Influential Mathematicians: Birth, Education, and Affiliation

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There is currently a surge of interest in comparing research impact and performance to produce league tables. These may be done at various levels, ranking countries, universities, departments, programs, journals, or even individual scientists, and they are typically based on certain simple bibliometric measures, such as impact factors, the *h*-index, and so forth.

This interest is not purely academic: these rankings have caught the attention of policy makers and have caused serious concern especially within European policy making due to the apparent lagging performance of Europe as compared with the United States. This has been documented by several indicators and reports commissioned by the European Union (see, e.g., [8], [5], [6]) but perhaps is best exemplified by the French president's public declaring as an aim (in January 2008) the amelioration of the position of French universities in the international rankings. If rankings can affect educational policy at such a high level, it is natural to revisit the question of how accurately they represent the truth, research quality being so difficult to quantify—which is especially true in the field of mathematics.

Criticisms focus on the appropriateness of different measures, their sensitivity/robustness, and their interpretability (see, e.g., [1], [8], [4]). For a detailed critical review of such indices, see [7].

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Quantitative analyses based on a wide spectrum of indices indicate a clear advantage of U.S. institutions as compared with institutions in Europe and the rest of the world. However, a different aspect that has not received attention is the static character of several of the indices employed, which fail to capture the "liquidity" of the modern academic landscape, in which high mobility of scientists is the rule rather than the exception. The measures used to quantify research performance are mostly static: even though research output is the result of a process that extends in time as well as in space, indices often take into account only the current affiliation when assigning influential research to institutions. This is manifested as a sort of Markovian property: the past is irrelevant given the present. But aside from the most recent affiliations of the scientists considered, is it reasonable to ignore the movement of scientists at various stages of their careers?

To take an example from the field of mathematics: should the credit of the achievements of Jong-Shi Pang, a highly cited mathematician (http://www.iese.uiuc.edu/research/faculty/pang.html), be attributed to a country or institution? Jong-Shi Pang was born in Vietnam, obtained his first degree at the National University of Taiwan, completed his Ph.D. at Stanford University, and has been affiliated with the University of Texas at Dallas, Carnegie Mellon University, the University of Wisconsin-Madison, Johns Hopkins University, and the Rensselaer Polytechnic Institute before moving to the University of Illinois at Urbana-Champaign in 2007. Although his present affiliation obviously deserves a lot of the credit stemming from his high citations, should we not take into account the fact that the scientist has been "nurtured" and "grown scientifically" in many places?

The purpose of this article is to attempt a first probe of the "movement effect" to see how this might influence a concrete question, such as the comparison between the United States and Europe

in the field of mathematics. We focus on highly cited mathematicians, since citations are often taken as a strong indicator of research impact, and track their countries of birth, education, and current affiliation.

In general, comparable data on researchers' movement between Europe, Asia, or Africa and the United States are incomplete. A database on highly cited researchers (HCRs) is compiled by the Institute of Scientific Information (ISI) covering twenty-one disciplines and 6,103 researchers.[1] These data are freely available from Thomson Scientific (`http://hcr3.isiknowledge.com/`) and cover the time period between 1981 and 1999.

With regard to mathematics, the Thomson database lists 343 highly cited mathematicians from 152 institutions. While the Thomson database may provide the list of HCRs and their present affiliations, we had to conduct a personalized case-by-case search in order to obtain data on the countries in which they obtained their first degrees, and their Ph.D.'s, as well as their birthplaces, either by searching through their webpages or by contacting them directly.

Table A3 summarizes the data on HCRs in the field of mathematics according to the countries of their present affiliations. One easily sees that the United States—as in all disciplines—gets the lion's share of HCRs. The United Kingdom and France are far behind the United States, but well ahead of the rest of the countries.

By bringing in the additional background data, we can immediately observe that intercontinental movement is indeed a very common practice. Specifically, based on the data collected, only 46.9 percent of HCRs were born and educated and are working in the same continent, while a significant 42.6 percent of them have completed at least one of their degrees or are working in a continent other than the one they were born in (due to missing information we cannot answer this question for 10.5 percent of HCRs). Our findings are presented in more detail in the following sections.

[1]Table A1 in the Appendix provides information on the numbers of HCRs according to the countries of their present affiliations. A further breakdown by scientific discipline of the numbers of HCRs according to country of present affiliation (United States, Europe, and the rest of the world) is given in Table A4. As one can observe, U.S. institutes dominate the list—in terms of HCRs—in the fields of social sciences (93.1%), economics (86.2%), psychology-psychiatry (86.1%), clinical medicine (75.8%), and computer science (73.9%). On the other hand, European institutions have the highest concentration of HCRs in the field of pharmacology (46.8%). In fact, this is the only instance in which Europe outperforms the United States in terms of HCRs (123 HCRs in comparison to 94 HCRs working in the United States). The highest percentage of HCRs working in non-U.S. and E.U. countries is observed in the agricultural sciences field (26.2%).

The Educational Background of HCRS in the Field of Mathematics

In this section, we examine the geographical breakdown of the numbers of HCRs in the field of mathematics, taking into consideration the countries of their birth and the countries in which their first degrees and their Ph.D. degrees were obtained.

Current Affiliations of HCRs

Table 1 presents the percentages of HCRs in the field of mathematics according to their current affiliations. The majority of researchers are working in the United States (68.2 percent), while 22.7 percent work in Europe.[2] Only 9 percent work in countries outside the United States and Europe. (Countries with more than one HCR outside the United States and Europe are Israel, Australia, Canada, Japan, and China). The percentages in the mathematics discipline are quite analogous to the percentages of all twenty-one disciplines (see Table A2).

		FREQ	(%)
Valid	US	234	68.2
	Europe	78	22.7
	Israel	8	2.3
	Australia	6	1.7
	Canada	6	1.7
	Japan	5	1.5
	China/Taiwan	3	0.9
	India	1	0.3
	Singapore	1	0.3
	Turkey	1	0.3
TOTAL		343	100.0

Table 1. Frequencies and percentages of HCRs according to the country of present affiliation.

Evidently, when looking only at current affiliations, the United States most emphatically dominates Europe, which in turn is well ahead of the rest of the world. Will this pattern persist when bringing in more background information?

Ph.D. Studies of HCRs

When focusing on the countries in which HCRs completed their Ph.D. education, the United States maintains an advantage over Europe and the rest of the world, but not nearly as strong as when compared with respect to current affiliations of the HCRs (Table 2). In particular, 57.7 percent of HCRs in mathematics have acquired their Ph.D. degrees in U.S. universities, 32.1 percent in Europe, and 8.5 percent in the rest of the world: the difference between the United States and Europe drops by approximately twenty percentage points.

		FREQ	(%)
Valid	US	198	57.7
	Europe	110	32.1
	Israel	7	2.0
	Canada	6	1.7
	Russia	5	1.5
	Japan	5	1.5
	India	2	0.6
	Australia	2	0.6
	Argentina	1	0.3
	South Africa	1	0.3
	Total	337	98.3
Missing		6	1.7
TOTAL		343	100.0

Table 2. Frequencies and percentages of HCRs according to the country in which Ph.D. studies were completed.

The distribution provided in Table 3 reveals that a stunning one in three HCRs who completed their doctorates in Europe are now affiliated with U.S. institutions. Even more extreme is the situation when looking at HCRs with Ph.D.'s from outside the United States or Europe, one in two of whom have eventually settled in the United States. The above findings outline an

[2]*The majority of European institutions with HCRs are based in E.U. countries. Three HCRs are working in Switzerland. In some places we use the term EU with this in mind.*

			Country of Present Affiliation of the HCRs			TOTAL
			US	EU	Rest of the world	
Country in which the Ph.D. Degree of the HCRs was obtained	US	Count	180	6	12	198
		%	90.9%	3.0%	6.1%	100.0%
	EU	Count	37	65	8	110
		%	33.6%	59.1%	7.3%	100.0%
	Rest of the world	Count	16	2	11	29
		%	55.2%	6.9%	37.9%	100.0%
TOTAL		Count	233	73	31	337
		%	69.1%	21.7%	9.2%	100.0%

Table 3. Contingency table between country of present affiliation of HCRs and country of Ph.D. degree.

overflow of outstanding mathematicians to the United States (a phenomenon known as "the brain drain"), which is confirmed to be a significant factor contributing to the global dominance of U.S. institutions.

The opposite type of movement is very rare, since only 3 percent and 6.1 percent of those who have completed their Ph.D. studies in the United States have moved to Europe and to non-European countries, respectively. In particular, the percentage of "E.U. doctors" moving to the United States is over ten times higher than the percentage of "U.S. doctors" moving to Europe: it seems that Europe is failing not only to retain its top talent but is also failing to attract top talent (a more detailed contingency table (A6) is presented in the Appendix).

BSc Studies of HCRs

		FREQ	(%)
Valid	EU	114	33.2
	US	112	32.7
	China/Taiwan	18	5.2
	Canada	14	4.1
	Australia	11	3.2
	India	9	2.6
	Russia	7	2.0
	Israel	6	1.7
	Hong Kong	4	1.2
	Japan	4	1.2
	South Africa	4	1.2
	rest of the world (*)	10	2.9
	Total	313	91.3
Missing		30	8.7
TOTAL		343	100.0

Table 4. Frequencies and percentages of HCRs according to the country in which first degree completed.

(*) 1 HCR for each of Argentina, Peru, Egypt, Brazil, Mexico, New Zealand, Venezuela, Algeria, Turkey, and Chile.

Examination of the countries in which the HCRs in mathematics earned their first degrees reveals further interesting facts (Table 4). Only 32.7 percent of the HCRs completed their B.Sc. degree studies in the United States, while 33.2 percent completed their first degrees in Europe, and a quite significant number (25.4 percent) have completed their B.Sc. studies in countries outside the United States and Europe. The distribution of HCRs between the three different "regions" seems close to uniform at this stage. As we go further into the background of the HCRs, the distribution of HCRs among countries becomes more and more diffuse. This could be an indication that "promising" undergraduate mathematics students are found equally in Europe and in the United States and also in other countries outside the United States and Europe.

			Country in which the B.Sc. Degree of the HCRs was obtained			TOTAL
			US	EU	Rest of the world	
Country of Present Affiliation of the HCRs	US	Count	107	50	61	218
		%	49.1%	22.9%	28.0%	100.0%
	EU	Count	3	62	2	67
		%	4.5%	92.5%	3.0%	100.0%
	Rest of the world	Count	2	2	24	28
		%	7.1%	7.1%	85.7%	100.0%
TOTAL		Count	112	114	87	313
		%	35.8%	36.4%	27.8%	100.0%

Table 5. Contingency table between country of present affiliation of HCRs and country in which first degree completed.

		FREQ	(%)
Valid	EU	129	37.6
	US	108	31.5
	China/Taiwan	19	5.5
	Canada	11	3.2
	Australia	11	3.2
	Israel	9	2.6
	India	9	2.6
	Russia	8	2.3
	Japan	5	1.5
	Hong Kong	4	1.2
	South Africa	3	0.9
	Argentina	2	0.6
	New Zealand	2	0.6
	rest of the world (*)	12	3.5
	Total	332	96.8
Missing		11	3.2
TOTAL		343	100.0

Table 6. Frequencies and percentages of HCRs according to the country of birth.

(*) 1 HCR for each of Peru, Egypt, Brazil, Mexico, Venezuela, Algeria, Turkey, Chile, Tunisia, Vietnam, Pakistan, and Republic of Congo.

Table 5 provides a contingency table between the country in which the first degree was completed and the country of present affiliation and allows more detailed comparisons.

The results indicate a significant transfer of mathematics researchers to the United States from the rest of the world when the first degree is taken into account (from a total of 218 HCRs affiliated with U.S. institutions, 50 and 61, respectively, have acquired their first degrees in Europe and the rest of the world). Notice how diffuse the distribution of HCRs affiliated with U.S. institutions is with respect to the countries of their alma maters: only one in two were undergraduates in U.S. universities. The contrast with Europe is stark, as its respective distribution is acutely concentrated: nine out of ten HCRs affiliated with European institutions also received their bachelor's degrees from within Europe.

A more detailed version of the contingency table is presented in the Appendix (Table A5). The majority of highly cited researchers affiliated with U.S. institutions with B.Sc. studies outside the United States and Europe are coming from China,

Canada, and India (sixteen, eleven and seven, respectively). On the other hand, only five HCRs are affiliated with European institutions, having acquired their B.Sc. degrees outside European countries (three HCRs working in Europe obtained their first degrees in the United States; however, only one of them was born in the United States).

Birthplace of HCRs

Finally, we focus on the data regarding the birthplaces of the HCRs (Table 6), which show that the majority of HCRs were born in Europe (37.6 percent), while 31.5 percent came from the United States, and the remaining 27.7 percent were born in countries in other parts of the world.

In Table 7, a classification of the HCRs with respect to the countries of current affiliation and the countries of birth is presented. The results are quite similar to the previous results. It is obvious that for the HCRs currently working in the United States, less than half were native born (46.5 percent), while the vast majority of researchers working in Europe or the rest of the world are native-born citizens (94.7 percent and 83.3 percent, respectively). We also see that the movement from Europe to the United States (23.9 percent) heavily outnumbers the opposite movement (1.3 percent). A more detailed breakdown of the percentages is given in Table A7 in the Appendix. As observed, the majority of HCRs affiliated with U.S. institutions and born outside the United States and Europe come from China (7.5 percent), followed by Canada (4 percent). Although the status of a scientist as being highly cited is influenced by his or her whole career, if we are to accept that these scientists have achieved a potential they had all along, it is clear that the United States is doing best in harnessing this potential.

Generally, the majority of HCRs working in U.S. universities and institutions were born elsewhere (121 out of 226 researchers), while exactly the opposite holds true for the rest of the world, where the vast majority of researchers are native-born citizens (see Figure 1).

In relation to the movement of HCRs in the early stages of their lives, we observe from Table 8 that moving between the United States, Europe, and the rest of the world is minimal. Indeed, the vast majority of HCRs complete their B.Sc. studies in their native countries (96 percent, 91.5 percent and 90 percent, for the United States, Europe, and the rest of the world, respectively). Still, though, the number of HCRs who left Europe (and the rest of the world) in order to study for an undergraduate degree is larger than the number of those who leave the United States to go abroad for the same reason.

Finally, Table 9 relates the countries of undergraduate and Ph.D. studies of the highly cited mathematicians. As we observe, almost all of the researchers who obtained their B.Sc. degrees in the United States continued their studies there (99.1 percent). In contrast, a highly significant number of European researchers (20.2 percent) left Europe to continue their Ph.D. studies in the United States, while the majority of the researchers from other countries (59.8 percent) continued their Ph.D. studies in the United States. In total, of the 186 HC researchers who acquired their Ph.D.'s in the United States, 75 came from European universities and from the rest of the world. A further breakdown can be found in Table A8 of the Appendix. By inspection of Table A8, it becomes evident that a significant percentage of the HCRs who completed their Ph.D. studies in the United States had done their undergraduate studies elsewhere, in particular in Europe (12.4 percent), China (9.7 percent), Canada (4.8 percent), India (3.8 percent) and Hong Kong (2.2 percent). It is worth observing that none of the HCRs who did their undergraduate studies in Europe or the United States chose to go to another continent for their Ph.D. studies.

			Country of Birth of the HCRs			TOTAL
			US	EU	Rest of the world	
Country of Present Affiliation of the HCRs	US	Count	105	54	67	226
		%	46.5%	23.9%	29.6%	100.0%
	EU	Count	1	72	3	76
		%	1.3%	94.7%	3.9%	100.0%
	Rest of the world	Count	2	3	25	30
		%	6.7%	10.0%	83.3%	100.0%
TOTAL		Count	108	125	95	332
		%	32.5%	38.9%	28.6%	100.0%

Table 7. Contingency table between the country of present affiliation and the country of birth of HCRs.

			Country in which the B.Sc. Degree of the HCRs was obtained			TOTAL
			US	EU	Rest of the world	
Country of Birth of the HCRs	US	Count	96	3	1	100
		%	96.0%	3.0%	1.0%	100.0%
	EU	Count	7	107	3	117
		%	6.0%	91.5%	2.6%	100.0%
	Rest of the world	Count	6	3	81	90
		%	6.7%	3.3%	90.0%	100.0%
TOTAL		Count	109	113	85	307
		%	35.5%	36.8%	27.7%	100.0%

Table 8. Contingency table between the country of birth of the HCRs and the country where the first degree of the HCRs was completed.

			Country in which the Ph.D. Degree of the HCRs was obtained			TOTAL
			US	EU	Rest of the world	
Country in which the B.Sc. Degree of the HCRs was obtained	US	Count	111	1	0	112
		%	99.1%	0.9%	0.0%	100.0%
	EU	Count	23	91	0	114
		%	20.2%	79.8%	0.0%	100.0%
	Rest of the world	Count	52	9	26	87
		%	59.8%	10.3%	29.9%	100.0%
TOTAL		Count	186	101	26	313
		%	59.4%	32.3%	8.3%	100.0%

Table 9. Contingency table between the country of B.S. degree and the country of Ph.D. degree of the HCRs.

HCRs and Top Institutions

We now turn to a more detailed investigation and include the specific university of current affiliation. Table A9 in the Appendix lists the institutions (24 in all) that employ almost half of the HCRs (45.22 percent) in a total number of 161 institutions/universities. It

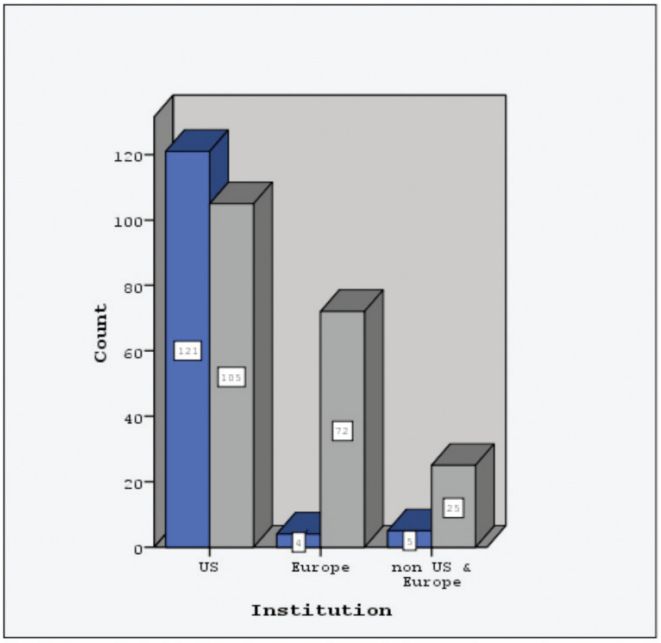

Figure 1. Counts of HCRs for U.S., European, and non-U.S. and European institutions. ***(Blue: non-native-born, gray: native-born.***

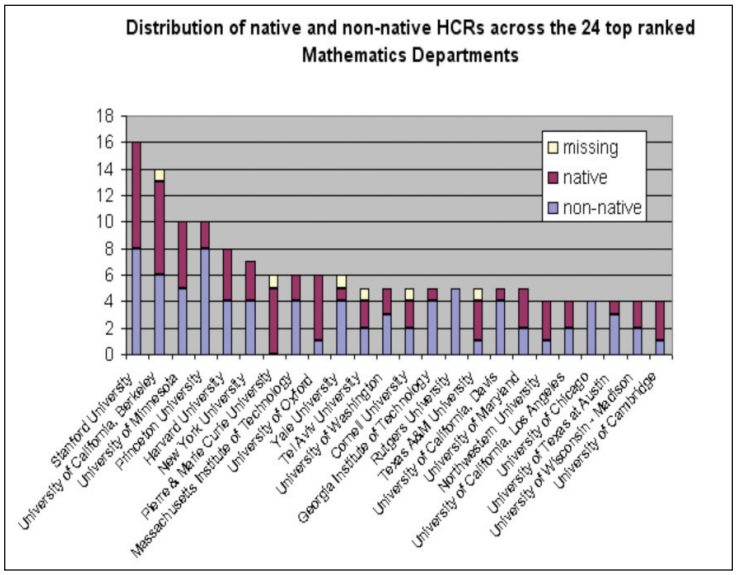

Figure 2. Distribution of native and non-native HCRs across the twenty-four top ranked mathematics departments.

has been reported elsewhere [2] that 30.1 percent of all HCRs in all fields work in the twenty-five top institutions. Our findings indicate a much higher concentration of HCRs in top mathematics institutions than in other scientific fields (one might attempt to attribute this to the fact that hiring a top mathematician is less "expensive" for institutions than hiring an experimental scientist). As one may observe, twenty of the top twenty-four institutions in mathematics ranked from the point of view of HCRs are in the United States, while only three are in Europe (University of Oxford, Pierre and Marie Curie University, and University of Cambridge) and one is located in Israel (Tel Aviv University).

Observing, however, the percentages of native and non-native HCRs in each one of the top universities, it is obvious that for the majority of the U.S. universities their HCRs come mostly from countries outside the United States. For instance, at Princeton University eight out of the ten HCRs come from countries outside the United States, while at Rutgers University, all five of the HCRs were born outside of the United States (see Figure 2).

On the other hand, we observe the exact opposite effect for the three European institutions that complete the table. For example, in Pierre and Marie Curie University and the University of Cambridge, the majority of the HCRs are native-born citizens (five and three, respectively), while for the University of Oxford only one out of five was born elsewhere. One may argue that the top European institutions have difficulties in attracting and retaining non-European-born HCRs.

We conclude with more general observations regarding the affiliations of the HCRs. In Table 11 we present the number of HCRs in mathematics and in all scientific fields in the top-ranking institutions.

The table indicates that the majority of top institutions in overall performance in terms of number of HCRs also have high numbers of HCRs in mathematics. Specifically, sixteen out of the twenty-seven top institutions in all disciplines also appear in the top list of the HCRs in mathematics. Stanford University and the University of California, Berkeley, are well ahead of the rest when we look at the number of HCRs in mathematics (4.66 percent and 4.08 percent of HCRs in the top ranking Institutions, respectively).[3]

To further investigate the impact of HCRs in mathematics on their institutions/universities, we present in Table 10 the proportion of mathematician HCRs to the overall number of highly cited researchers in the institutions. It is evident that the proportion of HCRs in mathematics is higher in institutions that are mainly (or solely) focused on science, such as the Georgia Institute of Technology or the Pierre and Marie Curie University. It is also of interest to note that in Tel Aviv University there are five HCRs in mathematics and twelve HCRs in all departments.

[3]*In cases of ties we have ranked the institution with fewer faculty members higher. Data on the number of faculty members associated with departments of mathematics/statistics have been collected from each department's webpage (data on the number of faculty members of universities has been collected from Wikipedia, The Free Encyclopedia,* `http://en.wikipedia.org`*).*

Conclusions

Research output and impact is currently the focus of a serious debate worldwide. In this article, we focused on the field of mathematics and investigated whether the image that emerges from static indices persists when bringing in more dynamic information through the study of the "trajectories" of highly cited mathematicians: birthplace, country of first degree, country of Ph.D., and current affiliation. While the dominance of the United States remains noticeable, some interesting patterns—that perhaps explain this dominance—emerged.

In particular, the results of the current study verify the widely held belief of a brain drain in mathematics from Europe and the rest of the world to the United States, at least among those mathematicians who have become highly cited. Moreover, it provides evidence supporting the view that this brain drain becomes more acute as the careers of the HCRs evolve. Focusing within this influential group of mathematicians we see that while only 6 percent of Europeans moved to the United States for their undergraduate studies, 20 percent of Europeans with bachelor's degrees did their Ph.D. work in the United States. At the next level, 33.6 percent of European Ph.D.'s were attracted to faculty or research positions in the United States.

The situation is worse for the HCRs born outside the United States and Europe. 59.8 percent of non-Europeans with foreign bachelor's degrees did their Ph.D. work in the United States, while 55.2 percent of non-European foreign Ph.D.'s were attracted to faculty positions in the United States. On the other hand, the retention level of the HCRs in mathematics is high at every level in the United States. The United States has managed to retain 99 percent of their bachelor's degrees for Ph.D. work and 90 percent of their Ph.D.'s as faculty members in U.S. institutions.

These results, combined with other findings in this article, reveal that a significant number of HCRs working in the United States have been scientifically "nurtured" elsewhere. The United States is able to attract some of the best minds in mathematics from all over the world and has found the means and conditions to keep them there.

One could think of a series of causes for this flow of human capital from the European Union and the rest of the world towards the United States. The United States has become the main pole of attraction for highly qualified scientists in general (and HCRs in particular), and various reasons, such as the higher wages offered by the U.S. institutions and the heavy taxes and inflexible labor legislation, combined with the lack of research opportunities and/or lack of research funding in the European Union and the rest of the world, could be accounted as responsible for attracting highly skilled foreign researchers to the United States. As a sign of the demand for immigration of scientists to the United States, it is worth mentioning the change in policy by the U.S. Congress in 2000, that was manifested in the raising of the number of temporary work visas granted to highly skilled foreign professionals to 195,000 annually (from about 115,000).

Rank	Institution of Affiliation (Mathematics/Statistics)	HCRs in math Departs	HCRs in the University	% of HCRs in math Departs	no of students	Country
1	Pierre & Marie Curie University	6	11	54.55%	30.000	France
2	Georgia Institute of Technology	5	12	41.67%	18.747	USA
3	Tel Aviv University	5	12	41.67%	29.000	Israel
4	Texas A&M University	5	22	22.73%	46.540	USA
5	New York University	7	31	22.58%	40.870	USA
6	University of Minnesota	10	47	21.28%	50.402	USA
7	Rutgers University	5	30	16.67%	49.760	USA
8	Princeton University	10	68	14.71%	7.334	USA
9	University of Oxford	6	45	13.33%	19.486	UK
10	University of California, Davis	5	40	12.50%	30.475	USA
11	University of Maryland	5	44	11.36%	36.014	USA
12	Northwestern University	4	40	10.00%	15.129	USA
13	University of Texas at Austin	4	40	10.00%	49.696	USA
14	University of California, Berkeley	14	142	9.86%	34.953	USA
15	Yale University	6	61	9.84%	16.714	USA
16	University of Washington	5	53	9.43%	42.974	USA
17	Cornell University	5	54	9.26%	19.800	USA
18	Stanford University	16	187	8.56%	14.945	USA
19	University of Chicago	4	48	8.33%	14.721	USA
20	Massachusetts Institute of Technology	6	76	7.89%	10.220	USA
21	University of Cambridge	4	52	7.69%	18.396	UK
22	University of Wisconsin - Madison	4	52	7.69%	42.041	USA
23	University of California, Los Angeles	4	59	6.78%	36.611	USA
24	Harvard University	8	187	4.28%	19.139	USA

Table 10. Percentages of HCRs in mathematics at the top institutions.

However, the phenomenon of highly qualified scientists' being attracted by the United States cannot—and should not—be tucked into a narrow economic framework and is not just about salaries. It has to do with broader concepts, such as the prestige and the overall quality of institutions, the opportunities offered by each institution for recognition, and more generally the opportunities for the researchers to use their competencies and expertise.

If Europe wants to compete with the United States, at least in mathematics, it should follow the example of the United States and find ways

Rank	Institution of Affiliation (Mathematics/Statistics)	HCRs	% of HCRs	Country	Institution of Affiliation (All 21 disciplines)	HCRs	% of HCRs	Country	Rank
1	Stanford University	16	4.66%	USA	Harvard University	187	3.06%	USA	1
2	University of California, Berkeley	14	4.08%	USA	Stanford University	142	2.33%	USA	2
3	Princeton University	10	2.92%	USA	National Institutes of Health	136	2.23%	USA	3
4	University of Minnesota	10	2.92%	USA	University of California, Berkeley	87	1.43%	USA	4
5	Harvard University	8	2.33%	USA	Massachusetts Institute of Technology	76	1.25%	USA	6
6	New York University	7	2.04%	USA	Max-Planck-Institute	76	1.25%	Germany	5
7	University of Oxford	6	1.75%	UK	Princeton University	68	1.11%	USA	8
8	Yale University	6	1.75%	USA	University of Michigan	68	1.11%	USA	7
9	Massachusetts Institute of Technology	6	1.75%	USA	University of California, San Diego	66	1.08%	USA	9
10	Pierre & Marie Curie University	6	1.75%	France	University of Pennsylvania	64	1.05%	USA	10
11	Cornell University	5	1.46%	USA	California Institute of Technology	61	1.00%	USA	12
12	University of California, Davis	5	1.46%	USA	Yale University	61	1.00%	USA	11
13	University of Maryland	5	1.46%	USA	University of California, Los Angeles	59	0.97%	USA	13
14	University of Washington	5	1.46%	USA	University of California, San Francisco	54	0.88%	USA	14
15	Georgia Institute of Technology	5	1.46%	USA	Cornell University	54	0.88%	USA	15
16	Rutgers University	5	1.46%	USA	University of Washington	53	0.87%	USA	16
17	Tel Aviv University	5	1.46%	Israel	University of Wisconsin - Madison	52	0.85%	USA	17
18	Texas A&M University	5	1.46%	USA	Columbia University	52	0.85%	USA	18
19	University of Cambridge	4	1.17%	UK	University of Cambridge	51	0.84%	UK	19
20	University of Chicago	4	1.17%	USA	University of Chicago	48	0.79%	USA	20
21	Northwestern University	4	1.17%	USA	University of Minnesota	47	0.77%	USA	21
22	University of Wisconsin - Madison	4	1.17%	USA	University of Oxford	45	0.74%	UK	22
23	University of California, Los Angeles	4	1.17%	USA	University of Maryland	44	0.72%	USA	23
24	University of Texas at Austin	4	1.17%	USA	NASA	43	0.70%	USA	24
					Duke University	41	0.67%	USA	25
					University of California, Davis	40	0.66%	USA	26
					Northwestern University	40	0.66%	USA	27

Table 11: Comparing percentages of HCRs in mathematics and in all 21 disciplines at the top.

not only of retaining its best scientists but also of attracting more from other parts of the world, including the United States. For this to happen, significant changes in research policy are necessary.

There is an opportunity these days for this to happen, as there are already voices in the United States talking about a weakness of the United States in retaining their skilled foreign professionals and terms such as "reverse brain drain" are more frequently used (http://www.businessweek.com/smallbiz/content/aug2007/sb20070821_920025.htm).

Possibilities in this direction could be the development of large research centers (such as CERN in the field of physics) that could attract highly skilled researchers from abroad and at the same time prevent movement of young and promising native-born researchers towards the United States. China, for example, recently launched a large-scale project to transform 100 universities into world-class institutions [3].

There are already examples of similar efforts in Europe, looking to improve the attractiveness of European research institutions. The European Research Council (ERC) established recently and the Starting and Advanced Research Grants awarded are certainly steps in this direction.

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Appendix

Country of present affiliation	Number of HCRs	Percentage of HCRs
United States	4007	65.66%
United Kingdom	464	7.60%
Germany	262	4.29%
Japan	256	4.19%
Canada	185	3.03%
France	163	2.67%
Switzerland	113	1.85%
Australia	109	1.79%
Netherlands	97	1.59%
Italy	81	1.33%
Sweden	62	1.02%
Israel	48	0.79%
Belgium	39	0.64%
Denmark	31	0.51%
Spain	22	0.36%
People's Rep. China	20	0.33%
New Zealand	18	0.29%
Finland	17	0.28%
Austria	13	0.21%
Norway	13	0.21%
India	11	0.18%
Taiwan	9	0.15%
Ireland	8	0.13%
South Africa	7	0.11%
Hungary	6	0.10%
Russia	6	0.10%
Brazil	5	0.08%
Greece	5	0.08%
Chile	4	0.07%
Singapore	4	0.07%
Mexico	3	0.05%
Republic of Korea	3	0.05%
Panama	2	0.03%
Poland	2	0.03%
Algeria	1	0.02%
Hong Kong	1	0.02%
Iran	1	0.02%
Pakistan	1	0.02%
Philippines	1	0.02%
Portugal	1	0.02%
Romania	1	0.02%
Turkey	1	0,02%
TOTAL	6103	100%

Table A1 (left): Numbers of HCRs in all 21 disciplines according to their present affiliation.

Country of present affiliation	Number of HCRs	Percentage of HCRs
United States	4007	65.66%
EU	1400	22.94%
Rest of the world	696	11.40%
TOTAL	6103	100%

Table A2: Numbers of HCRs in all 21 disciplines according to their present affiliation.

Country of present affiliation	Number of HCRs	Percentage of HCRs
United States	234	68.22%
United Kingdom	24	7.00%
France	22	6.41%
Germany	9	2.62%
Israel	8	2.33%
Australia	6	1.75%
Canada	6	1.75%
Japan	5	1.46%
Denmark	4	1.17%
Italy	4	1.17%
Netherlands	4	1.17%
Spain	4	1.17%
Switzerland	3	0.87%
Hungary	2	0.58%
People's Rep. of China	2	0.58%
Belgium	1	0.29%
India	1	0.29%
Singapore	1	0.29%
Sweden	1	0.29%
Taiwan	1	0.29%
Turkey	1	0.29%
TOTAL	343	100,00%

Table A3: Numbers of HCRs in the field of mathematics according to their present affiliation.

Discipline	Country of present affiliation			TOTAL
	US	EU	Rest of the world	
Agricultural Sciences	118	88	73	279
	42.3%	31.5%	26.2%	100.0%
Biology and Biochemistry	141	43	41	225
	62.7%	19.1%	18.2%	100.0%
Chemistry	143	72	35	250
	57.2%	28.8%	14.0%	100.0%
Clinical Medicine	166	41	12	219
	75.8%	18.7%	5.5%	100.0%
Computer Science	241	46	39	326
	73.9%	14.1%	12.0%	100.0%
Ecology-Environment	201	75	36	312
	64.4%	24.0%	11.5%	100.0%
Economics-Business	268	26	17	311
	86.2%	8.4%	5.5%	100.0%
Engineering	142	39	30	211
	67.3%	18.5%	14.2%	100.0%
Geosciences	219	73	24	316
	69.3%	23.1%	7.6%	100.0%
Immunology	209	84	35	328
	63.7%	25.6%	10.7%	100.0%
Materials Science	163	55	55	273
	59.7%	20.1%	20.1%	100.0%
Mathematics	225	78	31	334
	67.4%	23.4%	9.3%	100.0%
Microbiology	215	96	24	335
	64.2%	28.7%	7.2%	100.0%
Molecular Biology and Genetics	215	65	21	301
	71.4%	21.6%	7.0%	100.0%
Neuroscience	190	85	22	297
	64.0%	28.6%	7.4%	100.0%
Pharmacology	94	123	46	263
	35.7%	46.8%	17.5%	100.0%
Physics	160	91	37	288
	55.6%	31.6%	12.8%	100.0%
Plant and Animal Science	148	101	56	305
	48.5%	33.1%	18.4%	100.0%
Psychology-Psychiatry	229	24	13	266
	86.1%	9.0%	4.9%	100.0%
General	296	12	10	318
	93.1%	3.8%	3.1%	100.0%
Space Sciences	224	83	39	346
	64.7%	24.0%	11.3%	100.0%
TOTAL	**4,007**	**1,400**	**696**	**6,103**
	65.7%	**22.9%**	**11.4%**	**100.0%**

Table A4: Distribution of HCRs in all 21 disciplines according to present affiliation and discipline.

		Country in which the B.Sc. Degree was obtained										
		US	EU	India	Canada	Russia	Israel	China-Taiwan	Australia	Japan	Turkey	Argentina
Country of Present Affiliation	US	107 49.1%	50 22.9%	7 3.2%	11 5.0%	4 1.8%	2 0.9%	16 7.3%	5 2.3%	0 0.0%	0 0.0%	1 0.5%
	EU	3 4.5%	62 92.5%	0 0.0%	0 0.0%	2 3.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
	India	0 0.0%	0 0.0%	1 100.0 %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
	Canada	1 16.7%	0 0.0%	1 16.7%	3 50.0%	0 0.0%	0 0.0%	0 0.0%	1 16.7%	0 0.0%	0 0.0%	0 0.0%
	Israel	1 16.7%	0 0.0%	0 0.0%	0 0.0%	1 16.7%	4 66.7%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
	China-Taiwan	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 66.7%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
	Australia	0 0.0%	1 16.7%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	5 83.3%	0 0.0%	0 0.0%	0 0.0%
	Japan	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	4 100.0%	0 0.0%	0 0.0%
	Singapore	0 0.0%	1 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
	Turkey	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%	0 0.0%
TOTAL		112 35.8%	114 36.4%	9 2.9%	14 4.5%	7 2.2%	6 1.9%	18 5.8%	11 3.5%	4 1.3%	1 0.3%	1 0.3%

		Country in which the B.Sc. Degree was obtained										
		Hong Kong	Peru	South Africa	Egypt	Brazil	Mexico	New Zealand	Venezuela	Algeria	Chile	TOTAL
Country of Present Affiliation	US	3 1.4%	1 0.5%	3 1.4%	1 0.5%	1 0.5%	1 0.5%	2 0.9%	1 0.5%	1 0.5%	1 0.5%	218 100.0%
	EU	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	67 100.0%
	India	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%
	Canada	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6 100.0%
	Israel	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6 100.0%
	China-Taiwan	1 33.3%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	3 100.0%
	Australia	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6 100.0%
	Japan	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	4 100.0%
	Singapore	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%
	Turkey	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%
TOTAL		4 1.3%	1 0.3%	3 1.0%	1 0.3%	1 0.3%	1 0.3%	2 0.6%	1 0.3%	1 0.3%	1 0.3%	313 100.0%

Table A5: Contingency table between the country of present affiliation and the country in which first degree completed in mathematics.

		Country of Present Affiliation										
		US	EU	India	Canada	Israel	China-Taiwan	Australia	Japan	Singapore	Turkey	TOTAL
Country in which the Ph.D. Degree was obtained	US	180	6	1	3	3	3	1	0	0	1	198
		90.9%	3.0%	0.5%	1.5%	1.5%	1.5%	0.5%	0.0%	0.0%	0.5%	100.0%
	EU	37	65	0	3	0	0	4	0	1	0	110
		33.6%	59.1%	0.0%	2.7%	0.0%	0.0%	3.6%	0.0%	0.9%	0.0%	100.0%
	India	2	0	0	0	0	0	0	0	0	0	2
		100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Canada	6	0	0	0	0	0	0	0	0	0	6
		100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Russia	2	2	0	0	1	0	0	0	0	0	5
		40.0%	40.0%	0.0%	0.0%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Israel	3	0	0	0	4	0	0	0	0	0	7
		42.9%	0.0%	0.0%	0.0%	57.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Australia	1	0	0	0	0	0	1	0	0	0	2
		50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	100.0%
	Japan	0	0	0	0	0	0	0	5	0	0	5
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	Argentina	1	0	0	0	0	0	0	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	South Africa	1	0	0	0	0	0	0	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
TOTAL		233	73	1	6	8	3	6	5	1	1	337
		69.1%	21.7%	0.3%	1.8%	2.4%	0.9%	1.8%	1.5%	0.3%	0.3%	100.0%

Table A6: Contingency table between the country of present affiliation and the country of Ph.D. degree in the field of mathematics.

		Country of Birth												
		US	EU	India	Canada	Russia	Israel	China-Taiwan	Australia	Japan	Turkey	Argentina	Hong Kong	Peru
Country of Present Affiliation	US	105	54	7	9	5	4	17	5	0	0	2	3	1
		46.5%	23.9%	3.1%	4.0%	2.2%	1.8%	7.5%	2.2%	0.0%	0.0%	0.9%	1.3%	0.4%
	EU	1	72	0	0	2	0	0	0	0	0	0	0	0
		1.3%	94.7%	0.0%	0.0%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	India	0	0	1	0	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Canada	1	1	1	2	0	0	0	1	0	0	0	0	0
		16.7%	16.7%	16.7%	33.3%	0.0%	0.0%	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%
	Israel	1	0	0	0	1	5	0	0	0	0	0	0	0
		14.3%	0.0%	0.0%	0.0%	14.3%	71.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	China-Taiwan	0	0	0	0	0	0	2	0	0	0	0	1	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%
	Australia	0	1	0	0	0	0	0	5	0	0	0	0	0
		0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%	83.3%	0.0%	0.0%	0.0%	0.0%	0.0%
	Japan	0	0	0	0	0	0	0	0	5	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
	Singapore	0	1	0	0	0	0	0	0	0	0	0	0	0
		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Turkey	0	0	0	0	0	0	0	0	0	1	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
TOTAL		108	129	9	11	8	9	19	11	5	1	2	4	1
		32.5%	38.9%	2.7%	3.3%	2.4%	2.7%	5.7%	3.3%	1.5%	0.3%	0.6%	1.2%	0.3%

		Country of Birth												
		South Africa	Egypt	Brazil	Mexico	New Zealand	Venezuela	Algeria	Chile	Tunisia	Vietnam	Pakistan	Rep of Congo	TOTAL
Country of Present Affiliation	US	3	1	1	1	2	1	1	1	1	1	1	0	226
		1.3%	0.4%	0.4%	0.4%	0.9%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.0%	100.0%
	EU	0	0	0	0	0	0	0	0	0	0	0	1	76
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	100.0%
	India	0	0	0	0	0	0	0	0	0	0	0	0	1
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Canada	0	0	0	0	0	0	0	0	0	0	0	0	6
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Israel	0	0	0	0	0	0	0	0	0	0	0	0	7
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	China-Taiwan	0	0	0	0	0	0	0	0	0	0	0	0	3
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Australia	0	0	0	0	0	0	0	0	0	0	0	0	6
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Japan	0	0	0	0	0	0	0	0	0	0	0	0	5
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Singapore	0	0	0	0	0	0	0	0	0	0	0	0	1
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Turkey	0	0	0	0	0	0	0	0	0	0	0	0	1
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
TOTAL		3	1	1	1	2	1	1	1	1	1	1	1	332
		0.9%	0.3%	0.3%	0.3%	0.6%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	100.0%

Table A7: Contingency table between the country of present affiliation and the country of birth in the field of mathematics.

		Country in which the Ph.D. Degree was obtained										
		US	EU	India	Canada	Russia	Israel	Australia	Japan	Argentina	South Africa	TOTAL
Country in which the B.Sc. Degree was obtained	US	111 59.7%	1 1.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	112 35.8%
	EU	23 12.4%	91 90.1%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	114 36.4%
	India	7 3.8%	0 0.0%	2 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	9 2.9%
	Canada	9 4.8%	2 2.0%	0 0.0%	3 60.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	14 4.5%
	Russia	2 1.1%	0 0.0%	0 0.0%	0 0.0%	5 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	7 2.2%
	Israel	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6 1.9%
	China-Taiwan	18 9.7%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	18 5.8%
	Australia	3 1.6%	5 5.0%	0 0.0%	1 20.0%	0 0.0%	0 0.0%	2 100.0%	0 0.0%	0 0.0%	0 0.0%	11 3.5%
	Japan	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	4 100.0%	0 0.0%	0 0.0%	4 1.3%
	Turkey	1 0.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
	Argentina	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%	0 0.0%	1 0.3%
	Hong Kong	4 2.2%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	4 1.3%
	Peru	1 0.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
	South Africa	2 1.1%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%	3 1.0%
	Egypt	0 0.0%	0 0.0%	0 0.0%	1 20.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
	Brazil	1 0.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
	Mexico	1 0.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
	New Zealand	1 0.5%	1 1.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 0.6%
	Venezuela	1 0.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
	Algeria	0 0.0%	1 1.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
	Chile	1 0.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.3%
TOTAL		186 100.0%	101 100.0%	2 100.0%	5 100.0%	5 100.0%	6 100.0%	2 100.0%	4 100.0%	1 100.0%	1 100.0%	313 100.0%

Table A8: Contingency table between the country of B.S. degree and the country of Ph.D. degree in the field of mathematics.

Institution of Affiliation	HCRs	% of HCRs	non-native HCRs	% of non-native HCRs	native HCRs	% of native HCRs	BSs acquired in same country	% of BSs acquired in same country	BSs acquired elsewhere	% of BSs acquired elsewhere	PhDs acquired in same country	% of PhDs acquired in same country	PhDs acquired elsewhere	% of PhDs acquired elsewhere	Country
Stanford University	16	4.66%	8	50.0%	8	50.0%	8	50.0%	8	50.0%	16	100.0%	0	0.0%	USA
University of California. Berkeley (*)	14	4.08%	6	42.9%	7	50.0%	7	50.0%	5	35.7%	11	78.6%	3	21.4%	USA
University of Minnesota	10	2.92%	5	50.0%	5	50.0%	6	60.0%	3	30.0%	8	80.0%	2	20.0%	USA
Princeton University	10	2.92%	8	80.0%	2	20.0%	3	30.0%	7	70.0%	5	50.0%	5	50.0%	USA
Harvard University	8	2.33%	4	50.0%	4	50.0%	4	50.0%	4	50.0%	8	100.0%	0	0.0%	USA
New York University	7	2.04%	4	57.1%	3	42.9%	4	57.1%	3	42.9%	6	85.7%	1	14.3%	USA
Pierre & Marie Curie University (*)	6	1.75%	0	0.0%	5	83.3%	4	66.7%	0	0.0%	3	50.0%	2	33.3%	France
Massachusetts Institute of Technology	6	1.75%	4	66.7%	2	33.3%	1	16.7%	5	83.3%	5	83.3%	1	16.7%	USA
University of Oxford	6	1.75%	1	16.7%	5	83.3%	4	66.7%	2	33.3%	4	66.7%	2	33.3%	UK
Yale University (*)	6	1.75%	4	66.7%	1	16.7%	2	33.3%	3	50.0%	4	66.7%	2	33.3%	USA
Tel Aviv University	5	1.46%	2	40.0%	2	40.0%	2	40.0%	2	40.0%	2	40.0%	3	60.0%	Israel
University of Washington	5	1.46%	3	60.0%	2	40.0%	2	40.0%	3	60.0%	3	60.0%	2	40.0%	USA
Cornell University (*)	5	1.46%	2	40.0%	2	40.0%	1	20.0%	3	60.0%	3	60.0%	2	40.0%	USA
Georgia Institute of Technology	5	1.46%	4	80.0%	1	20.0%	1	20.0%	3	60.0%	3	60.0%	2	40.0%	USA
Rutgers University	5	1.46%	5	100.0%	0	0.0%	0	0.0%	5	100.0%	2	40.0%	3	60.0%	USA
Texas A&M University (*)	5	1.46%	1	20.0%	3	60.0%	4	80.0%	1	20.0%	5	100.0%	0	0.0%	USA
University of California. Davis	5	1.46%	4	80.0%	1	20.0%	1	20.0%	4	80.0%	3	60.0%	2	40.0%	USA
University of Maryland	5	1.46%	2	40.0%	3	60.0%	3	60.0%	2	40.0%	4	80.0%	1	20.0%	USA
Northwestern University	4	1.17%	1	25.0%	3	75.0%	3	75.0%	1	25.0%	4	100.0%	0	0.0%	USA
University of California. Los Angeles	4	1.17%	2	50.0%	2	50.0%	2	50.0%	2	50.0%	3	75.0%	1	25.0%	USA
University of Chicago	4	1.17%	4	100.0%	0	0.0%	2	50.0%	2	50.0%	3	75.0%	1	25.0%	USA
University of Texas at Austin	4	1.17%	3	75.0%	1	25.0%	1	25.0%	3	75.0%	2	50.0%	2	50.0%	USA
University of Wisconsin - Madison	4	1.17%	2	50.0%	2	50.0%	2	50.0%	2	50.0%	3	75.0%	1	25.0%	USA
University of Cambridge	4	1.17%	1	25.0%	3	75.0%	4	100.0%	0	0.0%	2	50.0%	2	50.0%	UK

Table A9: Top institutions in the field of mathematics with reference to HCRs.
(*) One missing value as concerns the birthplace.