMANIA	577	25	0,00	5,02	0,00
TURKEY	535	31	0,00	8,68	0,00
SLOVAKIA	533	26	0,00	6,16	0,00
ARGENTINA	530	31	0,01	9,50	0,00
GREECE	491	41	93,45	14,02	66,10
FINLAND	475	37	44,67	14,39	73,80
PORTUGAL	429	28	0,00	11,41	1,30
MEXICO	427	28	0,00	10,08	0,00
NORWAY	392	34	38,27	13,65	54,50
BULGARIA	360	25	0,00	9,02	0,00
NEW ZEALAND	323	32	48,10	14,91	84,20
SINGAPORE	304	37	99,49	16,62	96,60

Table 12. Mathematics

Country	Number of papers	h-index	Percentile	Mean citation	Percentile mean
USA	5782	58	100,00	6,97	100,00
FRANCE	1927	35	72,42	5,83	99,90
GERMANY	1718	32	42,08	5,59	96,90
CHINA	1124	26	10,17	4,55	1,70
RUSSIA	1103	20	0,00	2,47	0,00
JAPAN	1039	26	20,65	4,32	0,10
ENGLAND	949	30	97,11	7,61	100,00
CANADA	943	32	99,90	6,26	100,00
ITALY	883	28	88,27	5,60	90,50
SPAIN	728	23	21,82	4,99	36,90
AUSTRALIA	569	22	44,72	5,46	78,90
ISRAEL	433	23	96,04	6,51	99,40
POLAND	375	15	0,42	3,79	0,10
INDIA	349	15	1,14	2,95	0,00
NETHERLANDS	326	18	49,44	5,78	89,10
SOUTH KOREA	281	15	10,52	4,21	4,20
HUNGARY	242	14	9,53	3,44	0,00
SWEDEN	240	16	54,73	5,38	70,00
BRAZIL	232	15	34,15	4,46	13,80
BELGIUM	217	20	99,81	6,58	97,60
TAIWAN	216	18	95,75	5,86	87,40
SWITZERLAND	182	21	100,00	8,47	100,00
SCOTLAND	181	20	99,98	7,57	99,70
UKRAINE	175	11	0,83	3,83	2,00
GREECE	159	13	34,58	4,39	15,30
AUSTRIA	149	14	75,34	6,24	91,20
CZECH REPUBLIC	140	14	82,14	4,68	32,30
DENMARK	120	14	93,13	6,45	92,80
ROMANIA	115	13	80,08	4,28	16,70
NEW ZEALAND	114	13	80,96	5,32	62,30
FINLAND	110	15	99,28	7,47	98,20
MEXICO	109	11	32,32	4,12	14,20
SINGAPORE	100	14	98,32	8,35	99,40
SOUTH AFRICA	96	8	0,76	3,19	1,00
NORWAY	94	14	99,02	7,61	98,30
BELARUS	91	6	0,00	1,43	0,00
BULGARIA	88	12	85,74	4,81	42,00
SERBIA & MONTENEGRO	85	7	0,20	2,27	0,00
PORTUGAL	77	11	78,59	5,64	72,70
TURKEY	75	8	6,89	3,44	3,70

Table 13. Computer Science

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	4630	69	100,00	10,03	100,00
GERMANY	1063	31	30,56	6,09	68,90
JAPAN	972	26	0,41	4,18	0,00
ENGLAND	925	32	79,45	6,21	70,50
FRANCE	674	27	55,55	6,07	66,20
ITALY	655	24	11,15	6,29	76,10
CANADA	496	22	20,70	5,60	44,30
TAIWAN	418	19	4,30	4,43	2,70
AUSTRALIA	402	22	59,86	5,98	60,40
CHINA	372	22	73,39	6,20	73,80
SOUTH KOREA	362	16	0,22	4,11	1,20
NETHERLANDS	344	19	23,24	6,02	65,30
SPAIN	292	14	0,07	4,16	1,80
ISRAEL	280	22	97,27	9,57	94,80
RUSSIA	211	11	0,01	1,64	0,00
SWITZERLAND	202	18	86,90	6,67	79,10
INDIA	197	12	0,33	3,49	0,30
SWEDEN	185	15	35,92	6,38	72,00
GREECE	170	14	25,08	4,20	7,30
BELGIUM	169	19	99,14	6,84	84,60
SINGAPORE	152	15	67,65	5,83	57,80
FINLAND	146	15	73,23	7,04	84,00
SCOTLAND	138	14	57,55	5,99	66,10
DENMARK	116	14	80,74	7,68	92,20
AUSTRIA	115	14	81,63	6,03	63,30
POLAND	108	9	0,89	3,86	6,40
BRAZIL	93	12	65,84	6,44	76,50
TURKEY	92	10	16,86	4,22	14,00
HUNGARY	64	10	63,97	5,06	44,50
PORTUGAL	59	7	5,14	3,59	9,90
NEW ZEALAND	57	10	77,37	8,54	91,80
IRELAND	53	7	10,49	3,85	15,40
WALES	51	13	99,89	8,02	87,90
ROMANIA	49	7	16,20	2,88	3,30
NORWAY	46	7	21,91	4,70	38,70
CZECH REPUBLIC	37	8	75,04	9,30	92,70
SOUTH AFRICA	35	4	0,50	2,31	1,60
ARGENTINA	29	5	14,97	3,34	15,70
SAUDI ARABIA	29	5	14,97	3,17	12,40
SLOVENIA	28	7	77,85	3,64	21,80

Table 14. Engineering

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	17258	100	100,00	8,33	100,00
JAPAN	6096	47	0,00	5,45	3,10
ENGLAND	4032	51	89,33	7,08	100,00
GERMANY	3840	52	97,94	7,29	100,00
FRANCE	2933	44	55,44	7,30	100,00
CHINA	2849	34	0,00	4,86	0,00
CANADA	2477	46	98,60	7,29	100,00
ITALY	2345	43	87,03	7,08	100,00
RUSSIA	2269	31	0,00	3,21	0,00
TAIWAN	1882	31	0,01	5,58	31,20
SOUTH KOREA	1593	28	0,00	4,93	0,20
INDIA	1553	28	0,00	4,27	0,00
AUSTRALIA	1264	35	85,23	7,26	99,90
SPAIN	1135	33	72,24	7,15	99,80
NETHERLANDS	1088	33	79,72	8,04	100,00
SWEDEN	766	31	95,53	8,20	100,00
SWITZERLAND	748	37	100,00	9,68	100,00
POLAND	691	27	54,03	5,44	26,10
SINGAPORE	660	22	0,46	5,87	64,00
ISRAEL	630	30	98,60	8,26	100,00
BELGIUM	623	33	99,99	9,37	100,00
SCOTLAND	610	24	17,29	5,54	35,90
GREECE	585	23	9,01	5,40	27,10
BRAZIL	521	25	67,01	5,73	51,90
UKRAINE	464	13	0,00	1,83	0,00
TURKEY	442	21	14,47	5,59	46,20
FINLAND	397	23	74,14	7,31	97,60
AUSTRIA	344	25	99,22	8,27	99,80
DENMARK	344	27	99,97	9,54	100,00
SAUDI ARABIA	291	16	1,13	4,24	0,80
EGYPT	268	15	0,45	4,89	11,10
PORTUGAL	259	19	60,83	6,01	66,90
NORWAY	255	19	63,50	6,36	83,00
HUNGARY	249	19	67,44	7,87	98,70
CZECH REPUBLIC	231	20	91,42	6,84	90,40
MEXICO	226	14	0,66	4,32	1,90
WALES	222	19	83,08	7,43	96,70
SOUTH AFRICA	192	15	15,27	4,84	14,80
NEW ZEALAND	188	16	40,77	6,22	73,30
ROMANIA	187	12	0,10	3,90	0,30

Table 15. Materials Science

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	6973	96	100,00	12,35	100,00
JAPAN	4207	62	91,11	8,67	99,10
GERMANY	3308	54	36,31	8,53	95,40
CHINA	2194	41	0,04	6,10	0,00
FRANCE	2127	50	86,90	9,48	100,00
ENGLAND	1830	48	88,41	9,80	100,00
RUSSIA	1782	24	0,00	2,64	0,00
SOUTH KOREA	1046	32	0,63	7,58	14,80
INDIA	1043	27	0,00	5,95	0,00
CANADA	962	43	99,93	10,12	100,00
ITALY	849	34	41,18	8,63	86,20
SPAIN	728	32	42,71	8,50	75,70
UKRAINE	722	14	0,00	1,84	0,00
SWEDEN	618	31	57,80	8,86	89,10
AUSTRALIA	580	30	50,94	8,82	89,00
TAIWAN	555	27	9,91	8,49	75,00
POLAND	538	19	0,00	4,81	0,00
NETHERLANDS	429	36	100,00	11,85	100,00
SWITZERLAND	392	29	95,45	12,71	100,00
BELGIUM	331	28	97,86	9,88	97,30
BRAZIL	272	22	39,31	7,76	41,30
AUSTRIA	260	22	48,28	7,08	17,70
CZECH REPUBLIC	248	21	35,10	7,43	29,30
ISRAEL	236	27	99,91	12,95	100,00
FINLAND	235	22	67,60	7,94	50,50
SINGAPORE	234	24	94,32	9,50	93,10
MEXICO	183	18	25,83	7,28	27,60
EGYPT	181	13	0,00	4,31	0,00
PORTUGAL	179	24	99,75	11,90	99,60
SCOTLAND	171	22	97,36	9,25	83,90
DENMARK	162	20	86,23	10,07	92,60
HUNGARY	158	17	27,59	7,17	25,70
GREECE	142	15	8,30	6,61	12,30
BULGARIA	142	14	2,05	5,57	1,00
TURKEY	141	14	2,23	6,85	19,40
SLOVAKIA	122	11	0,03	3,52	0,00
ROMANIA	117	13	3,27	4,62	0,10
WALES	117	13	3,27	6,32	10,60
ARGENTINA	107	14	22,86	7,05	24,80
BELARUS	107	10	0,02	3,15	0,00

Table 16. Geosciences

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	6508	109	100,00	21,01	100,00
FRANCE	1655	63	92,92	17,09	99,90
ENGLAND	1626	64	97,81	19,09	100,00
CANADA	1412	62	98,83	16,36	99,00
GERMANY	1368	65	99,99	19,46	100,00
RUSSIA	1359	40	0,00	5,71	0,00
JAPAN	940	45	1,56	14,65	59,30
AUSTRALIA	886	58	100,00	20,38	100,00
ITALY	612	39	2,84	14,26	47,60
INDIA	478	26	0,00	6,69	0,00
CHINA	476	37	14,12	12,36	2,30
NETHERLANDS	416	41	95,80	18,40	99,50
SPAIN	404	35	14,15	13,97	37,40
SWITZERLAND	371	40	97,35	18,75	99,50
SWEDEN	316	38	97,79	18,74	99,00
SCOTLAND	310	40	99,87	18,61	99,10
NORWAY	300	35	79,77	15,82	85,60
NEW ZEALAND	226	32	85,35	15,99	84,70
DENMARK	221	34	98,40	20,32	99,20
SOUTH AFRICA	180	28	66,12	13,35	31,60
BELGIUM	166	27	63,42	15,67	78,80
BRAZIL	160	25	30,67	17,15	90,60
GREECE	138	22	9,01	11,57	6,30
ISRAEL	123	21	10,60	12,98	24,40
FINLAND	118	22	32,16	15,36	69,80
WALES	112	24	82,59	17,42	90,60
MEXICO	111	15	0,00	12,85	25,30
AUSTRIA	109	22	48,68	15,98	78,70
TAIWAN	101	17	0,75	10,60	3,60
CZECH REPUBLIC	101	17	0,75	9,18	0,40
TURKEY	97	16	0,25	9,81	0,80
POLAND	96	19	16,04	13,23	33,70
SOUTH KOREA	95	17	1,82	11,25	6,90
ARGENTINA	95	17	1,82	10,02	1,00
UKRAINE	68	8	0,00	3,65	0,00
ESTONIA	53	10	0,02	6,02	0,00
HUNGARY	52	17	83,21	17,46	84,20
MOROCCO	48	11	0,94	6,08	0,10
SLOVAKIA	46	9	0,02	6,26	0,00
PORTUGAL	45	14	45,81	12,76	37,70

Table 17. Environment & Ecology

Country	Number of papers	h-index	Percentile	Mean citation	Percentile mean
USA	6070	103	100,00	18,97	100,00
CANADA	1330	56	73,32	16,82	95,80
ENGLAND	1307	63	99,99	19,08	100,00
GERMANY	1045	55	97,29	15,90	71,70
FRANCE	715	51	99,55	18,75	99,70
AUSTRALIA	699	50	98,89	19,93	100,00
JAPAN	618	36	0,01	12,79	0,10
NETHERLANDS	577	50	99,98	19,39	99,90
SPAIN	554	40	22,67	15,15	36,80
SWEDEN	524	43	86,22	18,03	98,10
ITALY	428	37	27,90	14,72	26,40
INDIA	346	24	0,00	7,86	0,00
DENMARK	337	39	97,75	21,11	100,00
FINLAND	309	39	99,42	18,06	94,00
SCOTLAND	291	35	81,73	23,30	100,00
CHINA	286	29	2,24	13,47	6,20
NORWAY	265	37	99,20	17,63	90,70
SWITZERLAND	254	43	100,00	25,66	100,00
NEW ZEALAND	252	31	43,11	14,30	21,10
BRAZIL	206	28	31,93	15,72	58,70
BELGIUM	204	27	17,39	14,40	26,70
RUSSIA	198	19	0,00	6,79	0,00
TAIWAN	177	23	0,95	12,26	2,10
SOUTH AFRICA	166	24	8,36	12,27	3,10
ISRAEL	158	27	70,78	15,66	56,00
MEXICO	147	25	43,53	14,77	36,80
ARGENTINA	136	23	21,37	13,68	19,10
GREECE	131	19	0,16	9,92	0,10
AUSTRIA	128	24	54,02	15,52	53,10
SOUTH KOREA	125	20	1,95	10,32	0,00
POLAND	105	18	1,14	11,43	1,80
TURKEY	97	19	10,75	12,27	7,50
WALES	86	23	95,12	18,83	90,50
CHILE	79	15	0,44	9,90	0,20
PORTUGAL	73	20	79,56	15,58	58,40
CZECH REPUBLIC	67	17	31,43	13,66	26,40
EGYPT	52	9	0,00	7,98	0,10
SLOVAKIA	50	8	0,00	5,40	0,00
NIGERIA	46	9	0,00	5,54	0,00
HUNGARY	46	11	0,74	13,52	29,00

Table 18. Agricultural Sciences

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	3339	62	99,99	11,96	100,00
GERMANY	1036	36	21,73	8,16	0,80
JAPAN	874	34	15,36	7,66	0,00
FRANCE	758	37	96,09	11,04	100,00
ENGLAND	714	41	100,00	14,16	100,00
INDIA	689	16	0,00	2,89	0,00
SPAIN	679	33	45,69	11,54	100,00
CANADA	634	35	95,06	12,12	100,00
AUSTRALIA	606	33	71,82	10,30	95,90
ITALY	504	32	84,69	10,85	98,70
NETHERLANDS	411	38	100,00	15,66	100,00
BRAZIL	343	19	0,00	4,15	0,00
NEW ZEALAND	257	25	79,51	10,67	94,30
DENMARK	251	33	100,00	17,01	100,00
SCOTLAND	206	28	99,97	14,74	100,00
RUSSIA	197	13	0,00	4,22	0,00
SWEDEN	175	24	98,55	12,73	99,80
FINLAND	172	27	99,99	17,90	100,00
BELGIUM	163	25	99,87	12,73	99,50
IRELAND	153	25	99,95	15,13	100,00
SWITZERLAND	149	23	98,92	12,79	99,40
ARGENTINA	136	20	78,48	9,43	59,90
HUNGARY	134	10	0,00	3,93	0,00
CZECH REPUBLIC	124	11	0,00	3,86	0,00
MEXICO	123	19	74,45	9,32	56,60
POLAND	116	14	1,14	9,03	47,10
CHINA	110	18	71,57	10,84	88,30
NIGERIA	107	10	0,00	3,23	0,00
GREECE	107	18	75,66	10,67	85,40
AUSTRIA	96	16	47,78	8,71	37,70
TURKEY	96	16	47,78	8,80	40,30
EGYPT	96	13	1,83	5,57	0,10
TAIWAN	90	18	92,78	12,52	97,10
PORTUGAL	89	18	93,42	12,42	96,70
ISRAEL	86	19	98,74	11,94	94,00
NORWAY	81	17	90,36	12,72	97,10
SOUTH KOREA	67	16	93,30	12,25	94,30
WALES	53	13	69,98	10,94	80,40
SOUTH AFRICA	53	10	5,98	7,79	23,70
KENYA	49	6	0,00	3,61	0,00

Table 19. Plant & Animal Science

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	13270	99	100,00	13,01	100,00
JAPAN	3252	55	11,86	9,86	0,70
GERMANY	3116	62	99,08	11,41	100,00
ENGLAND	2780	71	100,00	15,42	100,00
CANADA	2681	57	90,34	12,79	100,00
FRANCE	2500	61	99,98	12,43	100,00
AUSTRALIA	2160	51	54,80	12,05	100,00
INDIA	1650	23	0,00	3,19	0,00
SPAIN	1591	45	25,53	11,29	97,70
NETHERLANDS	1159	53	100,00	15,96	100,00
ITALY	994	37	5,45	10,35	38,60
BRAZIL	974	27	0,00	6,48	0,00
SCOTLAND	953	45	99,69	14,35	100,00
SWEDEN	839	44	99,89	14,09	100,00
NEW ZEALAND	747	37	60,80	11,84	98,50
CHINA	745	30	0,01	7,12	0,00
BELGIUM	731	36	46,03	11,39	93,50
SOUTH AFRICA	670	27	0,00	6,80	0,00
SWITZERLAND	624	42	99,99	14,18	100,00
DENMARK	623	43	100,00	14,50	100,00
POLAND	594	21	0,00	5,37	0,00
RUSSIA	575	22	0,00	4,40	0,00
NORWAY	530	37	98,96	14,28	100,00
ISRAEL	521	37	99,20	13,28	100,00
MEXICO	517	27	0,12	8,05	0,00
FINLAND	468	34	94,72	11,79	95,60
ARGENTINA	431	24	0,01	8,01	0,00
CZECH REPUBLIC	368	24	0,33	7,71	0,00
AUSTRIA	355	29	65,93	10,48	51,90
TAIWAN	314	27	48,53	9,77	20,20
HUNGARY	279	22	1,08	7,55	0,00
WALES	252	32	99,99	14,52	99,90
SOUTH KOREA	247	25	56,40	10,18	40,60
GREECE	212	17	0,00	7,83	0,40
TURKEY	206	15	0,00	4,61	0,00
PORTUGAL	194	25	91,92	12,95	97,30
EGYPT	180	13	0,00	4,88	0,00
VENEZUELA	171	11	0,00	3,12	0,00
IRELAND	167	22	67,59	10,20	41,70
SLOVAKIA	142	11	0,00	3,42	0,00

Table20. Economics & Business

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	5566	98	100,00	13,42	100,00
ENGLAND	1256	48	63,40	10,69	100,00
CANADA	613	33	11,21	9,79	94,90
FRANCE	394	26	3,43	7,26	11,30
NETHERLANDS	388	29	43,02	9,55	89,20
GERMANY	372	21	0,00	5,95	0,20
AUSTRALIA	371	22	0,01	6,09	0,40
ITALY	182	22	63,36	10,24	91,00
SPAIN	180	16	0,20	6,81	14,20
CHINA	166	23	91,06	12,69	98,70
SWEDEN	164	20	46,00	9,74	83,30
JAPAN	157	15	0,28	6,24	5,50
ISRAEL	155	19	36,47	10,56	92,40
SCOTLAND	143	18	30,47	7,96	44,90
BELGIUM	138	20	76,74	10,88	92,20
DENMARK	109	16	34,77	8,28	52,70
SWITZERLAND	98	16	53,59	7,79	42,60
NORWAY	90	15	45,87	8,47	58,90
SOUTH KOREA	89	17	86,03	11,60	92,30
NEW ZEALAND	87	11	0,77	5,77	7,70
WALES	81	13	20,49	7,42	36,40
FINLAND	79	12	9,40	7,24	34,70
TAIWAN	62	11	17,28	8,53	57,70
AUSTRIA	62	10	5,21	6,60	25,50
SLOVAKIA	55	3	0,00	0,65	0,00
GREECE	55	9	3,58	4,11	1,10
RUSSIA	54	4	0,00	1,17	0,00
SINGAPORE	53	12	63,30	9,40	71,50
INDIA	53	9	4,95	5,85	15,70
CZECH REPUBLIC	53	3	0,00	0,43	0,00
IRELAND	44	7	0,80	5,39	12,20
ARGENTINA	42	7	1,30	2,79	0,20
SOUTH AFRICA	41	6	0,14	2,27	0,00
TURKEY	31	8	37,14	6,03	27,90
BRAZIL	30	5	0,38	2,53	0,20
MEXICO	25	7	36,98	5,88	27,10
NORTH IRELAND	22	5	5,69	3,77	7,10
CHILE	21	8	84,47	15,29	93,30
PORTUGAL	18	6	47,41	6,67	42,30
HUNGARY	18	6	47,41	4,56	18,00

Table 21. Social Sciences, General

Country	Number of papers	h-index	Percentile h	Mean citation	Percentile mean
USA	15948	83	100,00	8,07	100,00
ENGLAND	3084	43	1,69	7,02	99,30
CANADA	1507	37	43,14	6,81	92,00
AUSTRALIA	1185	30	0,72	6,18	34,30
GERMANY	707	20	0,00	3,35	0,00
NETHERLANDS	596	33	99,90	9,23	100,00
FRANCE	416	16	0,00	3,81	0,00
SCOTLAND	394	22	22,26	7,28	92,10
SWEDEN	358	23	61,54	8,79	99,80
ISRAEL	341	18	0,50	6,26	48,90
CHINA	261	17	3,15	5,03	3,80
JAPAN	255	17	4,07	5,06	3,40
RUSSIA	246	10	0,00	2,59	0,00
WALES	229	20	74,04	7,91	96,70
ITALY	224	18	32,24	6,05	40,10
FINLAND	206	21	95,66	9,07	99,20
NEW ZEALAND	204	16	9,06	5,14	7,80
NORWAY	178	20	96,02	8,75	98,40
BRAZIL	177	11	0,00	3,42	0,00
SPAIN	156	15	22,42	6,42	57,40
BELGIUM	155	15	23,28	5,41	19,40
SWITZERLAND	154	16	47,68	5,25	13,70
INDIA	137	11	0,11	5,01	10,60
SOUTH AFRICA	135	12	1,27	5,92	39,70
DENMARK	130	13	9,22	7,07	78,40
AUSTRIA	110	11	1,99	3,26	0,00
MEXICO	98	11	5,94	4,85	8,60
NORTH IRELAND	94	10	1,62	4,19	1,40
CZECH REPUBLIC	93	5	0,00	0,92	0,00
IRELAND	83	13	69,75	5,90	42,00
SINGAPORE	82	13	71,36	6,51	60,60
CROATIA	79	7	0,00	5,77	37,40
TAIWAN	75	15	98,57	7,49	78,60
SOUTH KOREA	67	12	73,91	5,79	40,80
GREECE	57	11	70,90	5,14	24,90
TURKEY	56	8	4,90	5,34	29,10
NIGERIA	45	7	4,66	3,09	0,60
POLAND	43	6	0,85	2,70	0,20
HUNGARY	38	6	2,64	4,68	20,20
THAILAND	33	7	27,74	12,33	97,80