

**COMPARING RESEARCH AT NORDIC HIGHER EDUCATION
INSTITUTIONS USING BIBLIOMETRIC INDICATORS
COVERING THE YEARS 1999-2014**

This report is both an update and an extension of two previous reports with the same title: "Comparing Research at Nordic Universities using Bibliometric Indicators" from 2011 and 2014. With the current report's use of more years, more institutions and more subject fields, the figures are not directly comparable to the figures in the former two. Therefore, it should not be seen as an update of the former two reports; rather it replaces these.

The main conclusion of the report is that we find relatively stable differences between the Nordic universities, university colleges and university hospitals. We find different research profiles and specialisations, and we find institutions with different volumes of research activity. By describing these differences, we want to bring attention to dimensions that one-dimensional global university rankings cannot capture.

Some Nordic higher education institutions score on a very high international level with regard to citation impact and shares of highly cited papers, at least in some of the major areas of research, while most Nordic institutions do not, although the majority of them perform above the world average. "World class" research is being conducted at a few Nordic institutions, but not at most of them.

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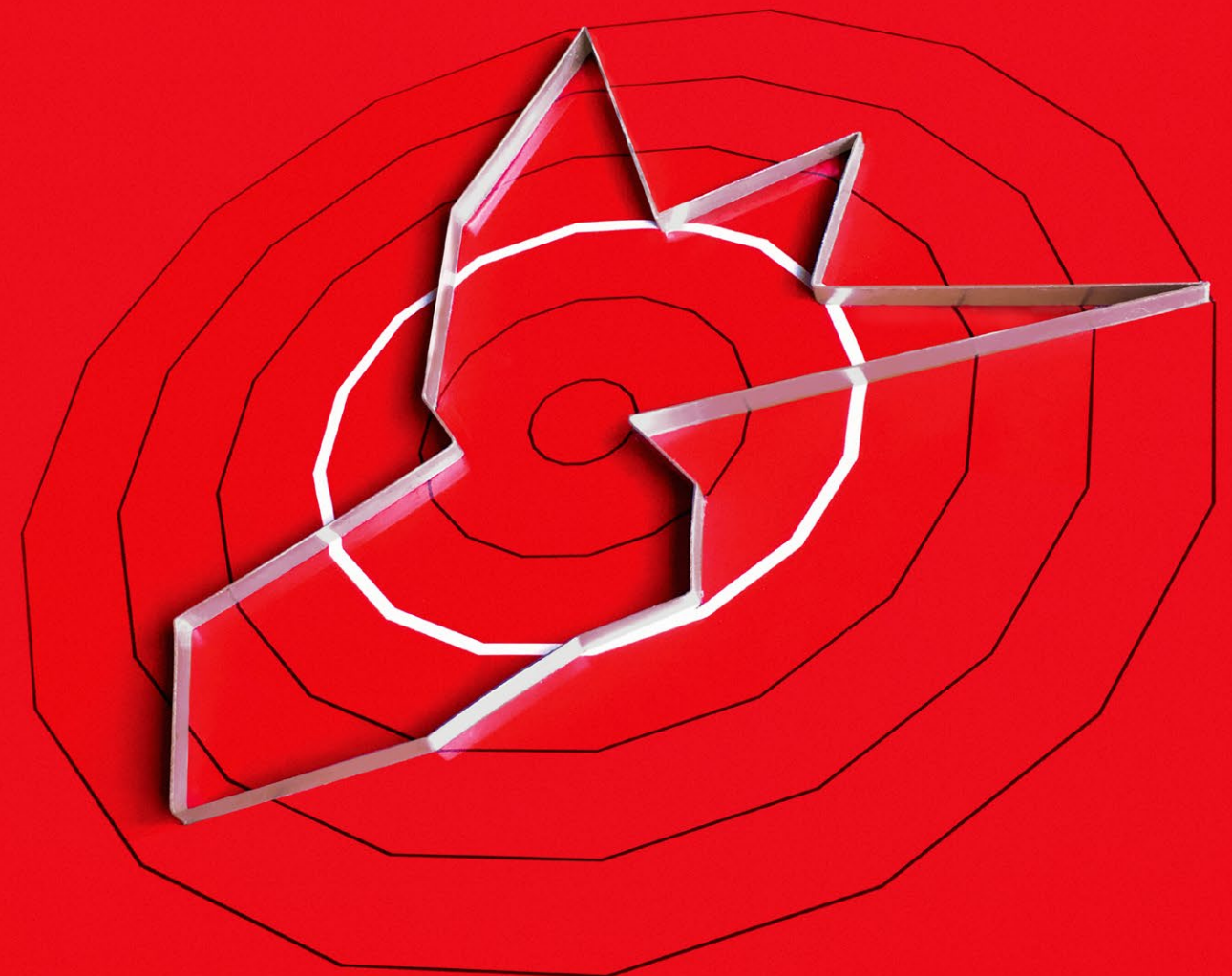


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POLICY PAPER 4/2017



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PREFACE

The present report "Comparing Research at Nordic Higher Education Institutions Using Bibliometric Indicators" is based on the reports from 2011 and 2014, building essentially on the same methodology but adding more information. All the reports use data from Clarivate Analytics and a Nordic network (below) to validate the data, develop the indicators and analyse the results. The discussions in the network have been paramount for the production of this third version and the presentation of data. A main difference between this report and the former two is that it is now far more comprehensive. This report covers more institutions, more years, more indicators and more subject fields. In the former reports, the scientific output of the universities was analysed within nine subject fields. These have now been reclassified into 16 new fields in order to provide more nuanced information. The current report should not be seen as an update of the former two reports; rather it replaces these reports.

NordForsk wishes to thank the following participants for their valuable contribution to the third version of our report on bibliometric indicators at the university level: Henrik Aldberg (Swedish Research Council, responsible for data analysis), Dag W. Aksnes (NIFU, Norway), Staffan Karlsson (Swedish Research Council), Yrjö Leino (CSC – IT Center for Science, Finland), Anu Nuutinen (Academy of Finland), Mette Venås Overballe-Petersen (Danish Agency for Science and Higher Education), Fredrik Niclas Piro (NIFU, Norway, network coordinator and editor of the report), Sigurður Óli Sigurðsson (RANNÍS, Iceland) and Gunnar Sivertsen (NIFU, Norway).

Oslo, June 2017



Gunnel Gustafsson
Director of NordForsk

1. INTRODUCTION

This report aims to demonstrate how state-of-the-art bibliometric indicators can be used at the level of Nordic higher education (*HE*) sector institutions (*HEIs*) to describe their performance in a more nuanced way than in the many international university rankings. In contrast to most such rankings, this report uses transparent methods and describes differences in university research profiles. This report does not use numbers to indicate rankings, but to represent real measurements and give more specific information. We concentrate on providing reliable and recognisable descriptions of similarities and differences in the institutions' activities, profiles, and impacts of research.

Our network hopes to serve the needs of Nordic universities, the central research authorities in each country, as well as organisations for Nordic collaboration at both levels by providing a better understanding of bibliometric indicators. We also hope our report will inspire the development of more meaningful and transparent performance indicators for Nordic universities that can serve as the basis for regular comparisons in the future.

Our analysis is based on data covering the years 1999-2014 from Clarivate Analytics' *Science Citation Index Expanded*, *Arts and Humanities Citation Index* and the *Social Science Citation Index*, which combined correspond largely to *Web of Science*. These data have been processed in a database that is updated and maintained by the Swedish Research Council under a license agreement with the producer of Web of Science, Clarivate Analytics.

The publication database covers a core of about 15,000 international scientific journals, although these are known to be less representative of publication patterns in the Social Sciences and Humanities (SSH)¹. The publications from these fields make up 11 per cent of all the Nordic articles in Web of Science in the period 2011-2014.

In this report, the Nordic HE sectors (including universities, university hospitals and university colleges) are compared across different research profiles, based on publications and citations in the following fields: Agriculture, Fisheries & Forestry; Biology; Biomedicine & Molecular Biosciences; Business Studies & Economics; Chemistry; Clinical Medicine; Computer & Information Sciences; Engineering; Geosciences; Health Sciences; Humanities; Materials Science; Mathematics & Statistics; Physics; Psychology; and Social Sciences .

Only HEIs with research activities above a minimum level in one or more of the fields mentioned are included in this study. In practice, this means that all general, technical and agricultural universities, as well as business schools above a certain size in terms of publication output, are included. All in all, the study covers 172 HEIs.

The methods and indicators used in this report were largely developed in three earlier reports from a bibliometric NORIA-network: "Bibliometric Performance Indicators for the Nordic Countries" (Schneider et al., 2010), "Comparing Research at Nordic Universities using Bibliometric Indicators" (Piro et al., 2011) and "Comparing Research at Nordic Universities using Bibliometric Indicators – Second report, covering the years 2000-2012 (Piro et al., 2014).

¹ See Figure A.1 in Appendix 1 for an estimate of the coverage in the subject fields of the report.

A main task of the last two studies was to enrich the data with standardised institutional affiliations of authors of publications. In the original data from Thomson Reuters used in the former reports, the names of the institutions are only partly standardised and therefore contain errors. Again, for this report, all addresses have been thoroughly checked to ensure that each publication is allocated to the right institution.

Compared to earlier reports, this report covers more years (1999-2014 compared to 2000-2012), analyses a broader set of scientific subject fields (16 subject fields compared to nine) and includes a higher number of institutions. Whilst previous reports focused on a selection of universities and university hospitals, this report presents data on several levels: first, we show results for each of the largest HEIs in each Nordic country, we then show aggregate results for all other HEIs in each country, and finally we show aggregate results for all other institutions (research institutes, public and private sector, non-governmental institutions, etc.). This makes it possible in each country to compare the relative scientific contribution from the HE sector to all other national research contributors and to compare the scientific impact of the research of the HEIs to that of other research performing institutions.

The report from 2014 analysed the Nordic universities and university hospitals over the years 2000-2012, splitting data into three time periods. In this report, data from 1999 and 2013-2014 are also included. As a consequence of this, the results in our previous report have changed because the time intervals are different. Throughout this report, we will not make any comparisons between the current report and the two previous ones, in part because we now have newer data, and in part because our time periods now cover different years.

Like the two previous reports, the current report focuses on characterising the publication activity and research impact of the HEIs and on setting out research profiles for each university, university hospital and university college based on publication activity. All analyses are conducted at both the institutional and subject field levels, and measure the HEIs' performance over four time periods: 1999-2002, 2003-2006, 2007-2010 and 2011-2014. Overall, two types of measures are used in this report: measures of research activity (activity and profile) and measures of research impact. We emphasise that citation-based performance indicators do not provide a clear measure of research quality. While they may reflect important aspects of quality, citations are primarily a formalised account of how the information is used and can thus be taken only as an indicator of the publications' reception at this level (Glänzel & Schoepflin, 1995).

Publications and citations are fractionalised based on each organisation's share of the author addresses in the publication. In some other bibliometric reports, this principle is not applied, and each institution is given full credit for a publication of which it is one of several contributors. This methodological difference has a large impact, as both publication numbers and citation indicators will be significantly lower when fractionalised methods are used (most publications do have authors from more than one institution).

Methods and indicators

The methods and indicators used in this report are described in detail in Appendix 1. In this appendix we also outline some of the methodological considerations behind our choice of data sources, methods and indicators. In summary, our report builds on the following *data material*:

- Data from the Clarivate Analytics indices *Science Citation Index Expanded*, *Social Sciences Citation Index* and *Arts & Humanities Citation Index*.²
- Data from the years 1999-2014 that are divided into four periods: 1999-2002, 2003-2006, 2007-2010 and 2011-2014.
- Covering publications defined by Clarivate Analytics as research articles or reviews.

² Certain data included herein are derived from the Science Citation Index Expanded, Social Science Citation Index and Arts & Humanities Citation Index, prepared by Clarivate Analytics®, Philadelphia, Pennsylvania, USA, © Copyright Clarivate Analytics® 2016. All rights reserved.

- Covering 172 HEIs (73 university colleges, 56 universities, 24 university hospitals, 12 research institutes and seven other HEIs, e.g. academies).
 - Of these institutions, we have split the sample in two. The first group includes those institutions that form the core of the publishing activity in the HE sectors, for which we will show separate results. This includes 74 institutions (45 universities, 17 university hospitals and 12 university colleges). The other HEIs are analysed as one unit titled “Other HES”. This group involves 98 institutions (61 university colleges, 12 research institutes, 11 universities and seven other institutions, e.g. academies). The institutions are listed in Appendix 1.
- The threshold for inclusion in the main analysis is that the HEI had a volume of 150 fractionalised publications in the period 2011-2014.
 - This limit was set to 25 fractionalised publications for Icelandic institutions.
 - We have made a special exception to this for HEIs specialised in Social Sciences, mostly business schools, where the limit was set at 40 fractionalised publications in the period 2011-2014 within one of the three scientific subject fields from Social Sciences and Humanities (Business Studies & Economics; Humanities; Social Sciences).

In conducting the address matching, identifying author addresses 16 years back in time, we often faced the challenge of institutional mergers. Our approach has been to treat all institutions as they were in January 2016.

Methodologically our report is based on:

- Data cleaning techniques (i.e. address matching) developed at the Swedish Research Council.³
- Measures of research activity based on fractionalised publication counts and impact measures based on fractionalised citation indicators. Self-citations are excluded.
- Analyses of 16 main subject fields, based on the 250 journal subject categories used by Clarivate Analytics: *Agriculture, Fisheries & Forestry* (includes 12 subject categories), *Biology* (11 subjects), *Biomedicine & Molecular Biosciences* (24 subjects), *Business Studies & Economics* (4 subjects), *Chemistry* (9 subjects), *Clinical Medicine* (32 subjects), *Computer & Information Sciences* (6 subjects), *Engineering* (27 subjects), *Geosciences* (10 subjects), *Health Sciences* (15 subjects), *Humanities* (31 subjects), *Materials Science* (9 subjects), *Mathematics & Statistics* (5 subjects), *Physics* (15 subjects), *Psychology* (11 subjects), and *Social Sciences* (29 subjects). See Appendix 2 for further details on these groupings.
- Analyses of production statistics for HEIs using a threshold of 150 fractionalised publications in the period 2011-2014 for inclusion (see discussion below).
- Analyses of citation statistics for HEIs, using a threshold of 40 fractionalised publications within each subject field in the time period 2011-2014 for inclusion.⁴
- Normalisation procedures relative to the “world average”, i.e. the average citation rate in Web of Science for a given subject category or an aggregation of categories.

In deciding which HEIs should be included in the report, the network agreed that institutions should only be included when they had more than 150 fractionalised publication points from the 16 main subject fields in the period 2011-2014. An exception was made for Icelandic institutions, where the minimum size was set at 25 (only for the volume-based indicators; for the citation-based indicators the threshold is 40 publications). The reason for this limitation is that low numbers may create unreliable results, especially in the measurement of citation impact. As a result of this limitation, several universities and colleges are excluded from the main analysis, but they do appear in the category *HES Other* where we only show results for the institutions combined. In Table A.2 in Appendix 1, we have listed all HEIs and to which analysis category they belong.

³ A full documentation of the Swedish Research Council database, data cleaning procedures and indicator calculations can be found in The bibliometric database at the Swedish Research Council – contents, methods and indicators.

⁴ Forty fractionalised publications equal 40 journal articles authored by one person. Alternatively, 80 journal articles with authors from two different universities.

The universities, university hospitals and university colleges in this report are compared in terms of the following *indicators*:⁵

- Fractionalised number of publications;
- Field normalised citation rates;⁶
- Percentage of highly cited papers (among the top 10 per cent of world production);⁷
- Relative Specialisation Index, indicating whether a HEI has higher or lower than average activity in the world in a specific scientific field.⁸

In earlier reports, we have grouped the 250 subject categories in Web of Science into nine subject fields. Now we have 16. This does not mean that our analyses are based on more publications; it simply means that the subject fields have been reclassified into 16 groups, so that we get more differentiated, nuanced results. The new classification made by the members of the NORIA-net (see Box 1.1) was partly based on an intuitive understanding of which of the Web of Science categories belong to the new classifications (e.g. *Orthopaedics* belonging to Clinical Medicine; *Environmental & Occupational Health* belonging to Health Sciences), and partly based on an investigation of the citation patterns of the subject fields. Some of the Web of Science subject categories were difficult to assign to (just) one of our 16 subject fields, as it could be argued that they naturally belonged to two (or more) subject fields. In those cases, we investigated which other subject fields gave the most citations to these subject categories, and assigned them to the fields that cited them the most.

5 The citation-based indicators are calculated using a three-year time window. As an example, when counting the citations for a publication published in the year 2000, references in publications from the years 2000-2002 are counted.

6 The normalisation is performed at the item level – the citation for each paper from a given university is divided by the average citation for the field(s) of that paper.

7 A value of 10 per cent equals the world average in the database. A share of highly cited papers below 10 per cent means a lower proportion than the world average, e.g. 8 per cent means a 20 per cent lower proportion of highly cited publications than the world average. Values over 10 per cent mean a higher proportion than the world average, e.g. 12 per cent means a 20 per cent higher proportion of highly cited publications than the world average.

8 See Chapter 3.3 for further explanation.

Box 1.1: Grouping of Web of Science subject categories

Field	Includes the following Web of Science categories
Agriculture, Fisheries & Forestry	Agricultural Economics & Policy; Agriculture, Dairy & Animal Science; Agriculture, Multidisciplinary; Agronomy; Fisheries; Food Science & Technology; Forestry; Horticulture; Plant Sciences; Soil Science; Water Resources; Veterinary Sciences.
Biology	Biodiversity Conservation; Biology; Ecology; Entomology; Evolutionary Biology; Limnology; Marine & Freshwater Biology; Mathematical & Computational Biology; Mycology; Ornithology; Zoology.
Biomedicine & Molecular Biosciences	Anatomy & Morphology; Behavioral Sciences; Biochemical Research Methods; Biochemistry & Molecular Biology; Biophysics; Biotechnology & Applied Microbiology; Cell & Tissue Engineering; Cell Biology; Chemistry, Medicinal; Developmental Biology; Genetics & Heredity; Immunology; Medical Laboratory Technology; Medicine, Research & Experimental; Microbiology; Microscopy; Neurosciences; Parasitology; Pathology; Pharmacology & Pharmacy; Physiology; Reproductive Biology; Toxicology; Virology.
Business Studies & Economics	Business; Business, Finance; Economics; Management.
Chemistry	Chemistry, Analytical; Chemistry, Applied; Chemistry, Inorganic & Nuclear; Chemistry, Multidisciplinary; Chemistry, Organic; Chemistry, Physical; Crystallography; Electrochemistry; Polymer Science.
Clinical Medicine	Allergy; Andrology; Anesthesiology; Audiology & Speech-Language Pathology; Cardiac & Cardiovascular Systems; Clinical Neurology; Critical Care Medicine; Dentistry, Oral Surgery & Medicine; Dermatology; Emergency Medicine; Endocrinology & Metabolism; Gastroenterology & Hepatology; Geriatrics & Gerontology; Hematology; Infectious Diseases; Medicine, General & Internal; Neuroimaging; Obstetrics & Gynecology; Oncology; Ophthalmology; Orthopedics; Otorhinolaryngology; Pediatrics; Peripheral Vascular Disease; Psychiatry; Radiology, Nuclear Medicine & Medical Imaging; Respiratory System; Rheumatology; Surgery; Transplantation; Tropical Medicine; Urology & Nephrology.
Computer & Information Sciences	Computer Science, Artificial Intelligence; Computer Science, Cybernetics; Computer Science, Information Systems; Computer Science, Interdisciplinary Applications; Computer Science, Software Engineering; Computer Science, Theory & Methods.
Engineering	Agricultural Engineering; Automation & Control Systems; Computer Science, Hardware & Architecture; Construction & Building Technology; Energy & Fuels; Engineering, Aerospace; Engineering, Biomedical; Engineering, Chemical; Engineering, Civil; Engineering, Electrical & Electronic; Engineering, Environmental; Engineering, Geological; Engineering, Industrial; Engineering, Manufacturing; Engineering, Marine; Engineering, Mechanical; Engineering, Multidisciplinary; Engineering, Ocean; Engineering, Petroleum; Instruments & Instrumentation; Metallurgy & Metallurgical Engineering; Mining & Mineral Processing; Operations Research & Management Science; Robotics; Telecommunications; Thermodynamics; Transportation Science & Technology.
Geosciences	Environmental Sciences; Geochemistry & Geophysics; Geography, Physical; Geology; Geosciences, Multidisciplinary; Meteorology & Atmospheric Sciences; Mineralogy; Oceanography; Paleontology; Remote Sensing.
Health Sciences	Gerontology; Health Care Sciences & Services; Health Policy & Services; Integrative & Complementary Medicine; Medical Ethics; Medical Informatics; Medicine, Legal; Nursing; Nutrition & Dietetics; Primary Health Care; Public, Environmental & Occupational Health; Rehabilitation; Social Sciences, Biomedical; Sport Sciences; Substance Abuse.
Humanities	Archaeology; Architecture; Art; Asian Studies; Classics; Cultural Studies; Dance; Ethics; Film, Radio, Television; Folklore; History; History & Philosophy of Science; History of Social Sciences; Humanities, Multidisciplinary; Language & Linguistics; Linguistics; Literary Reviews; Literary Theory & Criticism; Literature; Literature, African, Australian, Canadian; Literature, American; Literature, British Isles; Literature, German, Dutch, Scandinavian; Literature, Romance; Literature, Slavic; Medieval & Renaissance Studies; Music; Philosophy; Poetry; Religion; Theater.

Field	Includes the following Web of Science categories
Materials Science	Materials Science, Biomaterials; Materials Science, Ceramics; Materials Science, Characterization & Testing; Materials Science, Coatings & Films; Materials Science, Composites; Materials Science, Multidisciplinary; Materials Science, Paper & Wood; Materials Science, Textiles; Nanoscience & Nanotechnology.
Mathematics & Statistics	Logic; Mathematics; Mathematics, Applied; Mathematics, Interdisciplinary Applications; Statistics & Probability.
Physics	Acoustics; Astronomy & Astrophysics; Imaging Science & Photographic Technology; Mechanics; Nuclear Science & Technology; Optics; Physics, Applied; Physics, Atomic, Molecular & Chemical; Physics, Condensed Matter; Physics, Fluids & Plasmas; Physics, Mathematical; Physics, Multidisciplinary; Physics, Nuclear; Physics, Particles & Fields; Spectroscopy.
Psychology	Psychology; Psychology, Applied; Psychology, Biological; Psychology, Clinical; Psychology, Developmental; Psychology, Educational; Psychology, Experimental; Psychology, Mathematical; Psychology, Multidisciplinary; Psychology, Psychoanalysis; Psychology, Social.
Social Sciences	Anthropology; Area Studies; Communication; Criminology & Penology; Demography; Education & Educational Research; Education, Scientific Disciplines; Education, Special; Environmental Studies; Ergonomics; Ethnic Studies; Family Studies; Geography; Hospitality, Leisure, Sport & Tourism; Industrial Relations & Labor; Information Science & Library Science; International Relations; Law; Planning & Development; Political Science; Public Administration; Social Issues; Social Sciences, Interdisciplinary; Social Sciences, Mathematical Methods; Social Work; Sociology; Transportation; Urban Studies; Women's Studies.

The number of main subject fields – 16 – was based on a wish to have as many fields as possible, while at the same time ensuring that the fields had a sufficient number of publications. The field *Business Studies & Economics* deviates somewhat from this as it is rather small (compared to many other fields here). However, we wanted to distinguish the categories in this field from the categories in *Social Sciences* since the publications of the former field are more focused on journal publishing, as compared to other Social Science categories, e.g. Sociology and Social Anthropology, which are more oriented towards book publishing.

Our report is divided into three main chapters: Chapter 2 addresses the publication activity of the Nordic HEIs; Chapter 3 describes the research publication profiles for the HEIs; and Chapter 4 addresses the citation impact of the Nordic HEIs.

2. PUBLICATION ACTIVITY

The aim of this chapter is to give an overview of the relative size of scientific publication output at Nordic higher education institutions (HEIs) in the 16-year period from 1999-2014 and the changes within that period.

All subject fields covered by this study are combined to produce aggregated four-year interval publication numbers, covering 1999-2002, 2003-2006, 2007-2010 and 2011-2014. The results for each country's higher education (HE) sectors are briefly presented before focusing more closely on the universities, university hospitals and university colleges in each country.

2.1 Total scientific publication output – higher education sectors

The total scientific publication output in the Nordic countries was studied at the national level in one of our earlier reports (Schneider et al., 2010). In the last two reports (Piro et al., 2011; 2014), the national totals were limited to publications from universities and university hospitals. In this chapter, we show aggregate numbers for *all* institutions belonging to the HE sectors, whereas in later chapters we differentiate between three types of institutions:

1. HEIs with a publication activity above a certain threshold, for which we show specific results;
2. Total numbers for all other HEIs that do not meet the threshold;
3. Total numbers for all other national institutions that are not part of the HE sector (e.g. public research institutes, public bodies, private companies, non-governmental organisations, etc.).

The totals are calculated for four periods using the sum of the fractionalised number of publications within 16 subject fields, cf. Box 2.1.

As shown in Table 2.1, the relative growth rate from 1999 to 2014 is especially strong among the universities in Iceland. The smallest growth has been in the Swedish HE sector, whose share of Nordic publications has dropped from 45 per cent in the first period to 39 per cent in the last period, as all other countries have had a higher publication growth. As such, the Swedish HE sector's share of the world production has decreased to below 1 per cent in the period, while the Danish HE sector's share is now 0.59 per cent, the Finnish HE sector 0.43 per cent, the Norwegian HE sector 0.39 per cent and Iceland's HE sector 0.03 per cent. Compared to the baseline period, 1999-2002, Norway, Denmark and Iceland have all increased their shares of total world production. In contrast, the shares of Finland and Sweden have declined throughout the periods.

Table 2.1: Publication activity growth in the Nordic higher education sector (in the 16 subject fields of the study)*

	Volume				Percentage of world production				Annual growth rate
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014	1999-2014
Denmark	18177	19866	23906	32980	0.58 %	0.56 %	0.52 %	0.59 %	5 %
%	21.0	21.5	22.1	24.9					
Finland	17636	18545	20880	23983	0.57 %	0.52 %	0.46 %	0.43 %	3 %
%	20.3	20.1	19.3	18.1					
Iceland	578	738	1122	1463	0.02 %	0.02 %	0.02 %	0.03 %	7 %
%	0.7	0.8	1.0	1.1					
Norway	10973	12627	17815	21731	0.35 %	0.35 %	0.39 %	0.39 %	5 %
%	12.7	13.7	16.4	16.4					
Sweden	39367	40610	44620	52013	1.26 %	1.14 %	0.98 %	0.93 %	2 %
%	45.4	44.0	41.2	39.4					
Total	86732	92385	108343	132160	2.79 %	2.59 %	2.37 %	2.36 %	3.00 %

*Data from Clarivate Analytics

In sum, the Nordic HE sectors’ combined share of the world production has decreased from 2.79 to 2.36 per cent in the period. Despite this, the publication volume is 52 per cent higher in the last period compared to the baseline. However, the growth in the world production has been higher in total – 80 per cent (see Appendix 3). The increases in numbers of publications from institutions in all countries may be explained either by the growth of the publication database⁹ or by the science system itself (Schneider et al., 2010).

Sweden has the greatest publication activity among the Nordic countries, with its HE sector contributing to 39.4 per cent of the overall publication output from Nordic HE sectors in the period 2011-2014. The equivalent shares for Denmark (24.9 per cent), Finland (18.1 per cent) and Norway (16.4 per cent) are fairly similar, while that of Iceland (1.1 per cent) is much smaller.¹⁰

9 A more thorough discussion of this is given in Schneider et al. (2010). It is argued that it is reasonable to assume that the growth in database coverage affects all the Nordic countries in the same way.

10 This can be compared to Figure 10 in The Swedish Research Barometer 2016 which shows the number of publications per 1 000 inhabitants. In this respect, Denmark is number two in the world, behind Switzerland, Sweden is number four, Norway is number six, and Finland is number eight. Iceland (not in the figure) is number five in the world.

Box 2.2: Open Access publishing in Nordic higher education sectors

Open Access (OA) publishing refers to research outputs that are free of all restrictions on access and use. The European Commission has targeted OA as the standard by the year 2020, and most countries in Europe seem to have adopted different strategies to increase the OA output in their research systems.

Generally, publications can be openly available when published in OA journals or books (known as “gold” OA), through self-archiving (e.g. institutional repositories) or by author payment in “hybrid journals”. Due to lack of data, it is not possible to examine the total incidence of OA publishing covering all these alternative publishing models. However, in the Directory of Open Access Journals (DOAJ) there is a list of pure OA journals (“gold”). Based on this list, we have calculated the proportion of articles published in OA journals (and therefore, the green and hybrid OA that might be in the database is not part of the tables below).

As indicated in the table below, OA as the default is still in a very early phase in the Nordic countries’ HE sectors, although the share of OA among all publications has risen from under 1 per cent in 1999-2002 to more than 7 per cent in 2011-2014. It is Iceland in particular that has reached a high volume of OA publishing, with more than 11 per cent of all publications in 2011-2014 being in OA journals. For the other Nordic countries, the shares are between 6.7 and 7.9 per cent.

	Share of Open Access publications			
	1999-2002	2003-2006	2007-2010	2011-2014
Denmark	0.8 %	1.4 %	3.1 %	6.7 %
Finland	0.6 %	1.7 %	3.4 %	6.8 %
Iceland	1.7 %	1.5 %	8.3 %	11.5 %
Norway	1.1 %	1.8 %	3.7 %	7.6 %
Sweden	0.6 %	1.2 %	3.3 %	7.9 %
Total	0.7 %	1.4 %	3.4 %	7.4 %

Comparing OA publishing across the 16 scientific subject fields of this report for all Nordic HE sectors combined, we find that the development towards OA publishing differs greatly among the subjects. OA publishing in e.g. Business Studies & Economics and Physics is almost non-existent, even today. By contrast, almost 15 per cent of all publications in Geosciences and Biomedicine & Molecular Biosciences are now in OA journals, and several fields are equal to or above the Nordic average of 7.4 per cent (which is the same as the world average): Biology (12.0 per cent), Health Sciences (10.4 per cent) and Clinical Medicine (7.9 per cent).

Subject field	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	1.5 %	2.8 %	3.8 %	7.1 %
Biology	0.4 %	0.9 %	3.5 %	12.0 %
Biomedicine & Molecular Biosciences	0.5 %	1.4 %	5.0 %	14.3 %
Business Studies & Economics	0.1 %	0.1 %	0.1 %	0.7 %
Chemistry	0.2 %	0.2 %	2.0 %	3.6 %
Clinical Medicine	0.8 %	1.6 %	3.7 %	7.9 %
Computer & Information Sciences	1.2 %	1.7 %	2.2 %	3.1 %
Engineering	0.5 %	0.5 %	1.1 %	2.6 %
Geosciences	4.5 %	6.8 %	10.0 %	14.7 %
Health Sciences	0.5 %	1.4 %	4.6 %	10.4 %
Humanities	0.1 %	0.4 %	1.2 %	2.3 %
Materials Science	0.0 %	0.3 %	3.1 %	6.2 %
Mathematics & Statistics	1.6 %	2.0 %	2.4 %	3.9 %
Physics	0.2 %	0.3 %	0.5 %	1.4 %
Psychology	0.0 %	0.0 %	0.5 %	3.1 %
Social Sciences	0.1 %	1.4 %	2.5 %	2.9 %
Nordic countries total	0.7 %	1.4 %	3.4 %	7.4 %
Database total	0.9 %	1.5 %	3.9 %	7.4 %

Table 2.2 gives a more detailed picture of these issues by presenting relative publication activity for the HE sectors across subject fields for the period 2011-2014, alongside the annual growth rates since the year 1999.

Compared to the rest of the world, the Nordic HE sectors are substantially more oriented towards three fields: publications in *Health Sciences* (72.5 per cent more than the world average), *Social Sciences* (56.7 per cent more than the world average) and *Business Studies & Economics* (52.9 per cent more than the world average). The fourth subject field where the Nordic share is more than 20 per cent higher than the world average is *Clinical Medicine* (22.8 per cent). Hence, the Nordic countries stand out as much more oriented towards health/medical sciences and the social sciences compared to the rest of the world. (Nordic shares for *Humanities* and *Psychology* are also higher than the world average.)

Table 2.2: Publication activity in different subject fields for the Nordic HE sectors (percentages of fractionalised number of publications), 2011-2014, and annual growth rate of the production of fractionalised publications for each field. Blue colour = share 20 per cent above the Nordic average; red colour = share 20 per cent below the Nordic average*

Subject field	Denmark	Finland	Iceland	Norway	Sweden	All Nordic countries	World ¹	Annual growth rate 2011-2014
Agriculture, Fisheries & Forestry	6.1 %	4.3 %	4.8 %	4.5 %	3.8 %	4.6 %	5.3 %	1.7 %
Biology	3.8 %	5.1 %	5.2 %	4.7 %	3.6 %	4.1 %	3.5 %	4.2 %
Biomedicine & Molecular Biosciences	18.4 %	15.0 %	10.9 %	13.9 %	16.9 %	16.4 %	16.3 %	1.5 %
Business Studies & Economics	2.5 %	3.2 %	2.1 %	2.7 %	2.4 %	2.6 %	1.7 %	5.4 %
Chemistry	5.6 %	6.0 %	3.2 %	3.7 %	5.7 %	5.4 %	9.6 %	4.5 %
Clinical Medicine	25.7 %	17.8 %	21.9 %	21.4 %	22.2 %	22.1 %	18.0 %	4.1 %
Computer & Information Sciences	1.3 %	2.5 %	2.1 %	1.7 %	1.3 %	1.6 %	1.8 %	8.2 %
Engineering	6.9 %	9.4 %	6.3 %	8.2 %	8.5 %	8.2 %	9.5 %	9.7 %
Geosciences	4.1 %	4.0 %	10.0 %	6.1 %	4.1 %	4.5 %	4.4 %	6.7 %
Health Sciences	5.8 %	4.7 %	8.3 %	9.0 %	7.8 %	6.9 %	4.0 %	6.5 %
Humanities	2.6 %	3.3 %	4.4 %	3.9 %	2.5 %	2.9 %	2.5 %	7.8 %
Materials Science	2.1 %	3.5 %	1.1 %	1.5 %	3.1 %	2.6 %	4.1 %	10.3 %
Mathematics & Statistics	1.6 %	3.1 %	1.7 %	2.8 %	2.0 %	2.2 %	3.2 %	2.2 %
Physics	7.6 %	10.0 %	8.9 %	5.5 %	8.2 %	7.9 %	10.6 %	0.2 %
Psychology	1.3 %	2.4 %	2.9 %	2.9 %	1.9 %	2.0 %	1.9 %	7.9 %
Social Sciences	4.8 %	5.8 %	6.3 %	7.6 %	5.8 %	5.8 %	3.7 %	7.5 %
Total	100 %	100 %	100 %	100 %	100 %	100 %	100 %	4.6 %

*Data from Clarivate Analytics. ¹ Real numbers for World percentages are found in Appendix 3.

On the opposite side, the Nordic HE sectors are in general much less oriented towards the natural sciences compared to the rest of the world. In four fields, the Nordic shares of the production are more than 20 per cent lower than the world average: *Chemistry* (44 per cent below the world average), *Materials Science* (37 per cent), *Mathematics & Statistics* (31 per cent) and *Physics* (25 per cent).

Sweden is responsible for 39 per cent of the total publication volume of the Nordic HE sectors in the period 2011-2014. Thus, the relative publication activity of the Nordic countries in different fields, i.e. the Nordic averages by subject field, is quite similar to the Swedish numbers. As Sweden’s activity is distributed this way, there are no subject fields where Sweden diverges by 20 per cent or more from the Nordic average. In contrast, results for Iceland, Norway and Finland show large fluctuations from the Nordic average.

For *Finland*, substantial deviations from the average Nordic profile can especially be observed in *Physics* (2.1 percentage points), where the Finnish HE sector stands out with the highest proportion of publications among the Nordic HE sectors. Finland also has relatively high shares in many of the other subjects from the natural sciences (e.g. *Computer & Information Sciences*, *Materials Sciences* and *Mathematics & Statistics*). By contrast, Finland’s relative publication activity in *Clinical Medicine* and *Health Sciences* is well below the Nordic average (4.2 and 2.2 percentage points respectively). Finland is the only country with a lower share than the world average in *Clinical Medicine*.

In *Iceland*, *Geosciences* is the subject field that stands out in a Nordic context, making up almost 10 per cent of Iceland’s production (based on a rather long history of research in this field), which is much higher than in any other Nordic country. On the other hand, Iceland’s HE sector in particular has much lower relative shares than the Nordic average in *Biomedicine & Molecular Biosciences* (5.5 percentage points lower).

In *Norway*, *Geosciences* also represent a relatively large share of all publications (6.1 percent). Norway is the Nordic country with the highest share in *Health Sciences* (9 per cent) and *Social Sciences* (7.6 per cent). Relative to other Nordic countries, the Norwegian HE sector is less oriented in particular towards *Physics* (2.5 percentage points below) and *Chemistry* (1.7 percentage points below).

In *Denmark*, the publication activity in *Agriculture, Fisheries & Forestry* is much higher than the Nordic average. The Danish patterns deviate less from the Nordic means than in Finland, Norway and Iceland and complies more with what we observe in Sweden.

In Table 2.3 to Table 2.9 we show the growth rates per subject field for all Nordic HE sectors combined, comparing the first and last years (1999 and 2014) and then the four aggregated time periods (1999-2002, 2003-2006, 2007-2010 and 2011-2014), adjusting the growth for the size of the publication volumes (i.e. the baseline year(s) are set to 100).¹¹

Table 2.3: Standardised growth rates for the volume of publications in the HE sectors in all Nordic countries 1999-2014*

Subject field	1999	2014	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	100	122	100	102	106	121
Biology	100	140	100	103	116	128
Biomedicine & Molecular Biosciences	100	114	100	100	105	116
Business Studies & Economics	100	355	100	130	223	312
Chemistry	100	140	100	108	108	124
Clinical Medicine	100	131	100	99	110	129
Computer & Information Sciences	100	218	100	129	164	201
Engineering	100	277	100	125	159	231
Geosciences	100	194	100	113	140	171
Health Sciences	100	293	100	126	183	251
Humanities	100	407	100	104	216	336
Materials Science	100	226	100	113	142	197
Mathematics & Statistics	100	169	100	118	145	154
Physics	100	127	100	105	109	121
Psychology	100	279	100	123	160	225
Social Sciences	100	528	100	138	281	432
(Sum)	100	163	100	107	125	152

*Data from Clarivate Analytics

The growth in the Nordic countries has been especially high in *Social Sciences*, *Humanities* and *Business Studies & Economics*, which is arguably due more to an expansion of the publication database than to increased research activity itself. In the other fields, it is also the fields found in the interface of medicine and social sciences that have increased the most from 1999 to 2014: *Health Sciences* (193 per cent increase) and *Psychology* (179 per cent increase) (Table 2.3). The lowest levels of increase are found in *Physics* (up 27 per cent), *Agriculture, Fisheries & Forestry* (22 per cent) and *Biomedicine & Molecular Biosciences* (14 per cent). These three fields hardly increased at all before the last period, 2011-2014.

In the upcoming tables at the national level for HEIs, the numbers are coloured according to the Nordic averages in Table 2.3 (**blue colour** = share 20 per cent above the Nordic average; **red colour** = share 20 per cent below the Nordic average).

¹¹ Raw numbers are found in Appendix 5.

Table 2.4: Standardised growth rates for the volume of publications in the HE sector in Denmark 1999-2014*

Subject field	1999	2014	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	100	123	100	104	106	125
Biology	100	148	100	102	109	128
Biomedicine & Molecular Biosciences	100	158	100	106	117	149
Business Studies & Economics	100	371	100	117	196	292
Chemistry	100	185	100	113	124	168
Clinical Medicine	100	208	100	108	131	193
Computer & Information Sciences	100	215	100	124	147	202
Engineering	100	374	100	136	171	275
Geosciences	100	183	100	101	118	157
Health Sciences	100	343	100	135	192	296
Humanities	100	416	100	99	216	321
Materials Science	100	322	100	129	212	304
Mathematics & Statistics	100	132	100	111	108	126
Physics	100	128	100	97	110	132
Psychology	100	656	100	161	232	415
Social Sciences	100	591	100	139	293	489
(Sum)	100	199	100	109	132	181

*Data from Clarivate Analytics

Denmark's HE sector has seen an especially strong growth in *Psychology*, which in the period 2011-2014 was 84 per cent higher than for the Nordic average (Table 2.4). *Materials Science* and *Clinical Medicine* have both increased 50 per cent more in Denmark compared to the Nordic mean in this period. By contrast, Denmark's growth in *Mathematics & Statistics* has been approximately 20 per cent lower than the Nordic average.

Table 2.5: Standardised growth rates for the volume of publications in the HE sector in Finland 1999-2014*

Subject field	1999	2014	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	100	146	100	109	119	125
Biology	100	157	100	105	122	148
Biomedicine & Molecular Biosciences	100	97	100	99	96	99
Business Studies & Economics	100	453	100	129	282	405
Chemistry	100	121	100	106	112	114
Clinical Medicine	100	85	100	89	87	88
Computer & Information Sciences	100	198	100	127	167	185
Engineering	100	284	100	133	158	208
Geosciences	100	243	100	124	156	189
Health Sciences	100	177	100	99	131	159
Humanities	100	454	100	112	200	316
Materials Science	100	282	100	118	151	203
Mathematics & Statistics	100	209	100	109	150	172
Physics	100	157	100	118	129	139
Psychology	100	219	100	123	153	206
Social Sciences	100	538	100	148	268	420
(Sum)	100	149	100	105	118	136

*Data from Clarivate Analytics

In Finland's HE sector, the strongest increase relative to the Nordic mean is observed in *Business Studies & Economics* (30 per cent higher), whereas *Clinical Medicine* and *Health Sciences* are fields where the Finnish growth has been much lower (Table 2.5).

Table 2.6: Standardised growth rates for the volume of publications in the HE sector in Iceland 1999-2014*

Subject field	1999	2014	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	100	341	100	112	159	192
Biology	100	338	100	168	165	283
Biomedicine & Molecular Biosciences	100	111	100	143	139	157
Business Studies & Economics	100	135	100	68	145	352
Chemistry	100	220	100	81	152	179
Clinical Medicine	100	224	100	115	173	226
Computer & Information Sciences	100	1231	100	337	744	885
Engineering	100	984	100	99	454	838
Geosciences	100	368	100	147	217	245
Health Sciences	100	584	100	186	250	362
Humanities	100	370	100	68	191	270
Materials Science	100	657	100	203	297	506
Mathematics & Statistics	100	135	100	128	356	213
Physics	100	215	100	96	157	242
Psychology	100	538	100	122	281	242
Social Sciences	100	767	100	171	319	454
(Sum)	100	276	100	128	194	253

*Data from Clarivate Analytics

The increased publication levels for Iceland's HE sector are extreme (e.g. more than a 1 000 per cent increase in *Computer & Information Sciences* from 1999 to 2014), but are highly dependent on a very limited number of publications (Table 2.6).

Table 2.7: Standardised growth rates for the volume of publications in the HE sector in Norway 1999-2014*

Subject field	1999	2014	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	100	117	100	101	116	131
Biology	100	145	100	103	122	131
Biomedicine & Molecular Biosciences	100	139	100	108	131	147
Business Studies & Economics	100	316	100	149	258	311
Chemistry	100	124	100	105	117	130
Clinical Medicine	100	161	100	108	144	161
Computer & Information Sciences	100	359	100	162	271	324
Engineering	100	406	100	141	262	385
Geosciences	100	207	100	117	166	202
Health Sciences	100	458	100	156	270	398
Humanities	100	402	100	114	240	355
Materials Science	100	217	100	114	186	253
Mathematics & Statistics	100	235	100	125	187	210
Physics	100	161	100	124	152	181
Psychology	100	265	100	125	176	241
Social Sciences	100	539	100	130	302	426
(Sum)	100	201	100	115	162	198

*Data from Clarivate Analytics

In Norway, the HE sector's growth from the first to the last period is higher in most subject fields compared to the Nordic averages (Table 2.7). Together with Iceland, Norway is the only country that has a general growth above the Nordic average. The strongest growth in the Norway's HE sector compared to the Nordic mean is observed in some of the natural sciences; *Computer & Information Sciences* (more than 60 per cent higher in the last two periods) and *Physics* (more than 50 per cent higher in the last period).

Table 2.8: Standardised growth rates for the volume of publications in the HE sector in Sweden 1999-2014*

Subject field	1999	2014	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	100	111	100	98	96	110
Biology	100	121	100	101	115	115
Biomedicine & Molecular Biosciences	100	95	100	97	97	99
Business Studies & Economics	100	328	100	131	203	285
Chemistry	100	132	100	108	98	110
Clinical Medicine	100	109	100	96	102	112
Computer & Information Sciences	100	192	100	123	135	174
Engineering	100	217	100	114	134	191
Geosciences	100	172	100	112	131	156
Health Sciences	100	269	100	123	174	228
Humanities	100	378	100	98	214	353
Materials Science	100	184	100	107	116	162
Mathematics & Statistics	100	147	100	124	143	136
Physics	100	108	100	101	94	99
Psychology	100	254	100	115	138	190
Social Sciences	100	489	100	136	269	416
(Sum)	100	140	100	103	113	132

*Data from Clarivate Analytics

Finally, the Swedish HE sector's growth is quite in line with the Nordic average (Table 2.8). However, almost all numbers in Table 2.8 are slightly lower than for the Nordic mean (mostly in the range 1–10 percentage points). Consequently, the growth excess found in other countries, when compared to the Nordic average, is largely due to the slow growth in Sweden.

In total, the number of fractionalised publications for the Nordic HE sectors grew by 52 per cent from 1999-2002 to 2011-2014, having increased more modestly (7 per cent) in 2003-2006 and 25 per cent in 2007-2010 (Table 2.3).

In Table 2.9 we have calculated the Relative Specialisation Index (RSI) for the HE sector in each country, showing whether the countries have a relatively higher or lower share of publications than their overall share of the total world production in particular fields of science (a more detailed presentation is given in Chapter 3.3). The RSI values range between -1 and 1, dividing the specific share for each country's HE sector by the general share in the database. When the RSI is zero it reflects a proportion equal to that of the field in the world. As shown in Table 2.9, compared to the world, the Nordic HE sectors have a relatively high research publication production in *Health Sciences*, *Social Sciences*, *Business Studies & Economics*, *Clinical Medicine* and *Biology and Humanities*. For three fields (*Psychology*, *Geosciences* (except Iceland and Norway) and *Biomedicine & Molecular Biosciences*), the Nordic profile is more or less identical to the rest of the world. In all other subject fields, the Nordic HE sectors are less specialised than the world average. In particular, the RSI values are in particular lower in *Chemistry*, *Materials Science*, *Physics* and *Mathematics & Statistics*.

Table 2.9: Relative specialization indexes for the country totals of scientific publishing in the Nordic HE sectors, 2011-2014 (World average = 0)*

Subject field	Denmark	Finland	Iceland	Norway	Sweden	Total
Agriculture, Fisheries & Forestry	0.07	-0.10	-0.05	-0.08	-0.17	-0.07
Biology	0.04	0.19	0.20	0.15	0.02	0.08
Biomedicine & Molecular Biosciences	0.06	-0.04	-0.20	-0.08	0.02	0.00
Business Studies & Economics	0.20	0.32	0.13	0.23	0.19	0.23
Chemistry	-0.26	-0.23	-0.50	-0.44	-0.25	-0.28
Clinical Medicine	0.17	-0.01	0.10	0.09	0.10	0.10
Computer & Information Sciences	-0.15	0.14	0.07	-0.05	-0.17	-0.07
Engineering	-0.16	-0.01	-0.20	-0.08	-0.06	-0.08
Geosciences	-0.04	-0.05	0.39	0.16	-0.04	0.00
Health Sciences	0.18	0.08	0.35	0.38	0.32	0.27
Humanities	0.02	0.14	0.28	0.22	0.01	0.08
Materials Science	-0.33	-0.07	-0.58	-0.47	-0.13	-0.21
Mathematics & Statistics	-0.35	-0.01	-0.32	-0.06	-0.22	-0.18
Physics	-0.16	-0.03	-0.09	-0.32	-0.13	-0.14
Psychology	-0.20	0.12	0.21	0.22	0.02	0.04
Social Sciences	0.13	0.22	0.26	0.35	0.22	0.23

*Data from Clarivate Analytics

2.2 Publication activity of the HEIs

In this section we describe the publication activity of each Nordic HEI included in the study, as well as the totals for the HE sectors, the *Other* national institutions not included in the HE sector, and the country as a whole.

We study four time periods (1999-2002, 2003-2006, 2007-2010 and 2011-2014) and present the number of fractionalised publications, average annual growth rates (which can be negative, despite an increase in publication activity over time) and the growth rate between 1999 and 2014. As expected, the largest growth rates are found amongst smaller and younger universities.

Table 2.10: Number of fractionalised publications in Denmark*

	Volume				Per cent of higher education sector output	Average annual growth rate	Per cent increase
	1999-2002	2003-2006	2007-2010	2011-2014	2011-2014	1999-2014	1999-2014
Denmark							
Aalborg University	817	1189	1335	1857	5.6 %	9 %	241
Aarhus University	3260	3481	4237	5959	18.1 %	5 %	103
Copenhagen Business School	99	168	326	462	1.4 %	11 %	397
Roskilde University	212	240	321	424	1.3 %	4 %	73
Technical University of Denmark	2973	3302	3865	5078	15.4 %	4 %	85
University of Copenhagen	5906	5868	7173	9470	28.7 %	4 %	76
University of Southern Denmark	1081	1401	1662	2511	7.6 %	7 %	167
Aalborg University Hospitals	180	189	216	399	1.2 %	5 %	112
Aarhus University Hospitals	1122	1272	1547	2082	6.3 %	4 %	91
Copenhagen University Hospitals	2150	2318	2738	3854	11.7 %	4 %	83
University of Southern Denmark Hospitals	363	405	427	785	2.4 %	6 %	155
HES Other	13	34	59	89	0.3 %	18 %	1070
Other	3956	3921	4034	4445		1 %	24
HES Total	18177	19866	23906	32970		5 %	99
Denmark Total	22133	23787	27940	37415		4 %	86

*Data from Clarivate Analytics

Among the universities and university hospitals included in this report, and within the areas of research covered, Denmark has both the largest university (University of Copenhagen) and the largest hospital (Copenhagen University Hospitals).

It is important to note, however, that Danish research institutions in the entire period investigated here are treated according to their most recent status following widespread mergers of higher education institutions in Denmark. Two of the largest Danish universities (Copenhagen and Aarhus) have relatively low publication growth rates, while the growth rates are highest at the smaller universities (and especially so among all smaller colleges included in the category HES Other).

Table 2.11: Number of fractionalised publications in Finland*

	Volume				Average annual growth rate	Per cent of higher education sector output	Per cent increase
Finland	1999-2002	2003-2006	2007-2010	2011-2014	1999-2014	2011-2014	1999-2014
Aalto University	1538	1998	2325	3081	7 %	12.8 %	168
Hanken School of Economics	43	45	75	146	7 %	0.6 %	169
Lappeenranta University of Technology	147	237	345	583	11 %	2.4 %	402
Tampere University of Technology	507	642	842	1068	8 %	4.5 %	224
University of Eastern Finland	1477	1578	1851	1902	2 %	7.9 %	44
University of Helsinki	4170	4539	5033	5911	3 %	24.6 %	50
University of Jyväskylä	936	1036	1432	1746	5 %	7.3 %	113
University of Lapland	19	27	52	88	9 %	0.4 %	285
University of Oulu	1622	1554	1716	1906	2 %	7.9 %	25
University of Tampere	635	679	913	973	3 %	4.1 %	56
University of Turku	2086	1964	2003	2198	1 %	9.2 %	12
University of Vaasa	23	36	67	119	13 %	0.5 %	560
Åbo Akademi University	625	709	865	943	2 %	3.9 %	36
Helsinki University Hospital	1682	1600	1450	1288	-2 %	5.4 %	-29
Kuopio University Hospital	679	499	409	358	-4 %	1.5 %	-49
Oulu University Hospital	284	270	317	375	3 %	1.6 %	56
Tampere University Hospital	566	493	447	434	-2 %	1.8 %	-22
Turku University Hospital	345	313	342	392	0 %	1.6 %	6
HES Other	252	326	395	472	6 %	2.0 %	143
Other	5109	5529	5986	6076	2 %		27
HES Total	17636	18545	20880	23983	3 %		49
Finland Total	22745	24074	26866	30059	2 %		44

*Data from Clarivate Analytics

Of the 15 universities in Finland, 13 had the required minimum amount of publications to qualify for comparison. Five of these (Helsinki, Turku, Tampere, Oulu and Eastern Finland) have a medical faculty with an associated university hospital. There are two technical universities (in Lappeenranta and Tampere) and three others with an Engineering Faculty (Aalto, Oulu and Åbo). Of the remaining four, the Hanken School of Economics and the University of Vaasa have a strong focus on economic sciences.

In terms of publication volume, the University of Helsinki still dominates the HE sector in Finland with nearly a quarter of all publications, and with almost twice the share of the next most productive university. While it is fair to claim that smaller universities in general tend to show more rapid growth rates, some of the results are due to the improved coverage of the database in certain subject fields. This fact also explains some exceptions to the general rule.

When compared to Denmark, the publication growth rate in the university hospitals has been radically different – with three out of five hospitals, including Helsinki University Hospital, showing a negative growth throughout the four time periods. A similar, even clearer pattern can be recognised in Sweden, whereas in Norway and Denmark all university hospitals have continuously increased their publication output. Based on the overall growth rates for country totals, the same pairs appear, with Finland and Sweden showing slower growth rates and Denmark and Norway achieving higher figures.

Table 2.12: Number of fractionalised publications in Iceland*

	Volume				Average annual growth rate	Per cent of higher education sector output	Per cent increase
Iceland	1999-2002	2003-2006	2007-2010	2011-2014	1999-2014	2011-2014	1999-2014
Agricultural University of Iceland	17	12	17	28	5 %	1.9 %	101
Reykjavik University	1	9	84	138	-	9.5 %	-
University of Akureyri	9	23	46	49	18 %	3.3 %	1108
University of Iceland	397	515	742	995	7 %	68.0 %	187
Landspítali University Hospital	150	171	225	236	2 %	16.1 %	41
HES Other	5	8	9	17	20 %	1.1 %	1397
Other	205	264	310	352	6 %		154
HES Total	578	738	1122	1463	7 %		176
Iceland Total	784	1002	1432	1814	7 %		

*Data from Clarivate Analytics

Iceland has the highest growth among the Nordic countries. The universities of Reykjavik and Akureyri and the Agricultural University are all relatively young organisations in the process of developing their research capacity. Therefore, the number of publications from these universities is so low in the first period that the average annual growth rate and per cent increase is of little relevance. However, both the University of Iceland and Landspítali University Hospital show a large increase between the periods compared to the larger universities and university hospitals in other Nordic countries.

Table 2.13: Number of fractionalised publications in Norway*

	Volume				Average annual growth rate	Per cent of higher education sector output	Per cent increase
Norway	1999-2002	2003-2006	2007-2010	2011-2014	1999-2014	2011-2014	1999-2014
Nord University	23	40	111	187	17 %	0.9 %	986
Norwegian Business School	48	88	158	197	12 %	0.9 %	453
Norwegian School of Economics and Business Administration	79	109	165	166	3 %	0.8 %	60
Norwegian School of Sport Sciences	38	96	153	221	14 %	1.0 %	615
Norwegian University of Life Sciences	765	869	1117	1342	4 %	6.2 %	84
Norwegian University of Science and Technology	1710	2101	3329	4321	6 %	19.9 %	154
Oslo and Akershus University College of Applied Sciences	83	153	227	372	12 %	1.7 %	478
University College of Southeast Norway	63	66	155	302	16 %	1.4 %	814
University of Agder	45	86	155	370	17 %	1.7 %	955
University of Bergen	1736	2008	2602	2889	4 %	13.3 %	78
University of Oslo	2936	3117	4156	4925	3 %	22.7 %	57
University of Stavanger	106	147	364	473	12 %	2.2 %	458
University of Tromsø	814	881	1285	1572	5 %	7.2 %	101
St. Olavs Hospital	232	253	303	339	3 %	1.6 %	47
University Hospital North Norway	169	183	237	276	1 %	1.3 %	8
Bergen University Hospital	447	524	705	794	4 %	3.7 %	91
Oslo University Hospital	1536	1730	2128	2300	3 %	10.6 %	45
HES Other	144	176	464	686	12 %	3.2 %	462
Other	3737	4368	5561	7043	5 %		105
HES Total	10973	12626	17815	21731	5 %		101
Norway Total	14710	16994	23376	28774	5 %		102

*Data from Clarivate Analytics

Norway is represented by four broad universities (in Oslo, Bergen, Tromsø and the Norwegian University of Science and Technology in Trondheim), one agricultural university and three former university colleges that have recently acquired university status; the universities in Stavanger and Agder, and Nord University. In addition to this, Norway is represented by two business schools, three university colleges and four university hospitals.

All of the four broad universities have medical faculties and close cooperation with university hospitals. For the universities in Oslo and Bergen, this cooperation involves several hospitals, while the universities in Tromsø and Trondheim each have their own university hospital. There has been an increase in publication activity for all Norwegian universities and university hospitals included here, both in total and between all time periods studied. The growth has been especially marked in the smallest institutions. The Norwegian University of Science and Technology, however, also stands out with an increase in publication output from 1999 to 2014 that is twice as high as that found at the University of Bergen, and three times higher than the growth at the University of Oslo.

Swedish institutions in Table 2.14 have the lowest overall growth rates in publications between the four periods studied. There are large variations between Swedish institutions, and the growth has been modest at several of the larger universities compared to their equivalent institutions in other Nordic countries. The output from Swedish university hospitals seems to have decreased markedly, with all university hospitals showing negative growth rates (which is a trend observed in Finland as well). In the case of Sweden, this is probably due to a performance-based funding model that does not take the university hospitals into account and therefore predisposes researchers affiliated with a university and a university hospital to only use the university address when publishing.

The university colleges in Borås, Malmö and Gävle show the highest annual growth rates (14-15 per cent) alongside the universities in Örebro and Karlstad (15 and 14 per cent), while the four older, broad universities (Gothenburg, Lund, Stockholm and Uppsala) have increased their publication activity much less (all 3 per cent annual growth). In previous reports comparing the Nordic universities, this pattern was also observed, and it was suggested that the pattern could reflect funding schemes; using a one-year lag between funding (in constant prices) and output, the four small universities' funding increased by 28 per cent between 2000-2004 and 2005-2009 while their publication output increased by 84 per cent. The publication output of the four large universities increased by 5 per cent during the same period, while their funding increased by just 3 per cent (with a one-year time lag) (Piro et al., 2011). However, we have not investigated such an association between funding and publication output in conjunction with the results presented in this report.

Table 2.14: Number of fractionalised publications in Sweden*

	Volume				Average annual growth rate	Per cent of higher education sector output	Per cent increase
Sweden	1999-2002	2003-2006	2007-2010	2011-2014	1999-2014	2011-2014	1999-2014
Blekinge Institute of Technology	62	80	125	164	6 %	0.3 %	155
Borås University College	22	64	122	217	23 %	0.4 %	2142
Chalmers Univ. of Technology	2004	2166	2134	2793	3 %	5.4 %	57
Gävle University College	31	67	117	156	14 %	0.3 %	632
Jönköping University	58	86	198	259	13 %	0.5 %	524
Karlstad University	104	213	286	382	14 %	0.7 %	595
Karolinska Institutet	4243	4441	5642	6468	3 %	12.4 %	62
Linköping University	1748	1934	2259	3098	4 %	6.0 %	83
Linnaeus University	166	332	505	554	10 %	1.1 %	292
Luleå University of Technology	518	510	668	896	4 %	1.7 %	90
Lund University	4737	4974	5657	6871	3 %	13.2 %	56
Malmö University College	115	183	258	379	15 %	0.7 %	678
Mid Sweden University	178	203	311	446	10 %	0.9 %	297
Mälardalen University College	55	96	145	210	12 %	0.4 %	451
Royal Inst. of Technology (KTH)	2582	2973	3319	4172	4 %	8.0 %	79
Stockholm School of Economics	191	172	180	156	-2 %	0.3 %	-28
Stockholm University	2380	2525	2987	3612	3 %	6.9 %	62
Swedish Univ. Agr. Sciences	2095	2057	2135	2667	1 %	5.1 %	24
Södertörns University College	67	100	136	143	13 %	0.3 %	511
Umeå University	1852	1971	2413	2939	3 %	5.7 %	66
University of Gothenburg	3125	3195	3576	4392	3 %	8.4 %	46
Uppsala University	4536	4633	5057	6190	3 %	11.9 %	55
Örebro University	94	244	406	528	15 %	1.0 %	663
Karolinska University Hospital	2520	2144	1427	1152	-6 %	2.2 %	-57
Linköping University Hospital	415	403	337	171	-9 %	0.3 %	-75
Sahlgrenska University Hospital	1418	1207	1034	807	-4 %	1.6 %	-46
Skåne University Hospital	2069	1868	1322	750	-8 %	1.4 %	-70
University Hospital of Umeå	418	336	299	96	-14 %	0.2 %	-90
Uppsala University Hospital	1158	836	809	418	-9 %	0.8 %	-74
Örebro University Hospital	204	260	274	269	3 %	0.5 %	51
HES Other	204	335	479	655	12 %	1.3 %	415
Other	5969	6097	5920	6306	0 %		6
HES Total	39367	40610	44620	52013	2 %		40
Sweden Total	45336	46707	50540	58319	2 %		35

*Data from Clarivate Analytics

Comparing the HE sectors of the Nordic countries, we see that all HE sectors have increased their publication output from 1999-2014 (Figure 2.1). The visual impression from Figure 2.1 is important, because it provides some context for the somewhat modest numbers provided above for Sweden – and the very high numbers for Iceland.

Sweden’s growth rate has been lower than in other Nordic countries, but in absolute numbers, the increased publication volume is higher than it has been in e.g. Norway. Nevertheless, Norway shows a much higher growth rate because the publication baseline was initially much lower. Similarly, there has been a rapid growth in Denmark starting in the period 2007-2010. By contrast, the slower growth rate in publication activity in the Finnish HE sector becomes very clear.

Figure 2.1: Publication output (number of fractionalised publications) in Nordic HE sectors, 1999-2014*

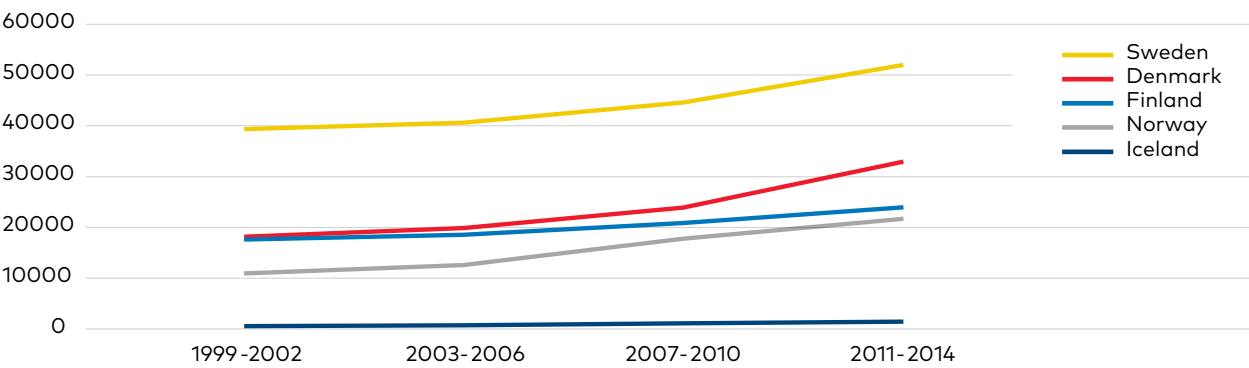
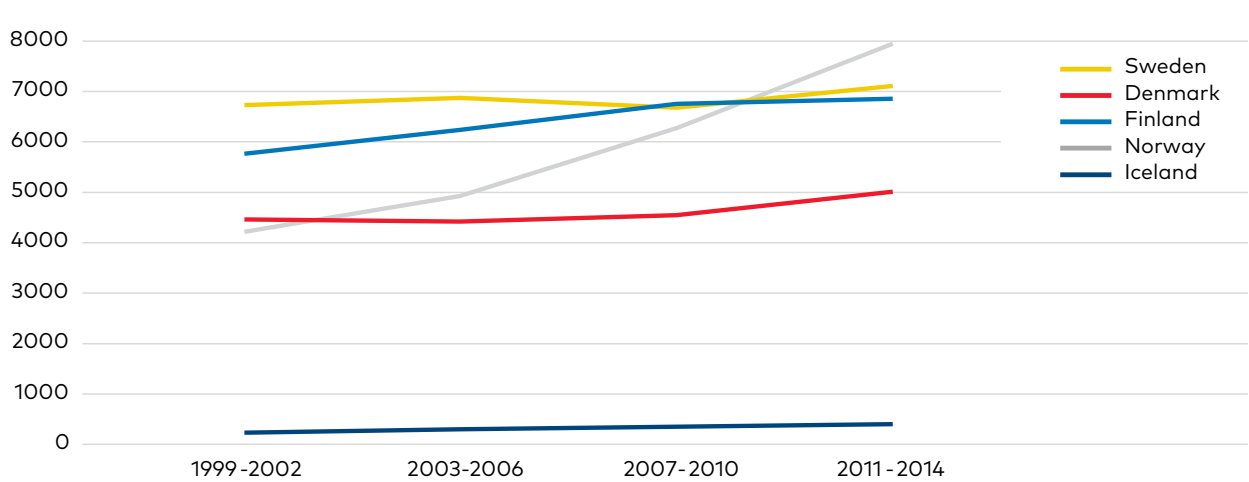


Figure 2.2, on the other hand, clearly demonstrates a Swedish stagnation in publishing outside of the HE sector, with a very modest increase in Denmark and a remarkable growth in Norway's publication output, which is now the highest amongst the Nordic countries.

Figure 2.2: Publication output of Other institutions, i.e. excluding HEIs (number of fractionalised publications) in the Nordic countries, 1999-2014*



*Data from Clarivate Analytics

2.3 International co-publications

In this section, we compare the Nordic countries' shares of international co-publications, i.e. publications with co-authors from other countries. We first look at each countries' HEIs, before looking at the Nordic HE sectors combined, studying differences in international collaboration for different scientific sub-fields.

The main impressions from Tables 2.15 to 2.19 is that with the exception of Iceland's HE sector (74 per cent international collaboration), there are practically no differences in the Nordic HE sectors' degree of international collaboration when we look at the time period 1999-2002, the time period 2011-2014, and the growth between these periods. If we look at the shares of international collaboration that are a result of bilateral collaboration with another Nordic country, the shares for Denmark, Finland and Sweden are around 10 per cent while the shares for Norway and Iceland are somewhat higher. In general, the university hospitals have higher shares of bilateral Nordic collaboration than the rest of the HE sector.

Table 2.15: Share of international co-publications for Denmark (whole counted)
(green colour = equal to or above the Nordic HE sector level)*

Denmark	1999-2002	2003-2006	2007-2010	2011-2014
Aalborg University	41 %	45 %	54 %	55 %
Aarhus University	47 %	50 %	57 %	60 %
Copenhagen Business School	37 %	37 %	50 %	59 %
Roskilde University	45 %	43 %	40 %	43 %
Technical University of Denmark	49 %	49 %	53 %	59 %
University of Copenhagen	47 %	51 %	56 %	61 %
University of Southern Denmark	50 %	51 %	56 %	57 %
Aalborg University Hospitals	32 %	39 %	49 %	44 %
Aarhus University Hospitals	34 %	40 %	46 %	47 %
Copenhagen University Hospitals	35 %	41 %	47 %	46 %
University of Southern Denmark Hospitals	30 %	32 %	41 %	45 %
HES Other	33 %	57 %	46 %	66 %
Other	45 %	49 %	53 %	56 %
HES Total	47 %	50 %	56 %	59 %
Denmark Total	48 %	52 %	57 %	61 %

*Data from Clarivate Analytics

In Denmark, the pattern is fairly similar to all Nordic countries except Iceland. The share of international co-publications from Denmark has increased from 48 per cent in 1999-2002 to 61 per cent in 2011-2014 (Table 2.15). In Finland the share has grown from 41 to 58 per cent in the same period (Table 2.16), in Norway from 44 to 59 per cent (Table 2.18) and in Sweden from 44 to 60 per cent (Table 2.19). The share of international co-publications from Iceland is much higher and has grown from 63 to 75 per cent (Table 2.17).

Table 2.16: Share of international co-publications for Finland (whole counted)
(green colour = equal to or above the Nordic HE sector level)*

Finland	1999-2002	2003-2006	2007-2010	2011-2014
Aalto University	41 %	41 %	48 %	56 %
Hanken School of Economics	41 %	49 %	45 %	54 %
Lappeenranta University of Technology	21 %	37 %	47 %	60 %
Tampere University of Technology	29 %	35 %	42 %	54 %
University of Eastern Finland	32 %	36 %	42 %	52 %
University of Helsinki	46 %	49 %	53 %	59 %
University of Jyväskylä	47 %	48 %	49 %	55 %
University of Lapland	65 %	54 %	48 %	48 %
University of Oulu	42 %	44 %	49 %	53 %
University of Tampere	31 %	30 %	37 %	43 %
University of Turku	38 %	43 %	50 %	57 %
University of Vaasa	35 %	55 %	41 %	53 %
Åbo Akademi University	41 %	43 %	48 %	54 %
Helsinki University Hospital	35 %	39 %	43 %	51 %
Kuopio University Hospital	24 %	29 %	32 %	44 %
Oulu University Hospital	19 %	30 %	33 %	43 %
Tampere University Hospital	29 %	31 %	35 %	44 %
Turku University Hospital	25 %	27 %	37 %	47 %
HES Other	50 %	52 %	57 %	66 %
Other	35 %	39 %	45 %	52 %
HES Total	40 %	44 %	50 %	56 %
Finland Total	41 %	45 %	51 %	58 %

*Data from Clarivate Analytics

Table 2.17: Share of international co-publications for Iceland (whole counted)
(green colour = equal to or above the Nordic HE sector level)*

Iceland	1999-2002	2003-2006	2007-2010	2011-2014
Agricultural University of Iceland	73 %	61 %	73 %	68 %
Reykjavik University	100 %	82 %	82 %	78 %
University of Akureyri	46 %	35 %	42 %	45 %
University of Iceland	60 %	60 %	67 %	73 %
Landspítali University Hospital	59 %	62 %	67 %	70 %
HES Other	86 %	72 %	73 %	85 %
Other	61 %	62 %	75 %	78 %
HES Total	62 %	63 %	69 %	74 %
Iceland Total	63 %	66 %	71 %	75 %

*Data from Clarivate Analytics

Table 2.18: Share of international co-publications for Norway (whole counted) (green colour = equal to or above the Nordic HE sector level)*

Norway	1999-2002	2003-2006	2007-2010	2011-2014
Nord University	26 %	22 %	40 %	48 %
Norwegian Business School	37 %	45 %	44 %	54 %
Norwegian School of Economics and Business Administration	36 %	38 %	47 %	53 %
Norwegian School of Sport Sciences	33 %	41 %	51 %	56 %
Norwegian University of Life Sciences	38 %	44 %	49 %	58 %
Norwegian University of Science and Technology	39 %	43 %	46 %	49 %
Oslo and Akershus University College of Applied Sciences	22 %	25 %	31 %	33 %
University College of Southeast Norway	27 %	42 %	42 %	45 %
University of Agder	45 %	40 %	52 %	62 %
University of Bergen	48 %	54 %	57 %	63 %
University of Oslo	43 %	51 %	52 %	56 %
University of Stavanger	30 %	42 %	37 %	46 %
University of Tromsø	47 %	49 %	53 %	57 %
St. Olavs Hospital	38 %	37 %	37 %	40 %
University Hospital North Norway	34 %	34 %	41 %	44 %
Bergen University Hospital	37 %	46 %	47 %	53 %
Oslo University Hospital	38 %	45 %	44 %	50 %
HES Other	45 %	46 %	45 %	55 %
Other	39 %	45 %	50 %	55 %
HES Total	43 %	50 %	52 %	57 %
Norway Total	44 %	51 %	54 %	59 %

*Data from Clarivate Analytics

Generally, for all the Nordic countries, there is little evidence of a size or age effect on international collaboration. Both small and large, and old and new universities have high shares of such collaboration. The only consistent finding from all countries (except Iceland) is that the university hospitals have lower shares of international collaboration. In the period 2011-2014, the most internationally oriented institution in Denmark was the University of Copenhagen (61 per cent), but this is hardly evidence of a size effect, as the smaller Danish HEIs (making up the category *HES Other*) had 66 per cent international collaboration (which, however, may be more susceptible to changes due to the small number of publications from these institutions). In Finland, Lappeenranta University of Technology had 60 per cent international collaboration, but also here the *HES Other* institutions had a higher share (66 per cent). In Iceland, the publications from *HES Other* institutions had a share of 85 per cent international collaboration, whereas in Norway the largest share was at the University of Bergen (63 per cent) followed by the much smaller university in Agder (62 per cent). In Sweden, Stockholm School of Economics had the highest share (69 per cent).

It should be noted, however, that the share of international collaboration varies between scientific fields (see Table 2.20), and therefore the research profile of a university might affect its overall share of internationally co-authored publications.

Table 2.19: Share of international co-publications for Sweden (whole counted) (green colour = equal to or above the Nordic HE sector level)*

Sweden	1999-2002	2003-2006	2007-2010	2011-2014
Blekinge Institute of Technology	42 %	29 %	34 %	52 %
Borås University College	18 %	21 %	36 %	35 %
Chalmers University of Technology	49 %	47 %	51 %	55 %
Gävle University College	31 %	34 %	34 %	38 %
Jönköping University	31 %	42 %	30 %	45 %
Karlstad University	40 %	35 %	38 %	43 %
Karolinska Institutet	45 %	51 %	58 %	63 %
Linköping University	35 %	37 %	41 %	48 %
Linnaeus University	35 %	37 %	45 %	46 %
Luleå University of Technology	40 %	43 %	43 %	48 %
Lund University	46 %	50 %	57 %	61 %
Malmö University College	40 %	38 %	39 %	45 %
Mid Sweden University	32 %	30 %	29 %	42 %
Mälardalen University College	21 %	20 %	28 %	37 %
Royal Institute of Technology (KTH)	45 %	46 %	56 %	61 %
Stockholm School of Economics	40 %	46 %	52 %	69 %
Stockholm University	47 %	52 %	58 %	63 %
Swedish University of Agricultural Sciences	41 %	48 %	54 %	60 %
Södertörns University College	39 %	39 %	43 %	40 %
Umeå University	43 %	46 %	50 %	56 %
University of Gothenburg	41 %	44 %	48 %	54 %
Uppsala University	46 %	49 %	55 %	60 %
Örebro University	26 %	30 %	37 %	38 %
Karolinska University Hospital	39 %	44 %	52 %	56 %
Linköping University Hospital	23 %	26 %	32 %	39 %
Sahlgrenska University Hospital	32 %	40 %	47 %	49 %
Skåne University Hospital	35 %	41 %	51 %	56 %
University Hospital of Umeå	32 %	39 %	47 %	52 %
Uppsala University Hospital	29 %	35 %	42 %	52 %
Örebro University Hospital	26 %	33 %	37 %	46 %
HES Other	26 %	32 %	36 %	40 %
Other	37 %	41 %	47 %	52 %
HES Total	44 %	48 %	54 %	59 %
Sweden Total	44 %	49 %	55 %	60 %

*Data from Clarivate Analytics

Table 2.20: Development of the share of international co-publications for the Nordic HE sectors in different subject fields (whole counted) (green colour = equal to or above the Nordic level)*

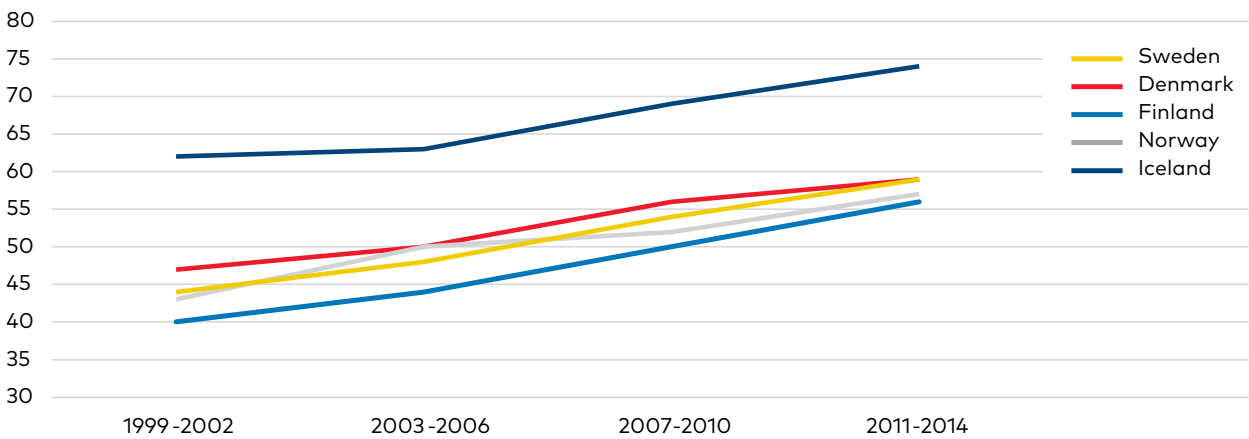
Subject field	1999-2002	2003-2006	2007-2010	2011-2014
Agriculture, Fisheries & Forestry	36 %	41 %	50 %	56 %
Biology	40 %	50 %	58 %	66 %
Biomedicine & Molecular Biosciences	45 %	49 %	55 %	61 %
Business Studies & Economics	33 %	35 %	41 %	49 %
Chemistry	43 %	44 %	53 %	59 %
Clinical Medicine	32 %	39 %	46 %	51 %
Computer & Information Sciences	38 %	38 %	47 %	55 %
Engineering	35 %	37 %	44 %	50 %
Geosciences	46 %	52 %	59 %	65 %
Health Sciences	31 %	35 %	42 %	47 %
Humanities	8 %	12 %	15 %	21 %
Materials Science	40 %	40 %	50 %	57 %
Mathematics & Statistics	48 %	47 %	53 %	61 %
Physics	61 %	61 %	66 %	70 %
Psychology	26 %	34 %	43 %	50 %
Social Sciences	23 %	26 %	29 %	35 %
Total	41 %	45 %	50 %	55 %

*Data from Clarivate Analytics

For most subject fields, the Nordic HE sectors combined have a share of international collaboration in the range of +/- 5 percentage points from the total average of 55 per cent (Table 2.20). International co-publications are most common in *Physics* (70 per cent), *Biology* (66 per cent) and *Geosciences* (65 per cent), and much lower in *Humanities* (21 per cent) and *Social Sciences* (35 per cent). However, the growth in international collaboration has generally been very high in these fields. Comparing the time periods 1999-2002 with 2011-2014, it is *Humanities* that have seen the largest growth in international collaboration (162 per cent), followed by *Psychology* (92 per cent) and *Biology* (65 per cent). The lowest growth levels have been in *Mathematics & Statistics* (27 per cent) and in *Physics* (15 per cent). For *Physics*, it must be noted that this subject field already had a very high share in 1999-2002, and is the most international of all fields in 2011-2014 with 70 per cent international collaboration. Fields where bilateral Nordic collaboration constitutes a small part of the international collaboration are *Mathematics & Statistics*, *Physics* and *Computer & Information Sciences*.

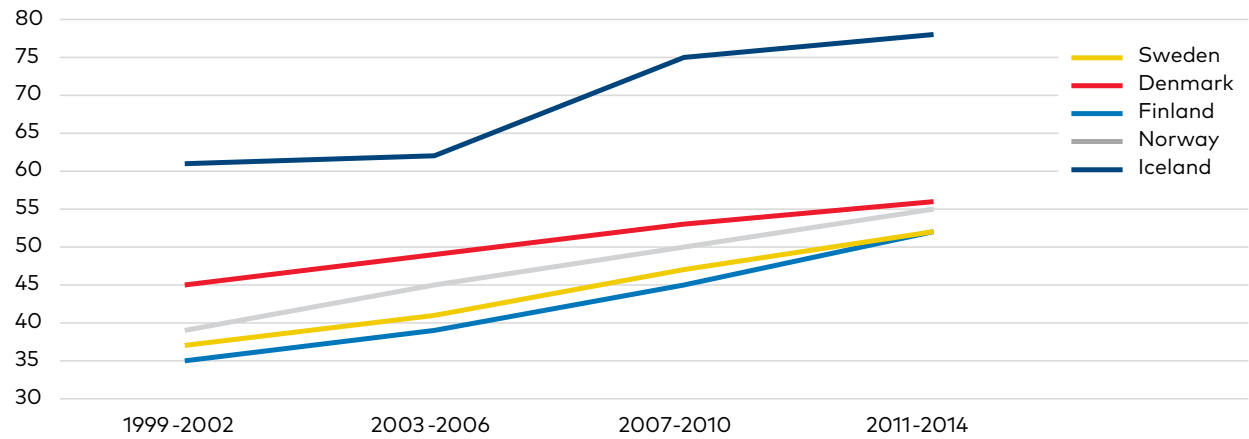
Illustrated in Figures 2.3 and 2.4, the growth is visible in all countries, both for the HE sectors (Figure 2.3) and for *Other* institutions (Figure 2.4). Apart from Iceland, the other four Nordic countries seem to follow the exact same path regarding international co-authorship.

Figure 2.3: Growth in HE sectors' shares of international collaboration, 1999-2014*



*Data from Clarivate Analytics

Figure 2.4: Growth in Other institutions' shares of international collaboration, 1999-2014*



*Data from Clarivate Analytics

3. RESEARCH PROFILES

The aim of this chapter is to demonstrate differences and similarities in the science research profiles of the Nordic higher education institutions (HEIs) by measuring their relative publication activities in the different subject fields. We have restricted the presentation of research profiles to the last four-year period (2011-2014). We present the percentages of fractionalised publication counts, distributed among the 16 major subject fields for each university and university hospital (Table 3.1 to Table 3.5). In Appendix 4, we set out the relative contribution of each university or university hospital (and the HE sectors compared to other institutions) to the overall national output within each subject field. However, the focus of Chapter 3 is the research profiles of the HEIs. Based on factor analysis we show how the HEIs group around different major domains, creating a figure that maps the HEIs' overall profiles (Figure 3.1). We then use polygons/radar charts to illustrate which subject fields the HEIs are specialised in (Figures 3.2 to 3.6).

3.1 Publications per research field for each Nordic HEI

Tables 3.1 to 3.5 present the percentage share of fractionalised publication counts distributed among major subject fields for each Nordic university, university college and university hospital. We use colours to describe the size of the publication output in each area of research relative to the size in the overall output for the national total, i.e. whether or not a HEI (or the HE sector) has a share equal to or above the national level. The publication numbers constituting the percentages in Table 3.1 to Table 3.5 are found in Appendix 5.

The *Danish* HEIs seem to form two groups. The first is a group of technical and natural science-oriented universities: Aalborg University, whose main research field is *Engineering*, and the Technical University of Denmark, whose main research fields are *Engineering* and *Physics*. The other universities can be considered as a group with broader portfolios, although Roskilde University with its strong emphasis on *Social Sciences* (and also *Humanities*) is linked more to Copenhagen Business School than to any other Danish HEI studied here. At the universities in Copenhagen, Southern Denmark and Aarhus, the fields *Biomedicine & Molecular Biosciences* and *Clinical Medicine* make up a very large part of the total publication output: 48, 37 and 27 per cent respectively.

Table 3.1: Different subject fields' share of the publication volume (fractionalised) in Denmark during 2011-2014, within each HEI (green colour = above the national level)*

Danish organisations	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering	Geo-sciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social sciences	Total
Aalborg University	2 %	1 %	10 %	2 %	4 %	7 %	5 %	34 %	3 %	5 %	3 %	3 %	2 %	7 %	2 %	10 %	100 %
Aarhus University	11 %	7 %	16 %	4 %	8 %	11 %	1 %	3 %	7 %	4 %	5 %	2 %	2 %	9 %	2 %	7 %	100 %
Copenhagen Business School	0 %	0 %	0 %	50 %	0 %	1 %	2 %	2 %	0 %	2 %	10 %	0 %	0 %	0 %	2 %	30 %	100 %
Roskilde University	3 %	6 %	10 %	3 %	7 %	2 %	2 %	1 %	5 %	3 %	9 %	1 %	2 %	12 %	1 %	32 %	100 %
Technical University of Denmark	6 %	3 %	12 %	1 %	12 %	2 %	2 %	24 %	6 %	1 %	0 %	8 %	2 %	19 %	0 %	1 %	100 %
University of Copenhagen	9 %	5 %	26 %	1 %	5 %	22 %	1 %	1 %	5 %	6 %	3 %	1 %	2 %	6 %	1 %	5 %	100 %
University of Southern Denmark	1 %	3 %	18 %	5 %	7 %	19 %	1 %	4 %	3 %	13 %	4 %	1 %	2 %	8 %	2 %	7 %	100 %
Aalborg University Hospitals	1 %	0 %	17 %	0 %	0 %	64 %	1 %	3 %	1 %	11 %	0 %	0 %	0 %	1 %	1 %	1 %	100 %
Aarhus University Hospitals	0 %	0 %	17 %	0 %	0 %	72 %	0 %	0 %	0 %	7 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
Copenhagen University Hospitals	0 %	0 %	20 %	0 %	0 %	69 %	0 %	0 %	0 %	8 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
University of Southern Denmark Hospitals	0 %	0 %	20 %	0 %	0 %	72 %	0 %	0 %	0 %	6 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
HES Other	2 %	5 %	1 %	1 %	2 %	3 %	40 %	4 %	3 %	5 %	11 %	0 %	7 %	2 %	0 %	14 %	100 %
Other	5 %	2 %	21 %	1 %	4 %	30 %	1 %	7 %	9 %	9 %	2 %	1 %	0 %	3 %	1 %	4 %	100 %
HES Total	6 %	4 %	18 %	2 %	6 %	26 %	1 %	7 %	4 %	6 %	3 %	2 %	2 %	8 %	1 %	5 %	100 %
Total	6 %	4 %	19 %	2 %	5 %	26 %	1 %	7 %	5 %	6 %	3 %	2 %	1 %	7 %	1 %	5 %	100 %

*Data from Clarivate Analytics

Compared to institutions that are not part of the Danish HE sector, the HEIs are in relative terms particularly more oriented towards *Physics*, *Biology*, *Chemistry* and *Mathematics & Statistics*. The Danish HE sector is less oriented towards *Geosciences* and the health-related fields compared to the institutions outside of the HE sector.

The *Finnish* universities seem to be divided into four groups. In the first group, the University of Tampere and University of Turku are strongly focused on health-related research; 60 and 42 per cent of the publications, respectively, are from the fields *Biomedicine & Molecular Biosciences*, *Clinical Medicine* and *Health Sciences*. It should also be noted that *Social Sciences* and *Humanities* are important subject fields at these universities.

The second group is formed by Aalto University and the technological universities in Tampere and Lappeenranta, which mainly publish in *Engineering*, *Physics*, *Materials Science*, *Chemistry* and *Computer & Information Sciences*. In addition, these universities have a relatively high share of publications within *Business Studies & Economics* as well, as both Aalto University and Lappeenranta University of Technology have higher shares of publications in this field than what is seen for both the HE sector and for the national total in Finland.

The third group contains HEIs oriented towards *Business Studies & Economics*; Hanken School of Economics, the University of Vaasa (with its emphasis on the combination *Business Studies & Economics* and *Engineering*) and the University of Lapland (having more than 60 per cent of its output in *Humanities*, *Social Sciences* and *Business Studies & Economics*). The fourth group contains HEIs with a more even distribution of publication activity across different subject fields.

There are some strong variations in subject field profiles of the Finnish HE sector and the institutions outside of the sector. The HE sector is more oriented in particular towards *Physics*, *Chemistry* and *Mathematics & Statistics*, and to some extent *Biomedicine and Molecular Biosciences*, *Humanities* and *Social Sciences*. Compared to the non-HE institutions, the HE sector is less oriented in particular towards *Agriculture, Fisheries & Forestry*, *Geosciences*, *Health Sciences* (and to a smaller degree *Clinical Medicine* as well).

Only in one field (*Agriculture, Fisheries & Forestry*) do we find a difference of more than 2 percentage points in a subject field's overall share of the publications, where the HE sector in this particular field has a lower share of the publications.

Table 3.2: Different subject fields' share of the publication volume (fractionalised) in Finland during 2011-2014, within each HEI (green colour = above the national level)*

Finnish organisations	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering	Geo-sciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social sciences	Total
Aalto University	1 %	1 %	4 %	6 %	10 %	2 %	6 %	26 %	2 %	0 %	1 %	9 %	4 %	24 %	1 %	3 %	100 %
Hanken School of Economics	1 %	0 %	0 %	72 %	0 %	2 %	3 %	4 %	0 %	1 %	1 %	0 %	1 %	0 %	1 %	13 %	100 %
Lappeenranta University of Technology	3 %	1 %	2 %	9 %	8 %	0 %	3 %	43 %	5 %	0 %	0 %	9 %	1 %	13 %	0 %	2 %	100 %
Tampere University of Technology	0 %	2 %	7 %	3 %	9 %	2 %	7 %	32 %	2 %	1 %	0 %	10 %	3 %	21 %	0 %	1 %	100 %
University of Eastern Finland	9 %	5 %	23 %	1 %	5 %	16 %	2 %	5 %	6 %	7 %	2 %	2 %	3 %	7 %	1 %	5 %	100 %
University of Helsinki	9 %	9 %	22 %	1 %	5 %	11 %	1 %	2 %	8 %	4 %	6 %	1 %	3 %	7 %	3 %	7 %	100 %
University of Jyväskylä	2 %	9 %	8 %	3 %	10 %	5 %	2 %	4 %	2 %	7 %	5 %	2 %	7 %	17 %	7 %	10 %	100 %
University of Lapland	3 %	10 %	0 %	8 %	0 %	0 %	0 %	0 %	17 %	5 %	13 %	0 %	0 %	0 %	1 %	41 %	100 %
University of Oulu	4 %	5 %	14 %	3 %	4 %	16 %	3 %	14 %	6 %	4 %	2 %	5 %	4 %	11 %	1 %	6 %	100 %
University of Tampere	0 %	1 %	16 %	3 %	1 %	30 %	3 %	1 %	0 %	14 %	5 %	0 %	3 %	0 %	5 %	17 %	100 %
University of Turku	4 %	9 %	18 %	3 %	6 %	18 %	3 %	3 %	2 %	6 %	4 %	2 %	3 %	9 %	3 %	6 %	100 %
University of Vaasa	1 %	1 %	2 %	48 %	0 %	1 %	3 %	18 %	2 %	1 %	3 %	0 %	8 %	2 %	1 %	9 %	100 %
Åbo Akademi University	3 %	4 %	13 %	2 %	20 %	3 %	3 %	18 %	3 %	2 %	4 %	11 %	2 %	3 %	3 %	6 %	100 %
Helsinki University Hospital	0 %	0 %	16 %	0 %	0 %	78 %	0 %	0 %	0 %	4 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
Kuopio University Hospital	0 %	0 %	24 %	0 %	0 %	60 %	0 %	2 %	0 %	9 %	0 %	0 %	0 %	1 %	1 %	1 %	100 %
Oulu University Hospital	0 %	0 %	15 %	0 %	0 %	73 %	0 %	0 %	0 %	7 %	0 %	0 %	0 %	0 %	2 %	1 %	100 %
Tampere University Hospital	0 %	0 %	21 %	0 %	0 %	68 %	0 %	0 %	0 %	6 %	0 %	0 %	0 %	0 %	2 %	0 %	100 %
Turku University Hospital	0 %	0 %	18 %	0 %	0 %	69 %	0 %	1 %	0 %	9 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
HES Other	3 %	4 %	10 %	5 %	3 %	13 %	7 %	7 %	2 %	8 %	3 %	3 %	2 %	22 %	1 %	5 %	100 %
Other	11 %	4 %	13 %	2 %	3 %	20 %	1 %	10 %	11 %	10 %	1 %	3 %	0 %	5 %	1 %	4 %	100 %
HES Total	4 %	5 %	15 %	3 %	6 %	18 %	2 %	9 %	4 %	5 %	3 %	4 %	3 %	10 %	2 %	6 %	100 %
Total	6 %	5 %	15 %	3 %	5 %	18 %	2 %	9 %	5 %	6 %	3 %	3 %	3 %	9 %	2 %	5 %	100 %

*Data from Clarivate Analytics

Table 3.3: Different subject fields' share of the publication volume (fractionalised) in Iceland during 2011-2014, within each HEI (green colour = above the national level)*

Icelandic organisations	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer-ing	Geo-sciences	Health Sciences	Human-ities	Materials Science	Mathe-matics & Statistics	Physics	Psychology	Social ciences	Total
Agricultural University of Iceland	65 %	15 %	1 %	0 %	0 %	0 %	0 %	0 %	17 %	0 %	0 %	0 %	0 %	0 %	0 %	2 %	100 %
Reykjavik University	0 %	1 %	7 %	7 %	0 %	2 %	15 %	31 %	1 %	4 %	1 %	2 %	7 %	11 %	4 %	6 %	100 %
University of Akureyri	4 %	1 %	13 %	6 %	8 %	7 %	2 %	5 %	4 %	21 %	3 %	0 %	0 %	4 %	1 %	22 %	100 %
University of Iceland	4 %	6 %	11 %	2 %	4 %	15 %	1 %	5 %	14 %	8 %	6 %	1 %	1 %	11 %	3 %	7 %	100 %
Landspítali University Hospital	1 %	0 %	12 %	0 %	0 %	69 %	0 %	0 %	1 %	13 %	0 %	0 %	0 %	0 %	2 %	1 %	100 %
HES Other	25 %	47 %	12 %	2 %	0 %	0 %	0 %	0 %	0 %	0 %	3 %	0 %	0 %	0 %	3 %	9 %	100 %
Other	14 %	11 %	12 %	1 %	2 %	15 %	0 %	6 %	19 %	6 %	6 %	1 %	1 %	1 %	2 %	3 %	100 %
HES Total	5 %	5 %	11 %	2 %	3 %	22 %	2 %	6 %	10 %	8 %	4 %	1 %	2 %	9 %	3 %	6 %	100 %
Total	7 %	6 %	11 %	2 %	3 %	21 %	2 %	6 %	12 %	8 %	5 %	1 %	1 %	7 %	3 %	6 %	100 %

*Data from Clarivate Analytics

In *Iceland*, the University of Akureyri and University of Iceland have fairly broad and general research profiles. The University of Akureyri is especially oriented towards *Social Sciences* and *Health Sciences*, whereas the two largest subject fields at the University of Iceland are *Clinical Medicine* and *Geosciences*. Reykjavik University stands out as a more specialised technical university in our analysis. Compared to institutions outside the HE sector, the Icelandic HE sector is clearly more specialised in *Clinical Medicine* and *Physics*, and also has higher shares of more than 2 percentage points in *Health Sciences*, *Computer & Information Sciences* and *Social Sciences*. The HE sector is less specialised in three fields in particular: *Geosciences*, *Agriculture, Fisheries & Forestry* and *Biology* (and to a smaller degree towards *Humanities* as well).

Table 3.4: Different subject fields' share of the publication volume (fractionalised) in Norway during 2011-2014, within each HEI (green colour = above the national level)*

Norwegian organisations	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social sciences	Total
Nord University	15 %	13 %	17 %	5 %	0 %	2 %	1 %	2 %	2 %	19 %	3 %	0 %	1 %	0 %	1 %	18 %	100 %
Norwegian Business School	0 %	0 %	0 %	59 %	0 %	0 %	2 %	3 %	1 %	2 %	3 %	0 %	2 %	0 %	12 %	16 %	100 %
Norwegian School of Economics and Business Administration	4 %	1 %	0 %	54 %	0 %	0 %	1 %	7 %	1 %	0 %	7 %	0 %	5 %	2 %	3 %	15 %	100 %
Norwegian School of Sport Sciences	0 %	0 %	9 %	0 %	0 %	15 %	0 %	1 %	0 %	60 %	2 %	0 %	0 %	0 %	4 %	9 %	100 %
Norwegian University of Life Sciences	38 %	12 %	22 %	2 %	2 %	2 %	0 %	3 %	7 %	2 %	0 %	0 %	1 %	1 %	1 %	5 %	100 %
Norwegian University of Science and Technology	3 %	4 %	8 %	2 %	6 %	10 %	3 %	24 %	5 %	6 %	3 %	5 %	4 %	10 %	2 %	6 %	100 %
Oslo and Akershus University College of Applied Sciences	1 %	1 %	4 %	4 %	1 %	9 %	1 %	2 %	1 %	24 %	5 %	0 %	3 %	6 %	4 %	34 %	100 %
University College of Southeast Norway	2 %	4 %	3 %	2 %	5 %	8 %	3 %	20 %	3 %	16 %	5 %	7 %	1 %	10 %	3 %	9 %	100 %
University of Agder	1 %	0 %	2 %	6 %	0 %	3 %	7 %	26 %	1 %	13 %	8 %	1 %	12 %	3 %	3 %	14 %	100 %
University of Bergen	3 %	7 %	15 %	1 %	3 %	19 %	3 %	4 %	12 %	8 %	4 %	0 %	4 %	4 %	4 %	7 %	100 %
University of Oslo	2 %	5 %	16 %	2 %	6 %	17 %	1 %	3 %	8 %	8 %	6 %	1 %	3 %	8 %	4 %	10 %	100 %
University of Stavanger	4 %	1 %	4 %	8 %	3 %	5 %	1 %	32 %	4 %	8 %	5 %	1 %	4 %	4 %	3 %	13 %	100 %
University of Tromsø	5 %	9 %	15 %	2 %	5 %	18 %	1 %	2 %	10 %	11 %	7 %	0 %	2 %	4 %	2 %	7 %	100 %
St. Olavs Hospital	0 %	0 %	16 %	0 %	0 %	63 %	0 %	1 %	0 %	14 %	0 %	0 %	0 %	1 %	2 %	1 %	100 %
University Hospital North Norway	0 %	0 %	16 %	0 %	0 %	57 %	1 %	0 %	0 %	21 %	0 %	0 %	0 %	0 %	2 %	1 %	100 %
Bergen University Hospital	0 %	0 %	19 %	0 %	0 %	67 %	0 %	0 %	0 %	8 %	0 %	0 %	0 %	0 %	3 %	1 %	100 %
Oslo University Hospital	0 %	0 %	24 %	0 %	1 %	62 %	0 %	1 %	0 %	8 %	0 %	0 %	0 %	0 %	2 %	1 %	100 %
HES Other	4 %	8 %	3 %	5 %	0 %	5 %	2 %	6 %	9 %	19 %	12 %	1 %	2 %	3 %	3 %	20 %	100 %
Other	11 %	8 %	9 %	3 %	3 %	13 %	1 %	10 %	15 %	9 %	1 %	2 %	1 %	3 %	2 %	9 %	100 %
HES Total	4 %	5 %	14 %	3 %	4 %	21 %	2 %	8 %	6 %	9 %	4 %	1 %	3 %	5 %	3 %	8 %	100 %
Total	6 %	6 %	13 %	3 %	3 %	19 %	2 %	9 %	8 %	9 %	3 %	2 %	2 %	5 %	3 %	8 %	100 %

*Data from Clarivate Analytics

The Norwegian universities can be divided into three groups. The first group contains the three universities of Bergen, Oslo and Tromsø, all of which have broad research profiles (and where *Clinical Medicine* and *Biomedicine & Molecular Biosciences* are the two largest subject fields). The more technologically oriented University of Stavanger and Norwegian University of Science and Technology in Trondheim make up a second group – although they both have large shares of publications in *Social Sciences*, especially the University of Stavanger. Some of the other smaller HEIs, such as the University in Agder and the University College of Southeast Norway, also have a large share of publications in *Engineering*, in addition to *Health Sciences* and *Social Sciences*. The Norwegian University of Life Sciences stands apart from these first two groups, as it has a specialised profile corresponding closely to its origins as an agricultural college.

Comparing the HE sector to institutions outside of the sector, the HE sector has higher shares of its publishing in *Biomedicine & Molecular Biosciences* and *Clinical Medicine* in particular, but also in *Humanities* and *Mathematics & Statistics*. By contrast, the HE sector has lower shares especially in *Agriculture, Forestry & Fisheries* and *Geosciences*, and to a lesser degree in *Biology*, *Engineering*, *Physics* and *Mathematics & Statistics* as well.

Table 3.5: Different subject fields' share of the publication volume (fractionalised) in Sweden during 2011-2014, within each HEI (green colour = above the national level)*

Swedish organisations	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engi-neering	Geo-sciences	Health Sciences	Human-ities	Materials Science	Mathe-matics & Statistics	Physics	Psychology	Social sciences	Total
Blekinge Institute of Technology	0 %	0 %	0 %	4 %	0 %	5 %	26 %	29 %	2 %	12 %	0 %	1 %	2 %	10 %	1 %	8 %	100 %
Borås University College	1 %	0 %	7 %	3 %	15 %	7 %	6 %	13 %	2 %	13 %	2 %	13 %	1 %	4 %	0 %	13 %	100 %
Chalmers University of Technology	1 %	1 %	7 %	2 %	13 %	1 %	3 %	31 %	4 %	1 %	0 %	8 %	3 %	22 %	0 %	2 %	100 %
Gävle University College	1 %	1 %	4 %	2 %	0 %	6 %	1 %	20 %	6 %	29 %	2 %	0 %	3 %	2 %	12 %	12 %	100 %
Jönköping University	0 %	0 %	1 %	20 %	1 %	14 %	2 %	8 %	0 %	29 %	1 %	3 %	6 %	1 %	1 %	13 %	100 %
Karlstad University	4 %	5 %	5 %	10 %	5 %	5 %	0 %	12 %	2 %	13 %	3 %	6 %	6 %	7 %	3 %	15 %	100 %
Karolinska Institutet	0 %	1 %	33 %	0 %	1 %	45 %	0 %	0 %	0 %	14 %	0 %	0 %	0 %	0 %	3 %	1 %	100 %
Linköping University	1 %	1 %	11 %	2 %	5 %	20 %	3 %	11 %	2 %	9 %	2 %	6 %	3 %	14 %	3 %	7 %	100 %
Linnaeus University	3 %	9 %	13 %	6 %	4 %	4 %	1 %	9 %	6 %	9 %	7 %	3 %	6 %	8 %	2 %	10 %	100 %
Luleå University of Technology	4 %	0 %	2 %	4 %	7 %	1 %	2 %	34 %	10 %	5 %	0 %	11 %	4 %	10 %	1 %	4 %	100 %
Lund University	3 %	4 %	18 %	3 %	6 %	24 %	1 %	8 %	4 %	7 %	3 %	2 %	1 %	8 %	2 %	5 %	100 %
Malmö University College	0 %	1 %	5 %	1 %	6 %	40 %	1 %	4 %	0 %	11 %	9 %	3 %	1 %	3 %	1 %	15 %	100 %
Mid Sweden University	3 %	2 %	4 %	4 %	4 %	5 %	1 %	16 %	2 %	21 %	1 %	11 %	3 %	8 %	2 %	14 %	100 %
Mälardalen University College	2 %	0 %	1 %	3 %	2 %	6 %	10 %	30 %	4 %	18 %	3 %	2 %	2 %	1 %	3 %	13 %	100 %
Royal Institute of Technology (KTH)	1 %	1 %	6 %	2 %	14 %	2 %	3 %	28 %	3 %	1 %	1 %	9 %	4 %	23 %	0 %	3 %	100 %
Stockholm School of Economics	0 %	0 %	1 %	72 %	0 %	4 %	0 %	3 %	0 %	1 %	3 %	0 %	1 %	0 %	1 %	14 %	100 %
Stockholm University	2 %	7 %	13 %	4 %	11 %	3 %	1 %	2 %	13 %	4 %	8 %	2 %	2 %	11 %	3 %	12 %	100 %
Swedish University of Agricultural Sciences	45 %	17 %	15 %	1 %	2 %	1 %	0 %	4 %	9 %	2 %	0 %	1 %	1 %	0 %	0 %	3 %	100 %
Södertörns University College	2 %	3 %	6 %	2 %	1 %	2 %	0 %	2 %	3 %	6 %	34 %	0 %	0 %	0 %	1 %	38 %	100 %
Umeå University	3 %	4 %	19 %	2 %	4 %	23 %	1 %	3 %	4 %	14 %	3 %	1 %	3 %	5 %	2 %	8 %	100 %
University of Gothenburg	2 %	5 %	21 %	4 %	3 %	28 %	1 %	2 %	4 %	9 %	4 %	1 %	2 %	4 %	3 %	10 %	100 %
Uppsala University	2 %	5 %	22 %	2 %	7 %	19 %	1 %	5 %	4 %	4 %	3 %	4 %	3 %	11 %	2 %	5 %	100 %
Örebro University	2 %	1 %	11 %	4 %	3 %	19 %	3 %	4 %	5 %	15 %	2 %	0 %	1 %	1 %	10 %	19 %	100 %
Karolinska University Hospital	0 %	0 %	24 %	0 %	1 %	66 %	0 %	0 %	0 %	6 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
Linköping University Hospital	0 %	0 %	13 %	0 %	1 %	70 %	0 %	1 %	0 %	12 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
Sahlgrenska University Hospital	0 %	0 %	15 %	0 %	0 %	72 %	0 %	1 %	1 %	10 %	0 %	0 %	0 %	0 %	0 %	0 %	100 %
Skåne University Hospital	0 %	0 %	17 %	0 %	0 %	72 %	0 %	0 %	1 %	9 %	0 %	0 %	0 %	0 %	0 %	0 %	100 %
University Hospital of Umeå	0 %	0 %	13 %	0 %	0 %	75 %	0 %	0 %	0 %	8 %	0 %	0 %	0 %	0 %	3 %	0 %	100 %
Uppsala University Hospital	0 %	0 %	16 %	0 %	1 %	72 %	0 %	1 %	1 %	8 %	0 %	0 %	0 %	0 %	1 %	0 %	100 %
Örebro University Hospital	0 %	1 %	20 %	0 %	0 %	66 %	0 %	0 %	1 %	10 %	0 %	0 %	0 %	0 %	0 %	1 %	100 %
HES Other	1 %	3 %	5 %	4 %	0 %	13 %	4 %	11 %	2 %	25 %	5 %	3 %	2 %	2 %	5 %	15 %	100 %
Other	6 %	3 %	15 %	3 %	5 %	23 %	1 %	11 %	7 %	9 %	2 %	4 %	0 %	6 %	1 %	4 %	100 %
HES Total	4 %	4 %	17 %	2 %	6 %	22 %	1 %	8 %	4 %	8 %	3 %	3 %	2 %	8 %	2 %	6 %	100 %
Total	4 %	4 %	17 %	2 %	6 %	22 %	1 %	9 %	4 %	8 %	2 %	3 %	2 %	8 %	2 %	6 %	100 %

*Data from Clarivate Analytics

Sweden is the only Nordic country to have a specialised medical university, Karolinska Institutet, where 92 per cent of the output is in the fields *Clinical Medicine*, *Health Sciences* and *Biomedicine & Molecular Biosciences*. The Swedish University of Agricultural Sciences has almost half (45 per cent) of its total output in *Agriculture, Fisheries & Forestry*, but still retains a relatively broad profile. The three technical universities also have relatively broad subject profiles, and although *Engineering* is the largest field at all of them, they differ somewhat in terms of what is the other most dominant subject field. For the Royal Institute of Technology (KTH) and Chalmers University of Technology it is *Physics*, whereas at Luleå University of Technology the second place is a tie between *Materials Science*, *Geosciences* and *Physics*. Furthermore, *Engineering* is the most dominant subject field at Blekinge Institute of Technology (closely followed by *Computer & Information Sciences*) and Mälardalen University College. For most of the other (smaller) HEIs, *Health Sciences* is the dominant subject field, and they have relatively high shares in *Social Sciences*. The exceptions to this rule are two HEIs highly specialised in fields related to *Social Sciences*. The first, for obvious reasons, is Stockholm School of Economics, and the second is Södertörns University College, which has almost 75 per cent of its publications in *Humanities* and *Social Sciences*, including *Business Studies & Economics*.

The larger universities have broader subject profiles. At universities such as Lund and Uppsala the concentration of one or more fields are less pronounced, i.e. in Lund where only *Clinical Medicine* (24 per cent) and *Biomedicine & Molecular Biosciences* (18 per cent) have shares above 10 per cent, and in Uppsala where the two same fields (19 and 22 per cent respectively) and *Physics* (11 per cent) have shares above 10 per cent.

In general, there is less diversity in the specialisation between the HE sector and the institutions outside of the sector in Sweden than what is observed in other Nordic countries, as there are fewer subject fields where the shares differ by 2 percentage points or more. In Sweden, the HE sector is more specialised (by just 2 percentage points) in *Biomedicine & Molecular Biosciences*, *Mathematics & Statistics*, *Physics* and *Social Sciences*, and less specialised in *Agriculture, Fisheries & Forestry* (2 percentage points), *Engineering* and *Geosciences* (both 3 percentage points).

3.2 University profiles according to their publication output

In this section we provide a graphic representation of the research profiles of the universities and university colleges (not the hospitals) to get an impression of their scientific proximity to each other. We performed a factor analysis to identify how universities and university colleges cluster together (based on correlating subject profiles). Factor analysis is a dimensionality reduction technique. Its purpose is to identify a relatively small number of latent themes, dimensions or factors underlying a larger set of variables. This is done by distinguishing sets of variables that have more in common with each other than with the other variables in the analysis. What the subsets of variables have in common is the underlying dimension or factors. In the present analysis, the 16 research fields are the initial (subject) dimensions that are targeted for reduction. After reduction, the universities are clustered in relation to the reduced number of subject dimensions. The analysis is based on the HEIs' research profiles for the fourth period (2011-2014), as shown in Tables 3.1 to 3.5. The results of the factor analysis are shown in Figure 3.1; each country's HEIs are highlighted with different colours, and the size of the circles indicates the size of each HEIs' total research publication production. The university hospitals are not included in the factor analysis as they are too specialised.

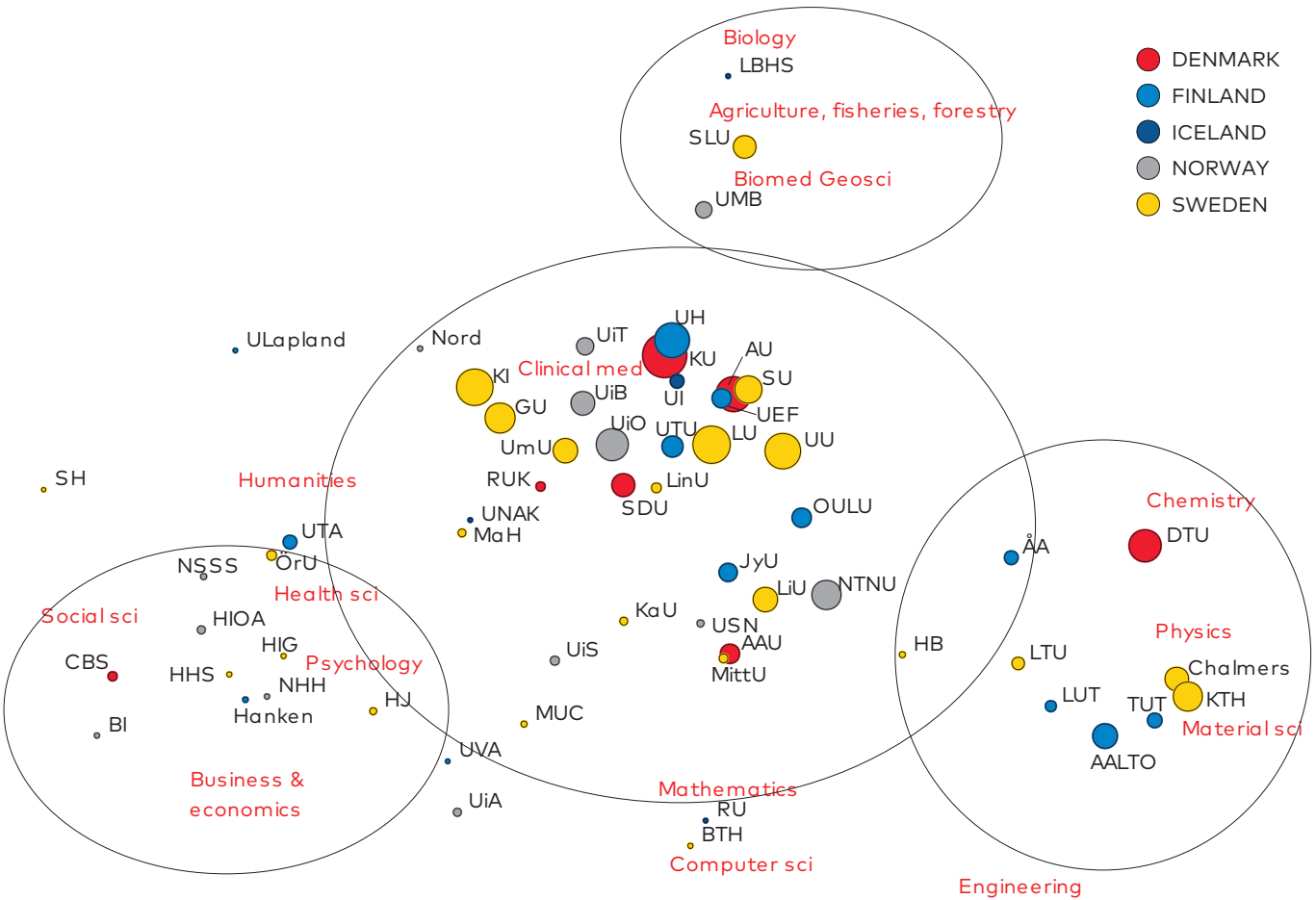
Figure 3.1 can be interpreted in the following way: the HEIs are positioned in the figure roughly according to how similar their research profiles are. The closer they are positioned to each other, the more similar their research profiles are likely to be. Conversely, if the distance between two universities (or groups of universities) is long, then they are probably less comparable. This is an important perspective to offer in the ranking-oriented area of university performance indicators, as most international rankings do not take into consideration that the universities have very different profiles.

The factor analysis reduces the initial 16 subject fields to what appears to be four latent main dimensions. These main dimensions are illustrated in Figure 3.1 as the four clustered areas, although the lines are difficult to draw between them. The four main dimensions that emerge from the analysis are the "applied technical sciences" (to the east in the map), "health and social sciences (incl. business and economics)" (to the west in the map), "agricultural sciences" (to the north in the map) and HEIs with a broad portfolio of subject fields at the centre of Figure 3.1. In the latter, the institutions are typically the older, more traditional universities that include a variety of faculties, where the publication production of medical fields typically comprises about 40 per cent of the total annual research output.

The universities/university colleges are identified using the following acronyms in the figure:

Aalborg University	DEN	AAU
Aarhus University	DEN	AU
Copenhagen Business School	DEN	CBS
Roskilde University	DEN	RUC
Technical University of Denmark	DEN	DTU
University of Copenhagen	DEN	KU
University of Southern Denmark	DEN	SDU
Aalto University	FIN	AALTO
Hanken School of Economics	FIN	Hanken
Åbo Akademi University	FIN	ÅA
Tampere University of Technology	FIN	TUT
University of Eastern Finland	FIN	UEF
University of Helsinki	FIN	UH
University of Jyväskylä	FIN	JyU
University of Lapland	FIN	ULapland
University of Oulu	FIN	OULU
University of Tampere	FIN	UTA
University of Turku	FIN	UTU
University of Vaasa	FIN	UVA
Agricultural University of Iceland	ICE	LBHS
Reykjavik University	ICE	RU
University of Akureyri	ICE	UNAK
University of Iceland	ICE	UI
Nord University	NOR	Nord
Norwegian Business School	NOR	BI
Norwegian School of Economics and Business Administration	NOR	NHH
Norwegian University of Sport Sciences	NOR	NSSS
Norwegian University of Life Sciences	NOR	UMB
Norwegian University of Science and Technology	NOR	NTNU
Oslo and Akershus University College of Applied Sciences	NOR	HiOA
University College of Southeast Norway	NOR	USN
University of Agder	NOR	UiA
University of Bergen	NOR	UiB
University of Oslo	NOR	UiO
University of Stavanger	NOR	UiS
University of Tromsø	NOR	UiT
Blekinge Institute of Technology	SWE	BTH
Borås University College	SWE	HB
Chalmers University of Technology	SWE	Chalmers
Gävle University College	SWE	HIG
Jönköping University	SWE	HJ
Karlstad University	SWE	KaU
Karolinska Institutet	SWE	KI
Linköping University	SWE	LiU
Linnaeus University	SWE	LinU
Luleå University of Technology	SWE	LTU
Lund University	SWE	LU
Malmö University College	SWE	MaH
Mid Sweden University	SWE	MittU
Mälardalen University College	SWE	MUC
Royal Institute of Technology	SWE	KTH
Stockholm School of Economics	SWE	HHS
Stockholm University	SWE	SU
Swedish University of Agricultural Sciences	SWE	SLU
Södertörn University College	SWE	SH
Umeå University	SWE	UmeU
University of Gothenburg	SWE	GU
Uppsala University	SWE	UU
Örebro University	SWE	ÖrU

Figure 3.1: Factor analysis grouping Nordic universities and university colleges by bibliometric research profiles. The symbol size is proportional to total research publication productivity.



3.3 Relative Specialisation Index (RSI)

We have now described the distribution of subject fields at the Nordic universities and university colleges and grouped them along four major dimensions. In this section, we will elaborate on these findings by calculating the Relative Specialisation Index (RSI) for each university (college) (defined in *REIST-2*, 1997). The RSI gives an overview of an institution's research profile (or specialisation) by comparing the shares of fields of science among the institution's total publications to the overall shares of each field among the world's total publications.

The symmetric RSI is a relative indicator based upon the Activity Index (AI), which is defined as:

$$AI = \frac{\text{the share of the given field in the publications of the given university}}{\text{the share of the given field in the world total of publications}}$$

The RSI is then defined as:

$$RSI = \frac{AI - 1}{AI + 1}$$

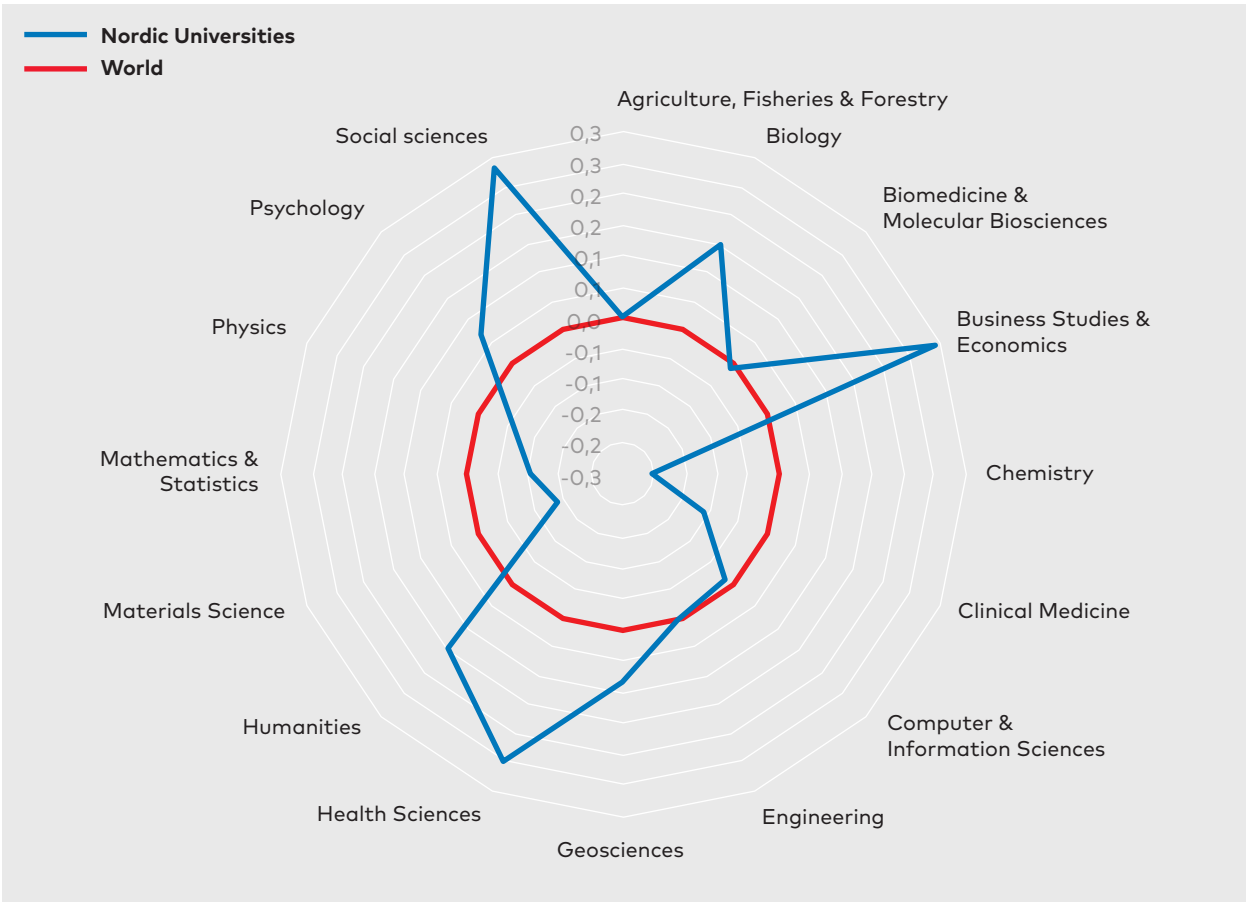
The RSI values range from -1 to 1. The value indicates whether a HEI has a higher-than-average activity than the world in a scientific field (RSI >0) or a lower-than-average activity (RSI <0).

RSI = 0 reflects that a HEI has an activity level which corresponds completely with the world average.

It is important to note that the RSI reflects a certain internal balance among the fields at the given HEI; positive RSI values must always be balanced by negative ones, as no HEI can have only positive RSI values (or only negative values for that matter). As a benchmark, an RSI = 0 value is used for all research fields, which corresponds to the "world standard case" as graphically presented by a red line in the following figures. The numbers behind the graphical presentation of the RSIs in this section are presented in detail in Appendix 6.

In this chapter we present the RSIs using radar charts, offering a visual presentation of each HEI's research publication activity in the 16 subject fields. Figure 3.2 shows that when we consider all the Nordic universities and university colleges in comparison to the world, they appear to have a specialisation profile that in particular favours *Social Sciences* (including *Business Studies and Economics*), *Humanities* and *Health Sciences* – and to a lesser degree *Biology*, *Geosciences* and *Psychology*. There are three fields where the Nordic HE sectors stand out with a much lower degree of specialisation than the world average: *Chemistry*, *Materials Science* and *Mathematics & Statistics*.

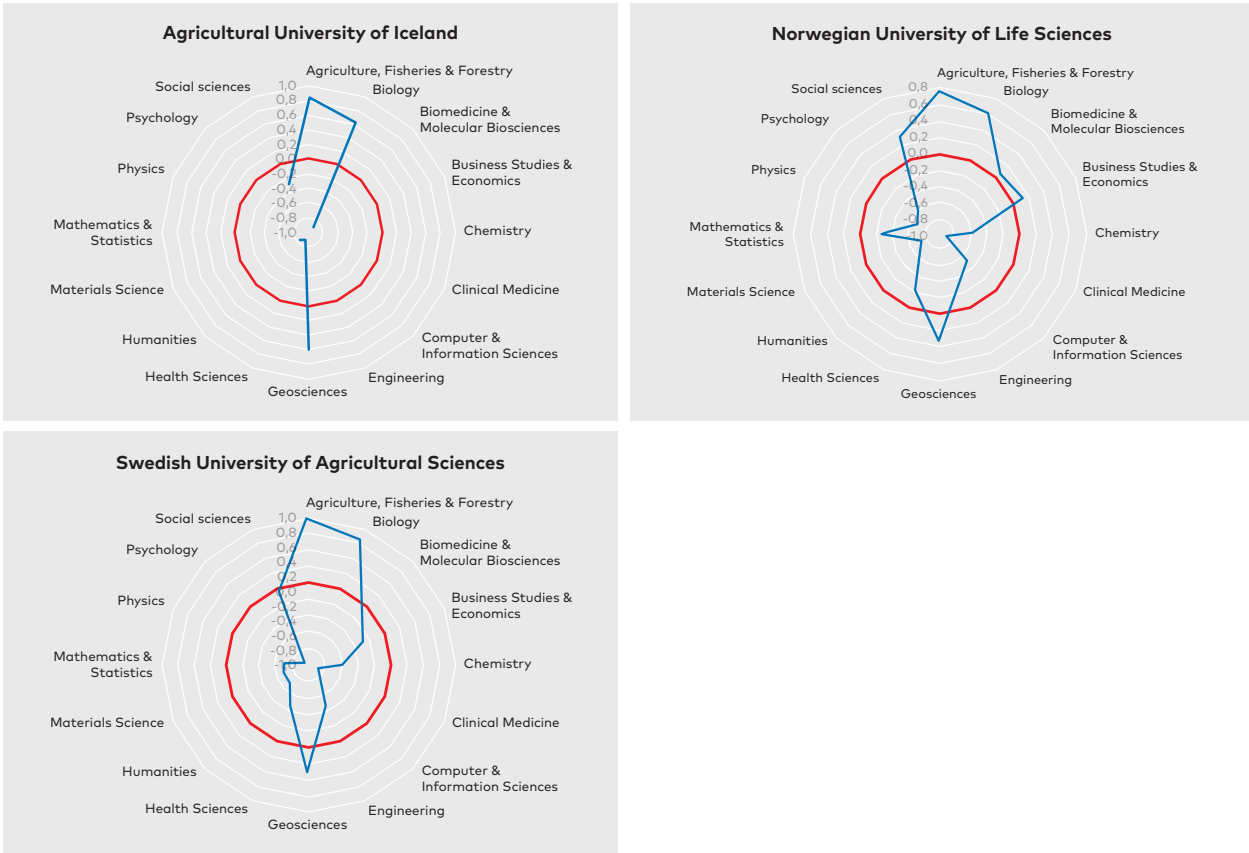
Figure 3.2: Nordic HEIs' (excluding university hospitals) Relative Specialisation Index (RSI) compared to the world (2011-2014)*



*Data from Clarivate Analytics

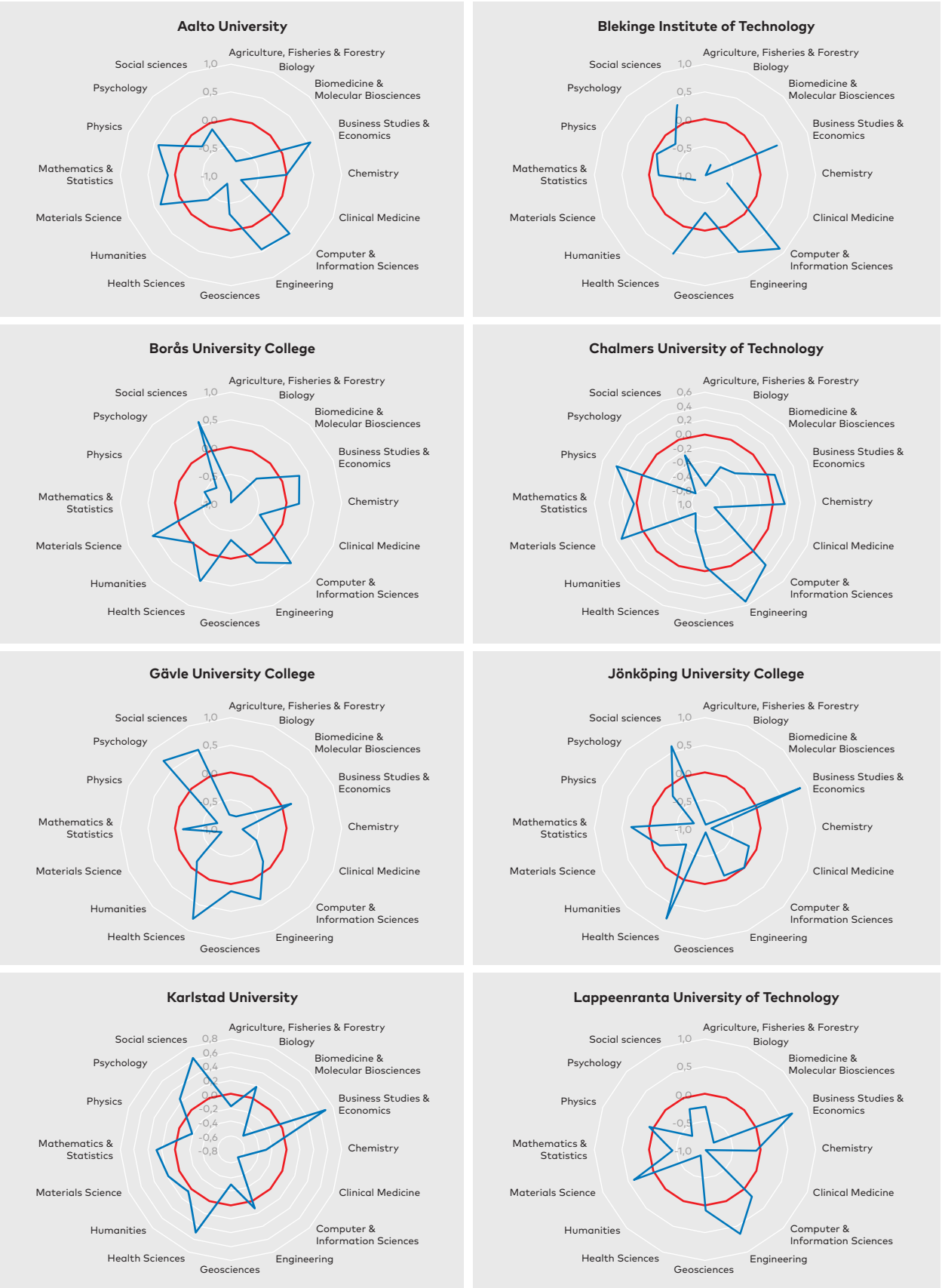
Similar specialisation diagrams (based on the RSI) for each of the Nordic HEIs (excluding the university hospitals) are presented in the following section, where the universities and university colleges are grouped based primarily on their position in Figure 3.1: the agricultural HEIs (Figure 3.3), HEIs without a medical faculty (Figure 3.4), HEIs with a medical faculty (Figure 3.5), and business schools (Figure 3.6). Because it is difficult to draw a clear line between technical and general HEIs, we have used the presence of a medical or health faculty to distinguish technical from general HEIs. The RSI numbers for all HEIs (and subject fields) are found in Appendix 6.

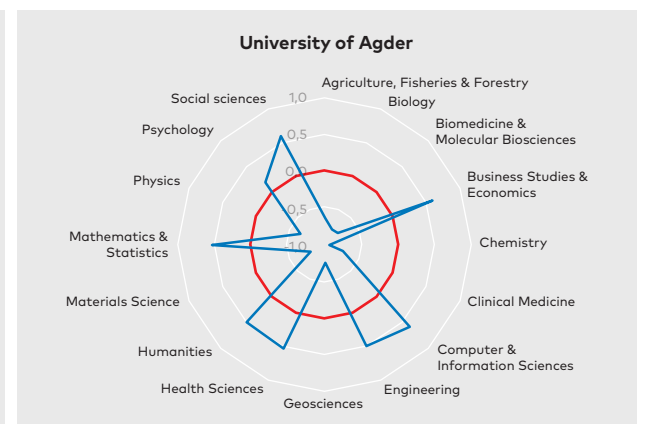
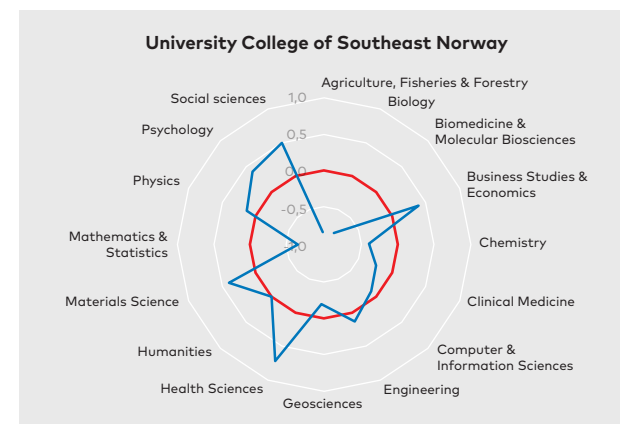
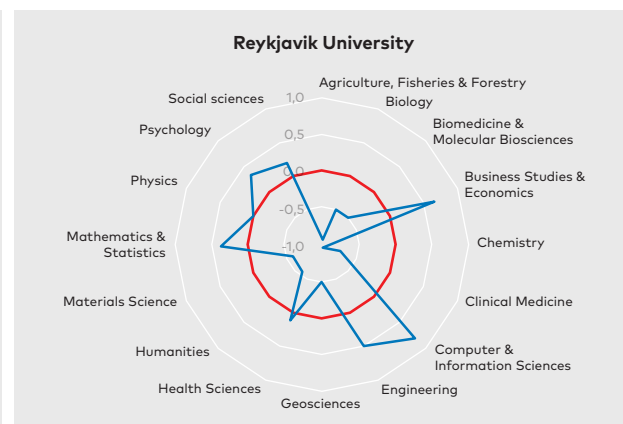
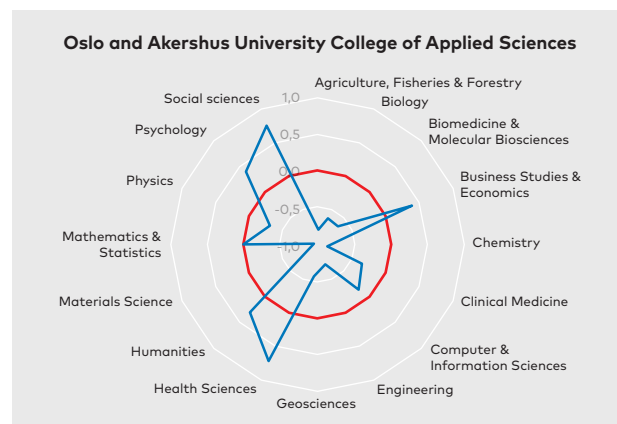
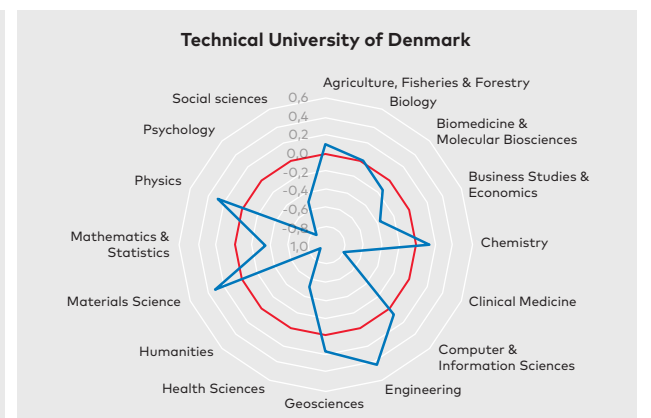
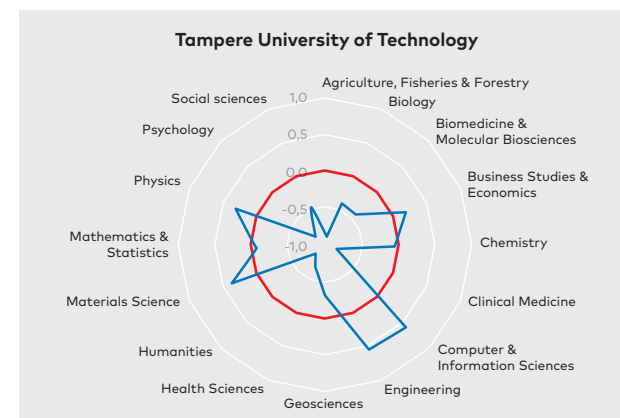
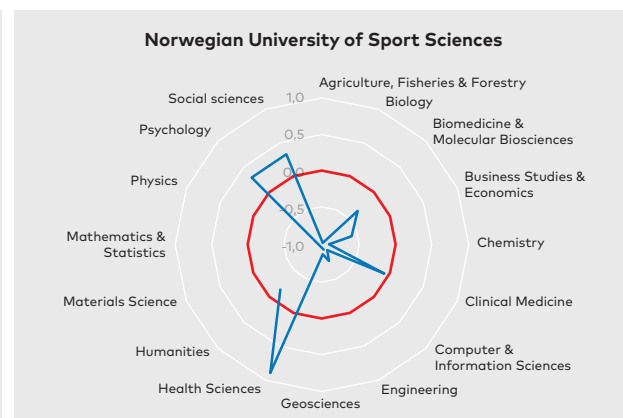
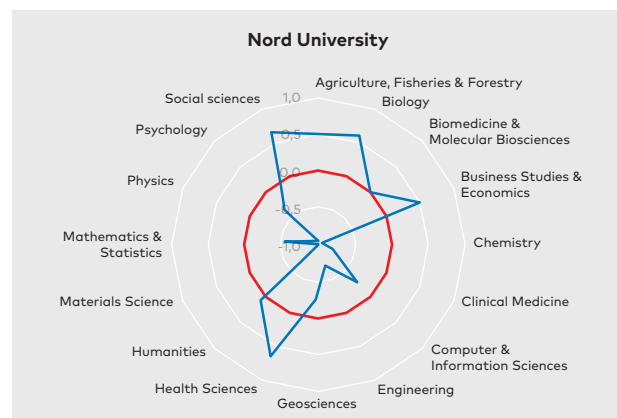
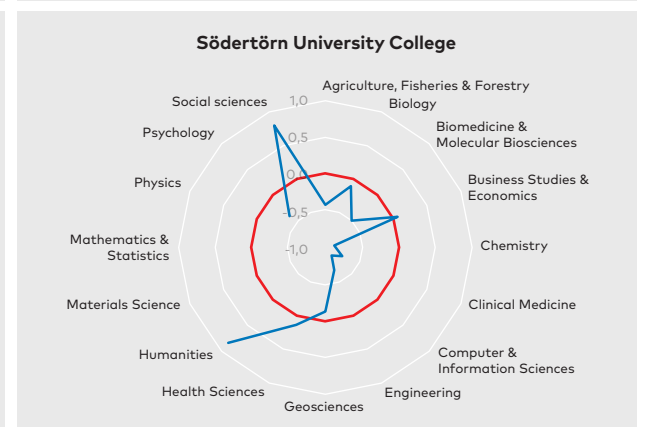
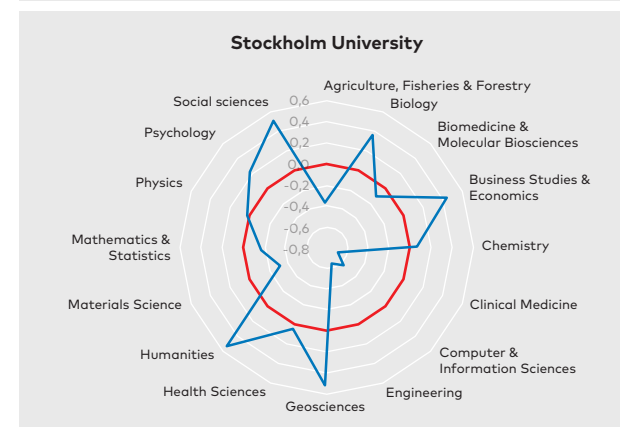
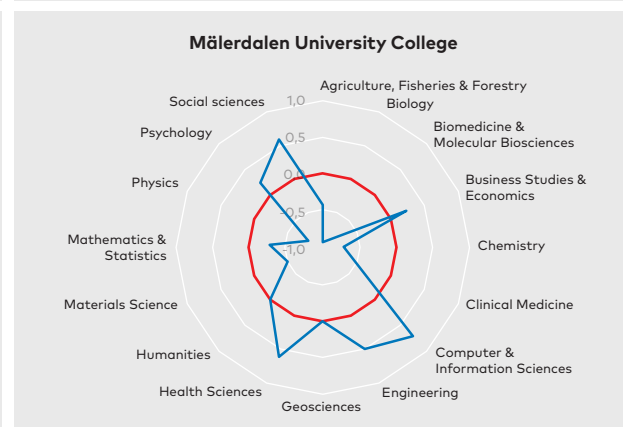
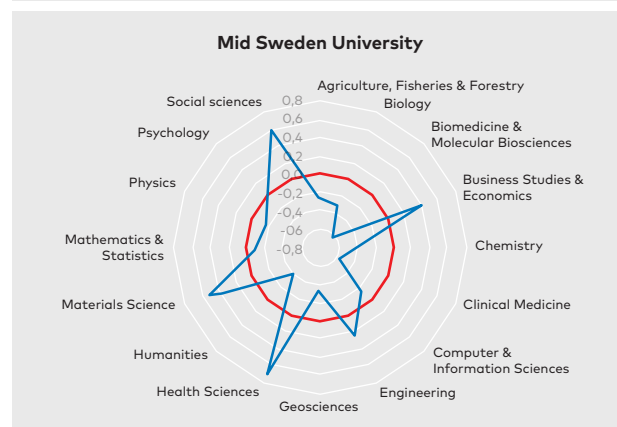
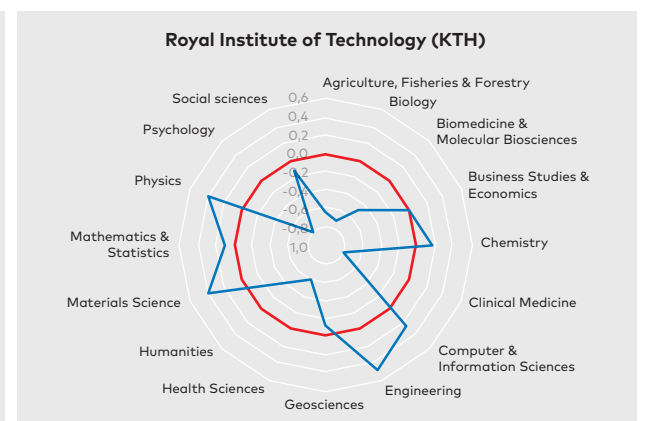
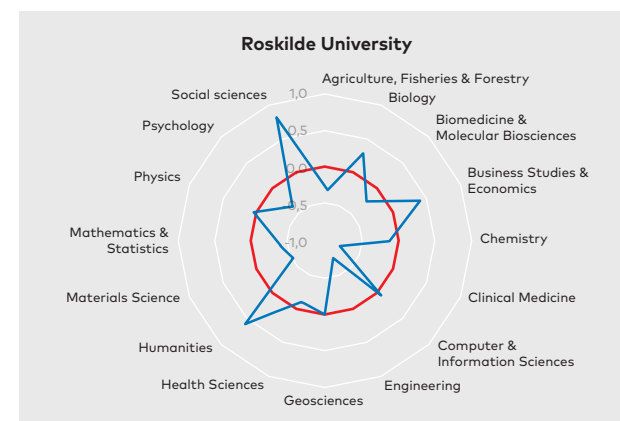
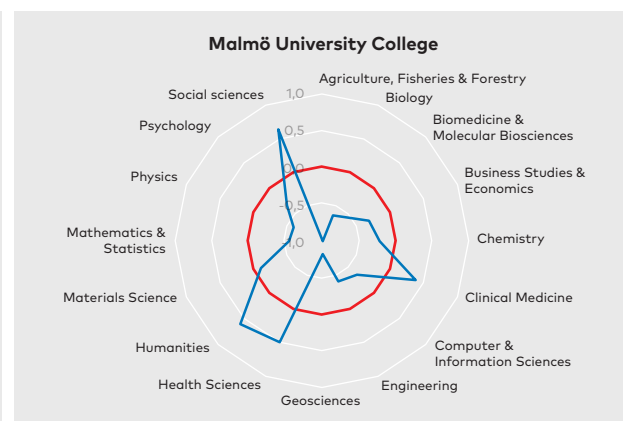
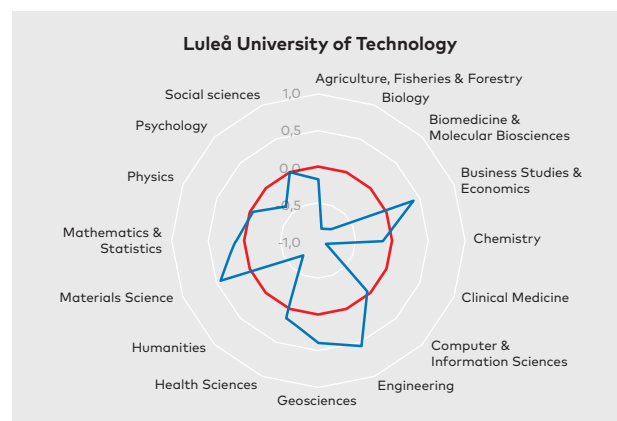
Figure 3.3: Relative Specialisation Index for agricultural universities
(red line equals the world average, blue line equals the Nordic university analysed)*

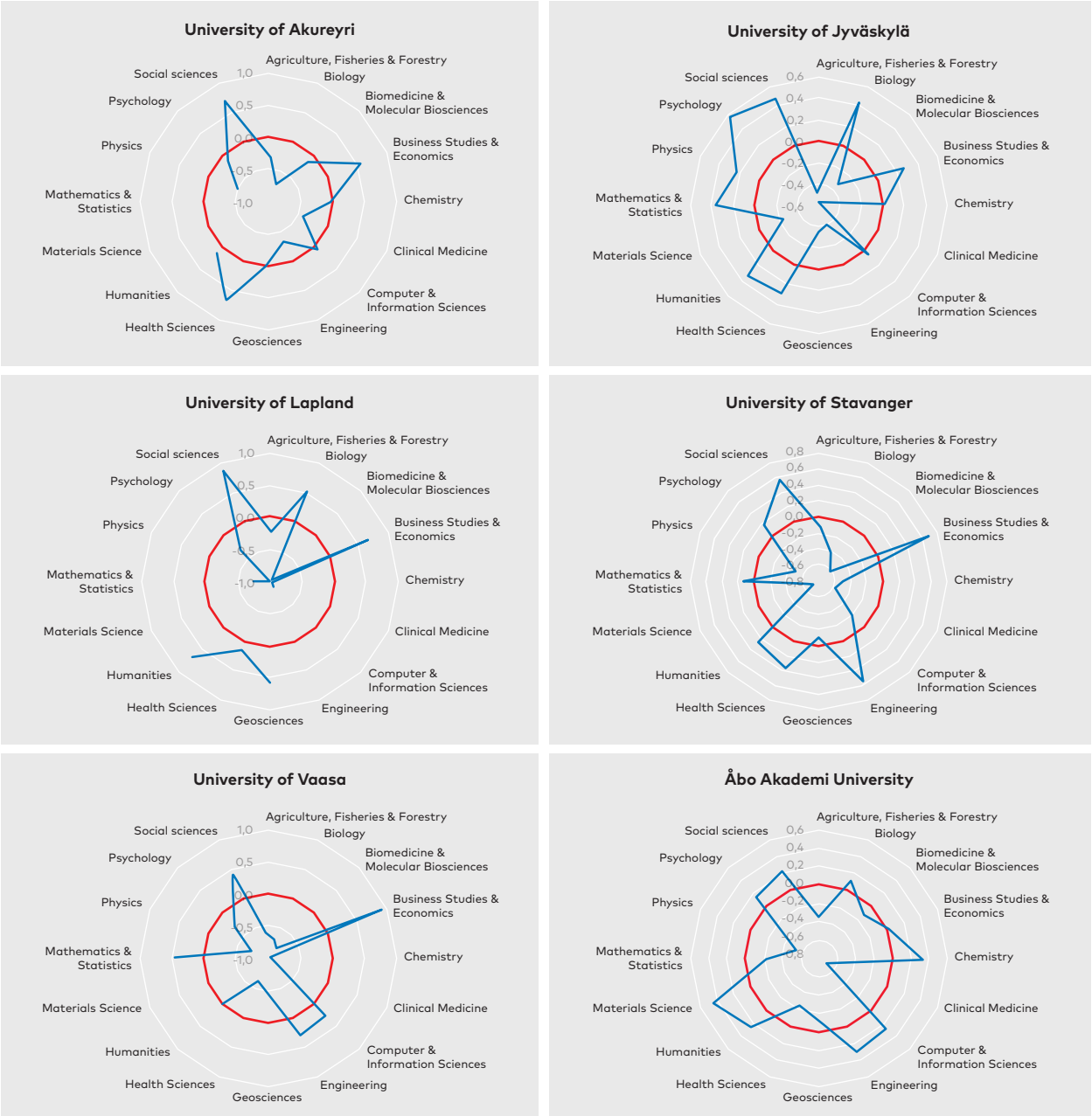


*Data from Clarivate Analytics

Figure 3.4: Relative Specialisation Index for HEIs without a medical or health faculty
(red line equals the world average, blue line equals the Nordic HEI analysed)*

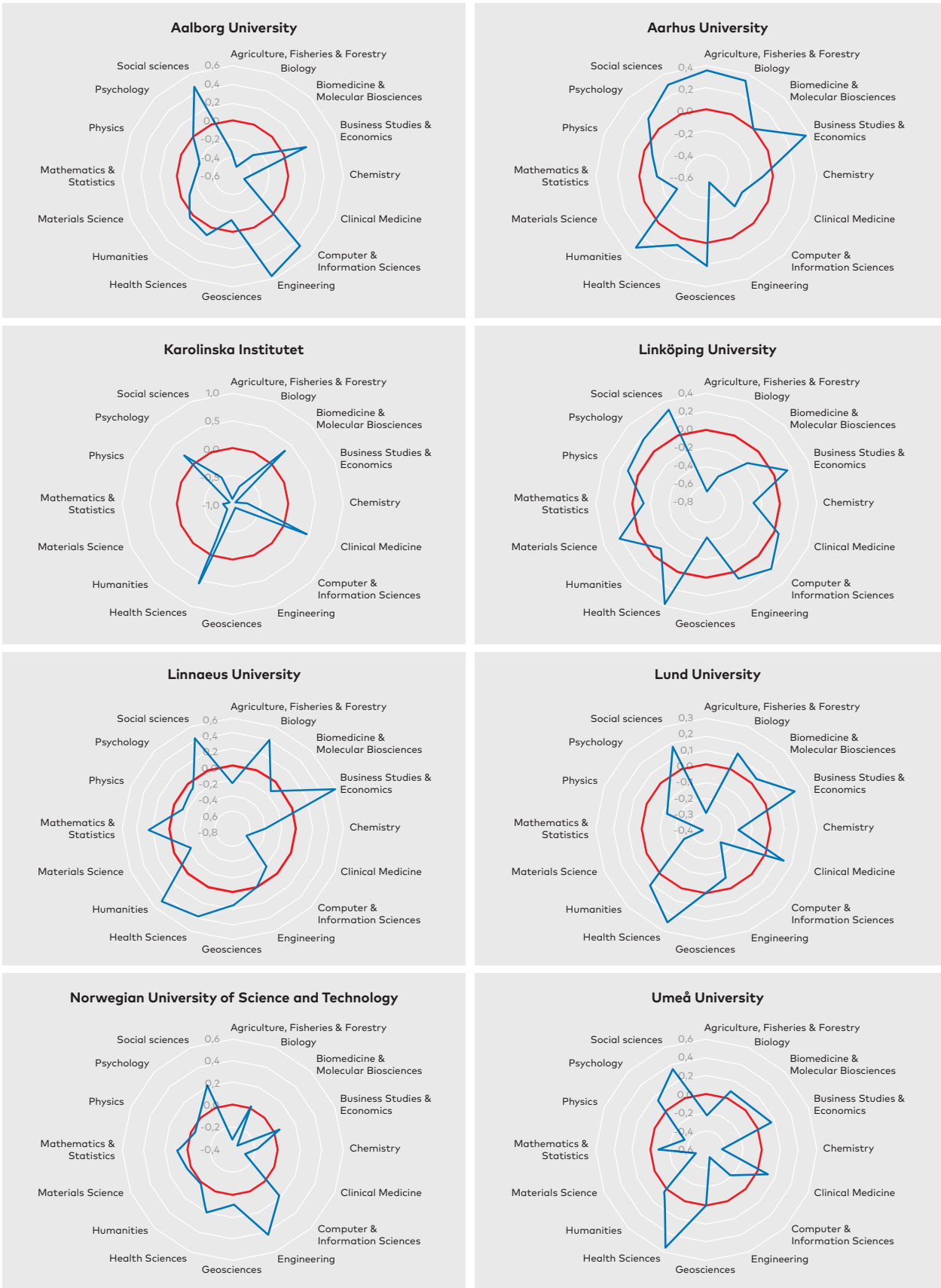


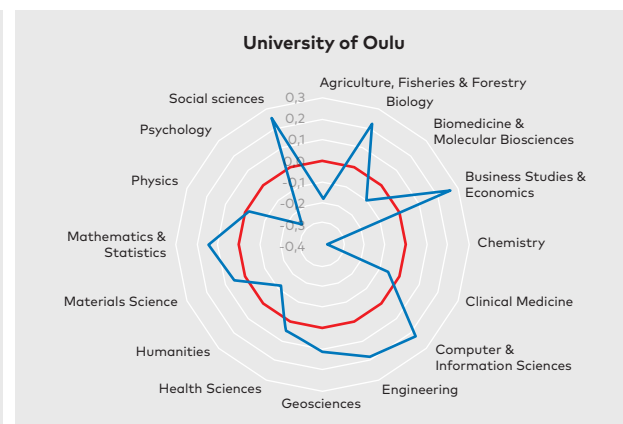
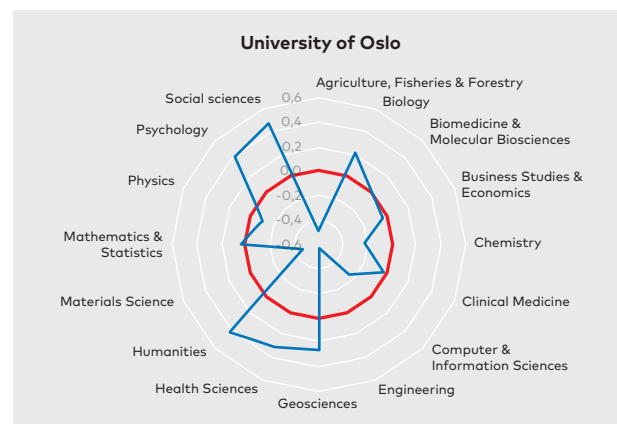
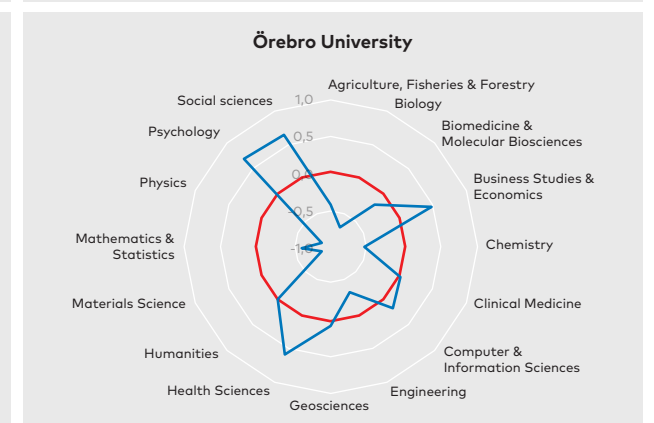
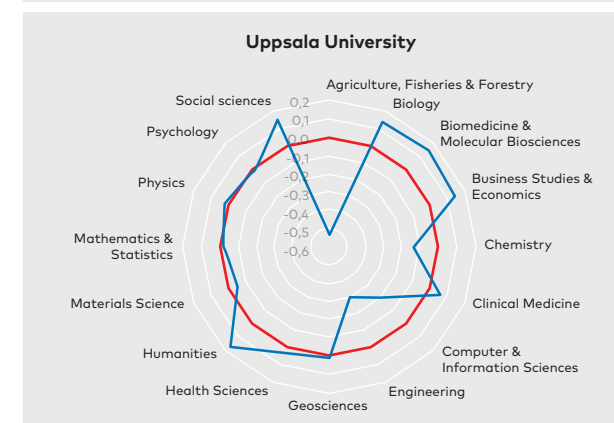
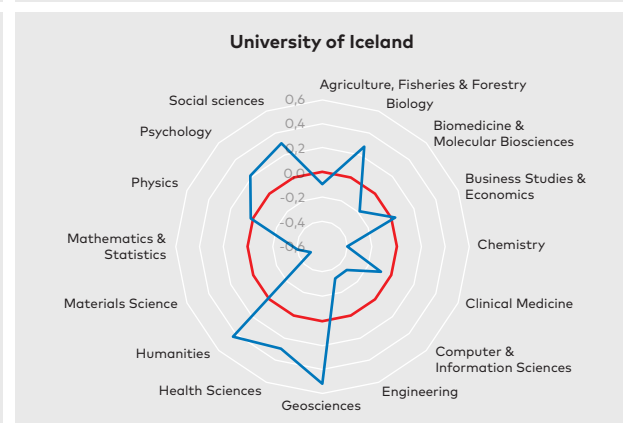
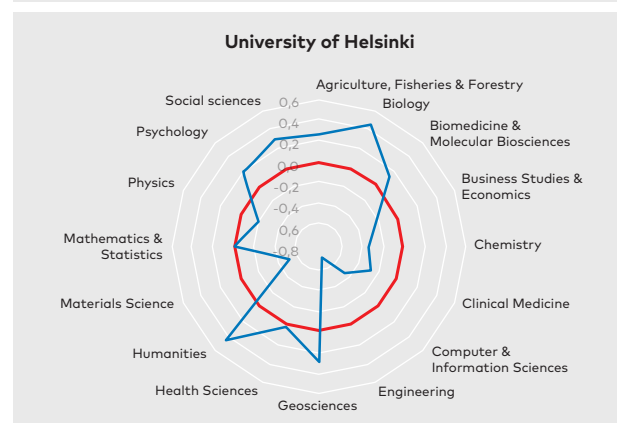
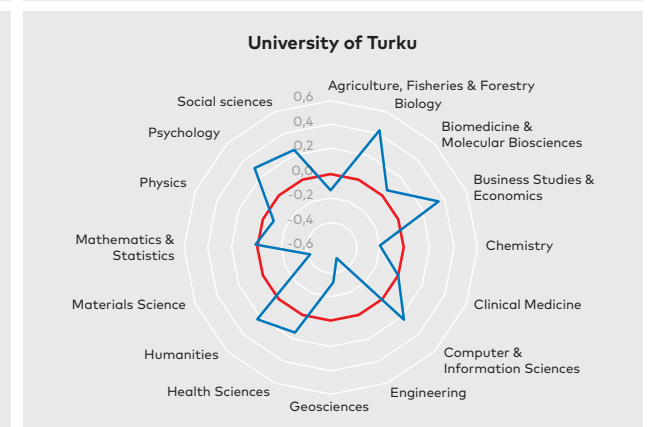
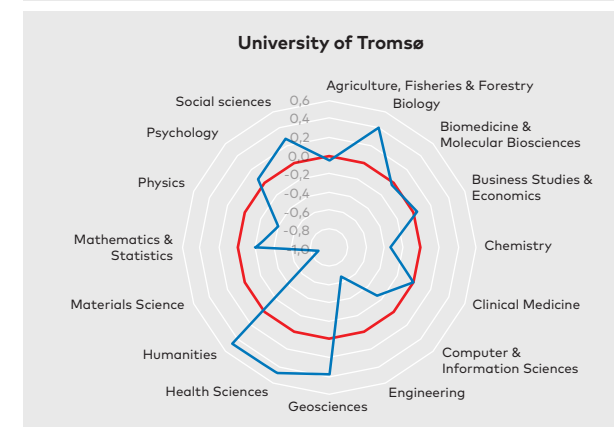
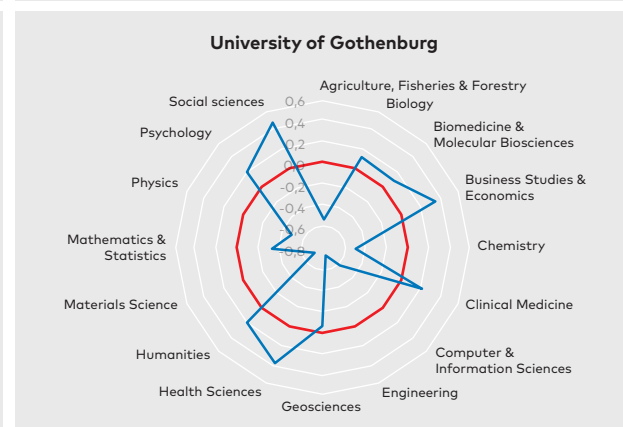
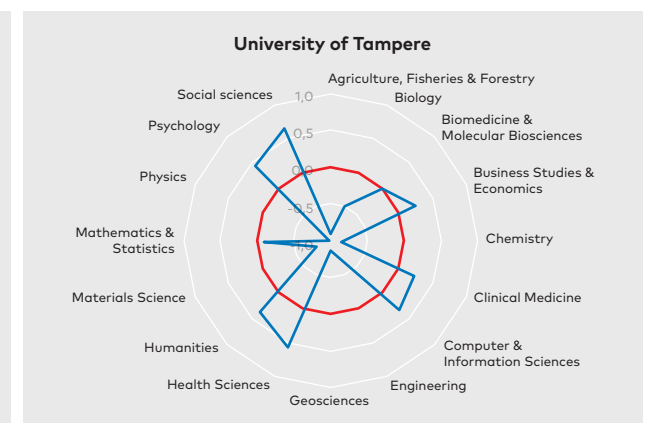
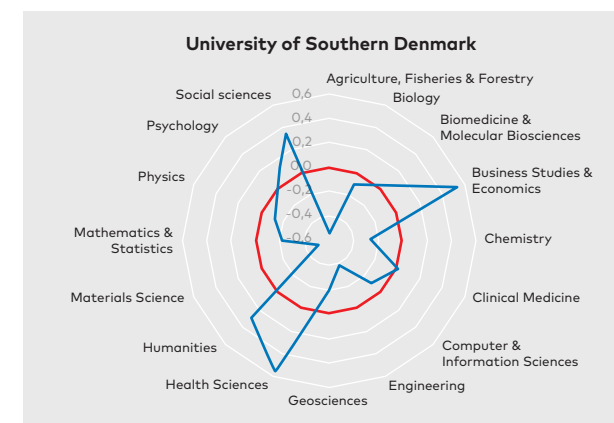
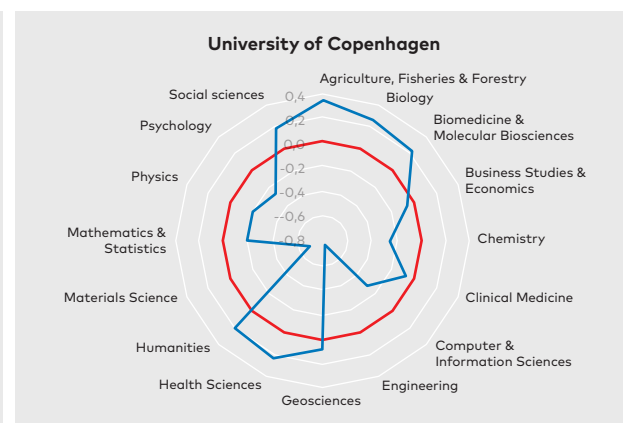
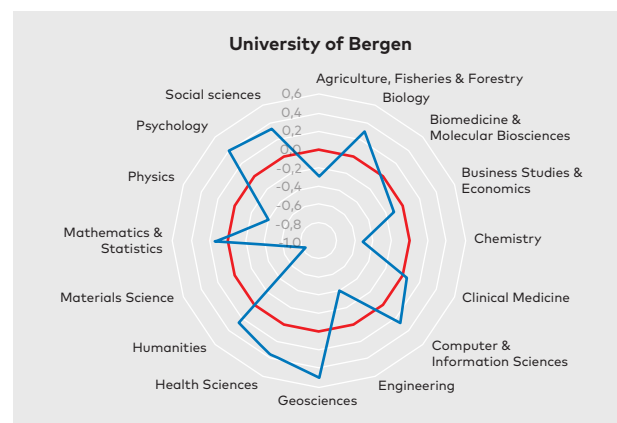




*Data from Clarivate Analytics

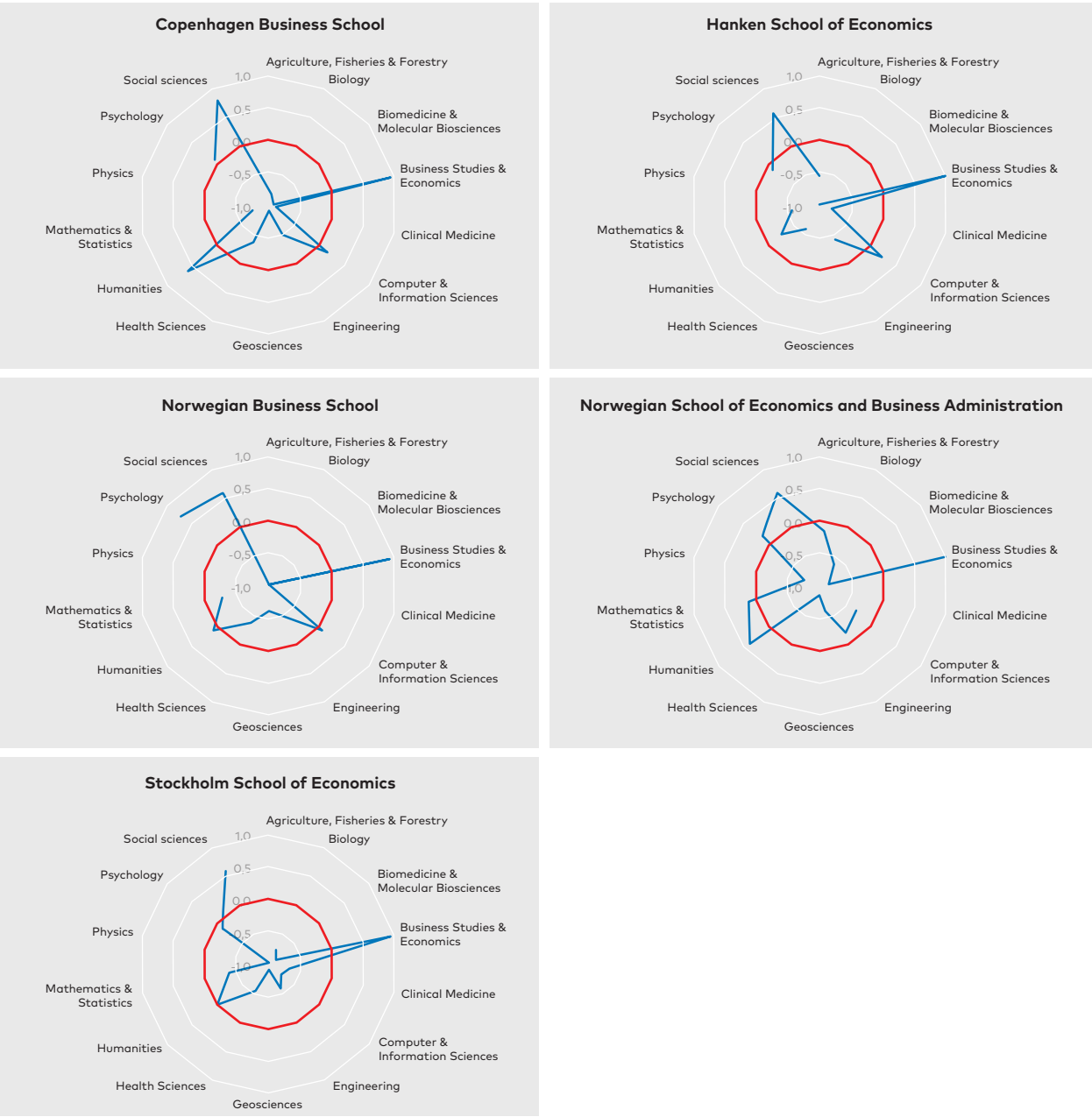
Figure 3.5: Relative Specialisation Index for universities with a medical or health faculty (red line equals the world average, blue line equals the Nordic HEI analysed)*





*Data from Clarivate Analytics

Figure 3.6: Relative Specialisation Index for business schools
(red line equals the world average, blue line equals the Nordic HEI analysed)*



*Data from Clarivate Analytics

In this chapter we have shown the research publication profiles of the Nordic HEIs, clearly illustrating the diversity that exists both within each country and within clusters of similar HEIs across countries. Even within clusters of more similar HEIs based on overall publication activity, the HEIs have different research profiles. This variation is usually hidden in aggregated university rankings. The aim of this chapter has thus been to highlight the diversity of the Nordic universities and university colleges and the need to specify profiles and subject fields when comparing them.

4. CITATION IMPACT OF THE NORDIC UNIVERSITIES

The aim of this chapter is to compare the citation impact of the Nordic HEIs over four four-year periods. The chapter contains two parts: first, we analyse citation impact at an aggregated HEI level (Chapter 4.1). We then analyse citation impact, broken down by subject field, for each HEI (Chapter 4.2).

All citation analyses presented in this report are carried out according to the following procedures and calculations:

- Field normalised (fractionalised) citation rates;
- Excluding self-citations;
- Three-year citation window;
- Analyses of 16 main subject fields, based on the 250 journal subject categories used by Clarivate Analytics during these periods: *Agriculture, Fisheries & Forestry* (includes 12 subject categories), *Biology* (11 subjects), *Biomedicine & Molecular Biosciences* (24 subjects), *Business Studies & Economics* (4 subjects), *Chemistry* (9 subjects), *Clinical Medicine* (32 subjects), *Computer & Information Sciences* (6 subjects), *Engineering* (27 subjects), *Geosciences* (10 subjects), *Health Sciences* (15 subjects), *Humanities* (31 subjects), *Materials Science* (9 subjects), *Mathematics & Statistics* (5 subjects), *Physics* (15 subjects), *Psychology* (11 subjects), and *Social Sciences* (29 subjects). See Appendix 2 for further details on these groupings.

We report relative citation rates as index values, where an index value of 1.00 is the “world average” for the aggregated field. An index value of 1.10 represents citation rates 10 per cent above the world average and an index value of 0.90 represents citation rates 10 per cent below world average. Citation rates are item-normalised according to publication year and subject category-specific citation rates. This means that citation rates per publication are compared to the average citation rate of publications from the same years in the same subject categories, before they are aggregated to provide totals. This enables the comparison of “relative” citation indicators across subject fields and publication years. Such relative indicators are needed because the typical number of citations is highly dependent on the subject field and the time allowed before citations are counted.

Another phenomenon that affects the reliability of citation indicators is the skewness of citation distributions; while a few publications get cited heavily, most publications are seldom or never cited (although recent studies suggest that the share of publications that do get cited is increasing¹²). Thus, the calculation of an average (normalised) citation rate for any number of publications is highly dependent on the presence and citation rates of a relatively small portion of highly cited publications. In light of this, a rule of thumb is that a minimum of 50 publications per unit should be used to produce reliable citation indicators in professional bibliometrics. The limit for inclusion in this report is that the sum of fractionalised publications in a four-year period is greater than or equal to 40. Nonetheless, we need to point out that the citation indicator for any given university, in any given field of research, may still be highly dependent on the presence or absence of just a few highly cited publications. We therefore also provide numbers for so-called *highly cited papers*.

¹² See e.g. Swedish Research Council (2010).

Share of highly cited papers

As mentioned above, citation distributions are typically skewed. A few publications tend to receive most of the citations. The issue of contribution to highly cited papers is therefore interesting to investigate, in addition to field normalised average scores. The indicator “Share of top 10 publications” is calculated by dividing the number of publications from an organisation that are among the 10 per cent most cited in the world with the total number of publications from the same organisation. The world average therefore corresponds to a value of 10 per cent. If an organisation or country has a share of highly cited papers equal to 12 per cent, it means that its share of highly cited papers is 20 per cent above the world average. On the other hand, if its share of highly cited papers is 7 per cent, it means that they are 30 per cent below the world average.

The average citation rate gives a measure of how the whole organisation is performing, where undoubtedly highly cited researchers and research groups will have their strong numbers levelled out by not so highly cited researchers and research groups – and vice versa. The share of top 10 publications, on the other hand, targets the presence of researchers who fulfil an ambition to contribute substantially to research of wide interest and impact. The two measures are complementary. One tells us about the general performance of an entire organisation, the other tells us about the performance of a very small share of that organisation’s researchers. The first gives a “satellite picture” of the research quality of an organisation as a whole, the other targets the excellence of the organisation. The share of highly cited papers is also a more stable indicator than the average citation rate, since it is not so easily affected be single, extremely highly cited publications.

4.1 Overall citation impact (all subjects)

First we investigate the share of highly cited papers and the average citation rates in each of the periods for the HEIs (Table 4.1 to Table 4.5, and at the national level in Figures 4.1 and 4.2). We then investigate whether citation rates vary among publications that are nationally and internationally co-authored (Chapter 4.1.1).

Table 4.1: Field normalised citation rates and share of top 10 publications (fractionalised), Denmark*

Denmark	Share of top 10 publications				Average citation rate			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
Aalborg University	12 %	10 %	11 %	13 %	1.21	1.08	1.09	1.30
Aarhus University	13 %	14 %	14 %	13 %	1.23	1.30	1.29	1.21
Copenhagen Business School	8 %	16 %	10 %	15 %	1.13	1.23	1.16	1.39
Roskilde University	6 %	9 %	11 %	12 %	0.85	1.02	1.10	1.06
Technical University of Denmark	15 %	17 %	17 %	16 %	1.43	1.51	1.60	1.43
University of Copenhagen	11 %	13 %	13 %	14 %	1.08	1.18	1.22	1.29
University of Southern Denmark	15 %	14 %	12 %	11 %	1.36	1.32	1.22	1.13
Aalborg University Hospitals	6 %	7 %	7 %	10 %	0.85	0.84	0.87	0.95
Aarhus University Hospitals	9 %	9 %	12 %	12 %	0.97	0.97	1.15	1.18
Copenhagen University Hospitals	10 %	13 %	14 %	12 %	1.05	1.20	1.29	1.17
University of Southern Denmark Hospitals	10 %	10 %	11 %	10 %	1.01	0.96	1.04	1.04
HES Other			14 %	12 %			1.34	1.15
Other	12 %	13 %	12 %	13 %	1.18	1.23	1.18	1.17
HES Total	12 %	13 %	14 %	13 %	1.17	1.24	1.28	1.25
Denmark Total	12 %	13 %	13 %	13 %	1.17	1.24	1.27	1.24

*Data from Clarivate Analytics

All Danish universities have relative citation impacts that are clearly above the world average in 2011-2014 (Table 4.1). The Technical University of Denmark has the highest citation rate in all four time periods measured. This university also stands out in terms of its shares of highly cited papers in all four time periods. It is interesting to note, though, since *Social Sciences* are seldom in the spotlight in bibliometric analyses, that Copenhagen Business School has both a very high share of highly cited papers and high average citation rates in all years.

Whilst the share of highly cited papers is not different between the Danish HE sector and the institutions outside this sector, the HE sector has a higher average citation rate in the years 2007-2014.

Table 4.2: Field normalised citation rates and share of top 10 publications (fractionalised), Finland*

Finland	Share of top 10 publications				Average citation rate			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
Aalto University	11 %	11 %	11 %	12 %	1.17	1.05	1.07	1.15
Hanken School of Economics	3 %	5 %	14 %	18 %	0.25	0.64	1.19	1.67
Lappeenranta University of Technology	4 %	9 %	5 %	9 %	0.65	0.87	0.74	0.96
Tampere University of Technology	7 %	8 %	9 %	9 %	0.77	0.85	0.93	0.98
University of Eastern Finland	8 %	8 %	9 %	9 %	0.98	0.93	1.00	0.99
University of Helsinki	12 %	11 %	11 %	11 %	1.14	1.13	1.15	1.11
University of Jyväskylä	8 %	8 %	11 %	10 %	0.91	0.94	1.04	1.08
University of Lapland			10 %	5 %			1.08	0.78
University of Oulu	8 %	8 %	8 %	9 %	0.85	0.85	0.93	0.96
University of Tampere	9 %	8 %	8 %	9 %	0.90	0.93	0.94	0.91
University of Turku	8 %	8 %	9 %	10 %	0.89	0.88	0.93	0.97
University of Vaasa			16 %	11 %			1.29	0.98
Åbo Akademi University	7 %	11 %	10 %	8 %	0.86	1.13	1.05	0.93
Helsinki University Hospital	10 %	10 %	10 %	10 %	1.07	1.06	1.05	1.09
Kuopio University Hospital	9 %	10 %	10 %	11 %	1.01	1.02	1.05	1.07
Oulu University Hospital	8 %	8 %	8 %	9 %	0.92	0.89	0.88	1.02
Tampere University Hospital	9 %	6 %	7 %	10 %	0.92	0.83	0.92	1.02
Turku University Hospital	8 %	10 %	10 %	14 %	0.95	0.89	1.04	1.19
HES Other	11 %	12 %	10 %	9 %	1.19	1.19	1.04	1.02
Other	9 %	9 %	10 %	10 %	0.97	0.97	1.02	1.04
HES Total	9 %	10 %	10 %	10 %	1.00	1.00	1.03	1.05
Finland Total	9 %	9 %	10 %	10 %	0.99	0.99	1.03	1.05

*Data from Clarivate Analytics

In Finland, only the two largest universities by publication output (Helsinki and Aalto) have managed to maintain their overall citation impact well above the world average through all four time periods. Most of the large and mid-sized Finnish universities systematically fall just below the world averages, with small fluctuations in both directions. The most remarkable development has taken place at the Hanken School of Economics, with both indicators reaching exceptionally high values during the last time period. It is worth noting that although the total publication output of Hanken is very low (146 fractionalised publications during 2011-2014 vs. for example 5911 by University of Helsinki in the same period), this clearly monotonous rise cannot be rejected as just statistical fluctuation. Rather, a more plausible explanation is that in a small university with a suitably limited focus, it is possible to achieve rapid change.

For the Finnish university hospitals, the overall development of impact has been positive, with all hospitals' citation rates exceeding the world average during the last period, and all but one hospital reaching or exceeding the world average in the share of top 10 publications (which corresponds to 10 per cent). Generally, there is a strong consistency in the HEIs results for top 10 publications and average citation rates. Those HEIs with a citation rate above the world average usually have more than 10 per cent top 10 publications, while those cited below the world average usually have shares of top 10 publications below 10 per cent.

The results between the HE sector and the *Other* sector differ very little. In the last period, both sectors had 10 per cent highly cited papers, while the citation rate was 1 percentage point higher in the HE sector.

Table 4.3: Field normalised citation rates and share of top 10 publications (fractionalised), Iceland*

Iceland	Share of top 10 publications				Average citation rate			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
Agricultural University of Iceland								
Reykjavik University			8 %	6 %	0.86	0.67	1.55	
University of Akureyri			6 %	8 %	0.70	0.85	1.55	
University of Iceland	6 %	8 %	8 %	9 %	0.78	0.92	0.95	1.01
Landspítali University Hospital	12 %	12 %	11 %	9 %	1.13	1.14	1.05	0.93
HES Other								
Other	14 %	12 %	13 %	10 %	1.26	1.25	1.47	1.16
HES Total	8 %	9 %	9 %	9 %	0.87	0.95	0.96	0.95
Iceland Total	9 %	10 %	10 %	9 %	0.97	1.03	1.07	0.99

*Data from Clarivate Analytics

In Iceland, there is a noticeable finding that the HE sector performs relatively poorly compared to the *Other* sector (Table 4.3). For the HE sector, both the shares of top 10 publications and the citation rates are below the world average in all periods. The University of Iceland has had a positive development though, with its share of top 10 publications gradually increasing, reaching 9 per cent in 2011-2014. In this period the citation rate also climbed above the world average for the first time. The HE sector's negative development in general is therefore due to the decline at Landspítali University Hospital in both top 10 publications and in an average citation rate – where the latter decreased below the world average for the first time in the period 2011-2014.

Table 4.4: Field normalised citation rates and share of top 10 publications (fractionalised), Norway*

Norway	Share of top 10 publications				Average citation rate			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
Nord University			9 %	8 %			0.92	1.16
Norwegian Business School	10 %	11 %	5 %	9 %	0.87	1.03	0.77	0.90
Norwegian School of Economics and Business Administration	2 %	6 %	7 %	11 %	0.52	0.83	0.73	0.99
Norwegian School of Sport Sciences		22 %	16 %	17 %		1.67	1.29	1.55
Norwegian University of Life Sciences	11 %	12 %	11 %	11 %	1.03	1.10	1.14	1.13
Norwegian University of Science and Technology	10 %	10 %	11 %	11 %	0.98	1.05	1.10	1.09
Oslo and Akershus University College of Applied Sciences	4 %	5 %	7 %	6 %	0.68	0.68	0.89	0.77
University College of Southeast Norway	8 %	7 %	5 %	7 %	0.81	0.80	0.67	0.86
University of Agder	5 %	8 %	7 %	8 %	0.63	0.84	0.89	1.03
University of Bergen	9 %	10 %	10 %	9 %	0.97	0.99	1.05	1.01
University of Oslo	10 %	10 %	11 %	10 %	1.02	1.06	1.05	1.07
University of Stavanger	7 %	9 %	6 %	12 %	0.79	0.86	0.80	1.05
University of Tromsø	9 %	9 %	9 %	9 %	0.92	0.98	0.98	0.97
St. Olavs Hospital	8 %	10 %	11 %	9 %	0.89	1.03	1.05	0.99
University Hospital North Norway	6 %	7 %	12 %	10 %	0.74	0.89	1.18	1.08
Bergen University Hospital	9 %	9 %	11 %	11 %	1.00	0.91	1.18	1.08
Oslo University Hospital	9 %	10 %	9 %	10 %	0.99	1.07	1.04	1.08
HES Other	7 %	5 %	8 %	8 %	0.79	0.68	0.88	0.82
Other	9 %	11 %	11 %	11 %	1.00	1.10	1.11	1.11
HES Total	9 %	10 %	10 %	10 %	0.97	1.02	1.05	1.05
Norway Total	9 %	10 %	10 %	10 %	0.98	1.04	1.06	1.06

*Data from Clarivate Analytics

In Norway, the HE sector is also consistently cited below the level of the institutions outside of the sector. In the latter sector there has also been a much greater increase in the average citation rate, although the shares of top 10 publications have been more similar between the two sectors. Unlike Denmark, Finland and Sweden, the two Norwegian business schools in Table 4.4 are not cited higher than the world average, and their shares of top 10 publications are not as high as at their counterparts in these countries. The highest citation rate in Norway in 2011-2014 is found at another specialised school: the Norwegian School of Sport Sciences, which is cited 55 per cent above the world average. Among the four old broad universities, the Norwegian University of Science and Technology (NTNU) and the universities in Oslo and Bergen are cited above the world average, but only NTNU and the University of Oslo have shares of top 10 publications above 10 per cent. It is the younger and smaller University of Stavanger that has the highest share of top 10 publications among the general universities (12 per cent).

Table 4.5: Field normalised citation rates and share of top 10 publications (fractionalised), Sweden*

Sweden	Share of top 10 publications				Average citation rate			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
Blekinge Institute of Technology	2 %	9 %	9 %	15 %	0.53	0.92	1.05	1.13
Borås University College		4 %	7 %	6 %		0.71	0.87	0.78
Chalmers University of Technology	12 %	11 %	11 %	12 %	1.17	1.07	1.09	1.12
Gävle University College		7 %	5 %	7 %		0.80	0.81	0.79
Jönköping University	5 %	8 %	7 %	8 %	0.64	0.76	0.87	0.88
Karlstad University	11 %	6 %	6 %	8 %	1.12	0.73	0.79	0.88
Karolinska Institutet	12 %	12 %	13 %	14 %	1.18	1.16	1.21	1.28
Linköping University	11 %	9 %	11 %	11 %	1.10	0.96	1.08	1.11
Linnaeus University	8 %	8 %	7 %	7 %	0.82	0.79	0.77	1.03
Luleå University of Technology	11 %	7 %	8 %	6 %	1.09	0.79	0.82	0.81
Lund University	11 %	11 %	11 %	11 %	1.11	1.12	1.11	1.10
Malmö University College	10 %	9 %	7 %	10 %	0.84	0.76	0.87	0.96
Mid Sweden University	7 %	10 %	7 %	8 %	0.79	1.02	0.83	0.80
Mälardalen University College	12 %	12 %	7 %	10 %	0.97	0.90	0.85	0.95
Royal Institute of Technology (KTH)	12 %	11 %	11 %	11 %	1.24	1.07	1.10	1.08
Stockholm School of Economics	12 %	9 %	11 %	13 %	1.03	0.95	1.22	1.26
Stockholm University	11 %	14 %	13 %	12 %	1.17	1.32	1.28	1.22
Swedish University of Agricultural Sciences	12 %	12 %	11 %	12 %	1.11	1.18	1.19	1.15
Södertörns University College	7 %	3 %	7 %	8 %	0.90	0.59	0.81	0.80
Umeå University	11 %	11 %	10 %	10 %	1.10	1.07	1.01	1.03
University of Gothenburg	10 %	10 %	11 %	11 %	1.03	1.02	1.08	1.10
Uppsala University	11 %	11 %	11 %	11 %	.14	1.08	1.08	1.11
Örebro University	10 %	11 %	10 %	9 %	0.99	1.02	1.11	0.98
Karolinska University Hospital	9 %	11 %	11 %	13 %	1.03	1.11	1.15	1.19
Linköping University Hospital	7 %	8 %	8 %	9 %	0.89	0.90	0.95	1.02
Sahlgrenska University Hospital	10 %	10 %	11 %	11 %	1.04	1.09	1.14	1.12
Skåne University Hospital	8 %	8 %	9 %	11 %	0.90	0.95	1.01	1.08
University Hospital of Umeå	9 %	9 %	10 %	11 %	0.94	0.94	0.93	1.05
Uppsala University Hospital	8 %	9 %	10 %	12 %	0.92	0.93	1.08	1.19
Örebro University Hospital	12 %	9 %	10 %	11 %	1.17	0.98	1.14	1.15
HES Other	6 %	6 %	8 %	8 %	0.72	0.74	0.84	0.86
Other	12 %	11 %	11 %	10 %	1.13	1.06	1.07	1.06
HES Total	11 %	11 %	11 %	11 %	1.09	1.07	1.10	1.11
Sweden Total	11 %	11 %	11 %	11 %	1.10	1.07	1.10	1.11

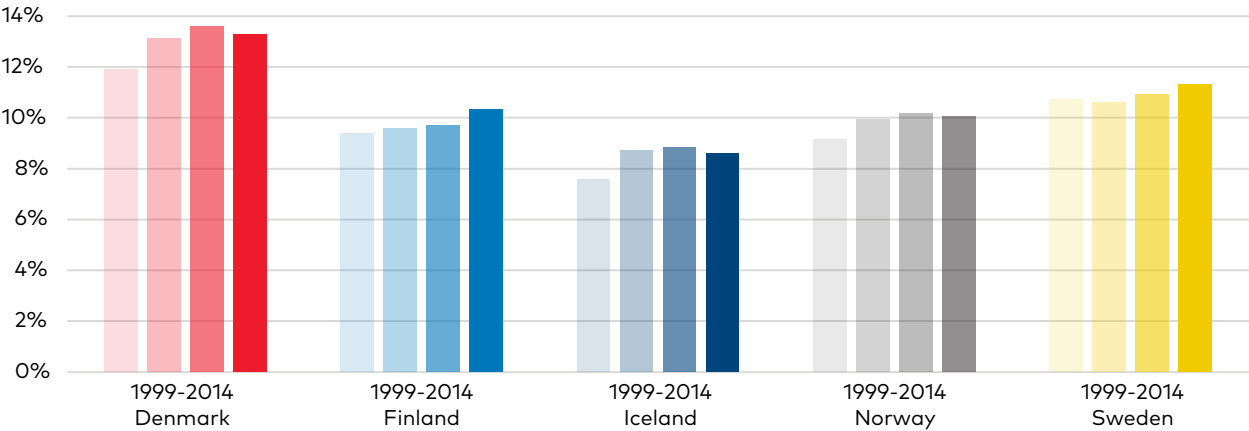
*Data from Clarivate Analytics

All of the larger Swedish institutions and some of the smaller ones have citation rates well above the average in all periods (Table 4.5), with Karolinska Institutet (its university hospital also) excelling with both 14 per cent highly cited papers and a citation rate 28 per cent above the world average in 2011-2014. The citation rate at Karolinska Institutet has also increased throughout the four time periods studied here. Blekinge Institute of Technology had the highest share of top 10 publications in 2011-2014 (15 per cent), but this is based on a very low number of publications.

The Swedish HE sector has had a fairly stable citation rate over the four time periods, with the rate going from 1.10 to 1.11 between the two last periods. The share of highly cited papers has been 11 per cent in all periods. While the share of highly cited papers is almost identical to that of the *Other* sector, the Swedish HE sector has a higher average citation rate than the *Other* sector in three of the four periods.

Finally, we present the share of top 10 publications (Figure 4.1) and citation rates (Figure 4.2) for the HE sectors over time at the national levels. Three main trends appear in Figure 4.1. *First*, the Danish HE sector has always had, and still has, the largest share of top 10 publications. *Second*, comparing the first and the last period, all countries have seen an increase in their shares of highly cited publications. *Third*, Finland is the only country where the share of top 10 publications has increased between all periods.

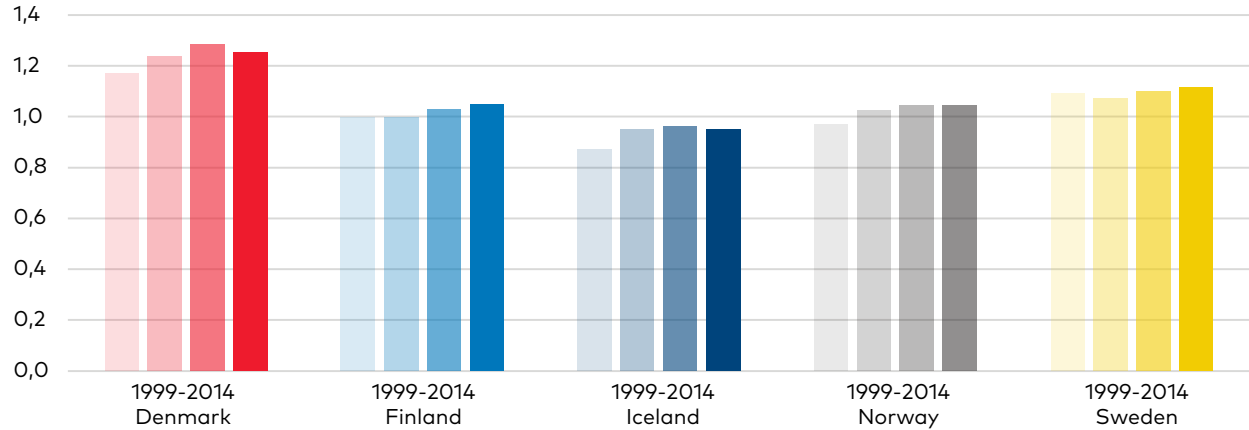
Figure 4.1: Share of top 10 publications for the HE sectors in the Nordic countries*



*Data from Clarivate Analytics

Studying the average citation rates of the Nordic HE sectors, the patterns are almost exactly the same (Figure 4.2). Denmark stands out among the Nordic countries with a substantially higher citation impact. The other countries, except Iceland, are all above the world average and with small differences between them. All countries have increased their citation impact between the first and last period, but Iceland's citation impact has not continued to increase from the second period and forwards.

Figure 4.2: Average citation rates for the HE sectors in the Nordic countries*



*Data from Clarivate Analytics

4.1.1 Citation rates in publications with and without international co-authorship

In an earlier NORIA-net report on international research cooperation in the Nordic countries it was shown that much of the increase in citation rates for Denmark and Norway, identified at the country level, could be attributed to increased citation rates for national publications, i.e. publications where all authors represent the same country (Schneider et al. 2010). By contrast, Iceland's increased citation rate was due to citation rates for international co-publications, i.e. publications where more than one country is represented among the authors. Finland and Sweden both saw their country-level citation rates decrease for international co-publications, while remaining constant for national publications.

Although international cooperation is not the focus of this report, it is nevertheless worthwhile looking at how field normalised citation rates vary between national and international co-publications for the HEIs in this report.

Table 4.6: Proportion of publications in the HE sectors with international collaboration*

All Nordic countries	Share of international co-publications			
	1999-2002	2003-2006	2007-2010	2011-2014
Denmark	47 %	50 %	56 %	59 %
Finland	40 %	44 %	50 %	56 %
Iceland	62 %	63 %	69 %	74 %
Norway	43 %	50 %	52 %	57 %
Sweden	44 %	48 %	54 %	59 %
Averages for the Nordic HE sector	41 %	45 %	50 %	55 %

*Data from Clarivate Analytics

The degree of international co-publications does not vary much among the Nordic HE sectors, with Iceland as an exception (Table 4.6). Almost three-fourths of Iceland's publications are co-authored in collaboration with other nations. All Nordic countries have increased their shares across all periods. In total, the share of Nordic HE sectors' international co-publications have risen from 41 per cent in 1999-2002 to 55 per cent in 2011-2014. The reason the Nordic average is lower than the share of international co-publications for each country is that the international co-publications with authors from two or more Nordic countries are only counted once in the total average.

Table 4.7: Share of highly cited publications among nationally and internationally co-authored publications from the HE sectors*

All Nordic countries	Share of top 10 publications among national publications				Share of top 10 publications among internationally co-authored publications			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
Denmark	11 %	12 %	13 %	12 %	14 %	15 %	16 %	16 %
Finland	8 %	9 %	9 %	9 %	13 %	12 %	12 %	13 %
Iceland	4 %	6 %	5 %	6 %	13 %	12 %	14 %	11 %
Norway	8 %	8 %	9 %	9 %	13 %	13 %	13 %	13 %
Sweden	10 %	10 %	10 %	10 %	12 %	13 %	14 %	14 %
Averages for the Nordic HE sector	10 %	10 %	10 %	10 %	13 %	13 %	14 %	14 %

*Data from Clarivate Analytics

Table 4.7 illustrates that the shares of top 10 publications are consistently higher in publications with international collaboration, whereas in Table 4.8 the same pattern is seen for average citation rates; national publications generally have lower citation rates than publications involving international collaboration; 30 percentage points in 2011-2014 (in Iceland this difference is 38 percentage points).

Table 4.8: Average citation rate among nationally and internationally co-authored publications from the HE sectors*

All Nordic countries	Average citation rate among national publications				Average citation rate among international co-publications			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
Denmark	1.09	1.18	1.21	1.15	1.37	1.39	1.43	1.45
Finland	0.92	0.94	0.96	0.95	1.24	1.17	1.20	1.23
Iceland	0.66	0.73	0.64	0.77	1.22	1.28	1.38	1.15
Norway	0.88	0.93	0.96	0.94	1.25	1.25	1.24	1.26
Sweden	1.03	1.00	1.01	0.99	1.26	1.25	1.29	1.33
Averages for the Nordic HE sector	1.00	1.01	1.03	1.01	1.28	1.27	1.30	1.33

*Data from Clarivate Analytics

A full list of the HEIs' citation rates for national and international co-publications is found in Appendix 7. An interesting development observed in Table 4.8 is the increased citation rates for domestic papers in Denmark and Iceland (and to some extent Norway). From 1999-2002 both Finland and Iceland have seen a decrease in their international co-publications, whereas Norway's citation rate is almost completely stable. The latter indicates that Norway's improved citation rate over the last period is due to the national publications.

4.2 Citation impact in subject fields

Chapter 4.1 focused on the total citation rates for the HE sectors. In this section, we turn our attention to the 16 subject fields. We show the shares of highly cited papers (Table 4.11) and average field normalised citation rates (Table 4.12) for each country's HEIs over a four-year period (2011-2014) broken down at field level. The citation rates are based on fractionalised publications.

Tables 4.13 to 4.28 show the development in these two indicators over four time periods for all HEIs that meet the limit of 40 publications within the relevant subject field in a four-year period. Chapter 4.2.1 is devoted to more detailed results from the subject field *Clinical Medicine*, because it is by far the largest subject field in the world, where it is interesting to see the results for Nordic HE sectors split by the different subcategories of *Clinical Medicine*.

It often becomes clear that we are dealing with a very limited number of publications when we study each field of research at the individual institutions. As already mentioned, citation indicators may become unreliable when they are based on small numbers. We therefore applied a minimum threshold of 40 fractionalised publications within a subject field over a four-year period in our analyses. Citation rates based on publication data below this threshold are not presented. This is in line with common practice in bibliometrics (see Moed et al., 1995, who suggested 50 publications as a minimum "in an oeuvre"). The result of applying this threshold is that many of the cells in Tables 4.13 to 4.28 are empty. However, the "Total" cells still represent the total for each HEI, regardless of whether a given subject field at that HEI has more or less than the 40 fractionalised publications required to produce subject-field specific results.

Table 4.9: Share of highly cited publications for the Nordic HE sectors combined in the different subject fields*

Subject field	Share of top 10 publications				
	1999-2002	2003-2006	2007-2010	2011-2014	Total
Agriculture, Fisheries & Forestry	14 %	13 %	14 %	15 %	14 %
Biology	13 %	13 %	13 %	14 %	13 %
Biomedicine & Molecular Biosciences	8 %	9 %	10 %	11 %	9 %
Business Studies & Economics	6 %	8 %	8 %	10 %	9 %
Chemistry	13 %	13 %	12 %	10 %	12 %
Clinical Medicine	10 %	10 %	11 %	12 %	11 %
Computer & Information Sciences	8 %	8 %	9 %	9 %	9 %
Engineering	13 %	12 %	12 %	12 %	12 %
Geosciences	11 %	12 %	12 %	11 %	11 %
Health Sciences	10 %	10 %	11 %	10 %	10 %
Humanities	8 %	8 %	11 %	13 %	11 %
Materials Science	15 %	14 %	12 %	10 %	12 %
Mathematics & Statistics	13 %	13 %	10 %	11 %	12 %
Physics	12 %	12 %	12 %	12 %	12 %
Psychology	7 %	6 %	8 %	9 %	8 %
Social Sciences	9 %	9 %	10 %	10 %	10 %

*Data from Clarivate Analytics

At Nordic level, there is no overall tendency towards increased shares of top 10 publications from 1999-2002 to 2011-2014 (Table 4.9). In many subject fields, the tendency is quite the opposite, i.e. the shares are declining, such as in *Chemistry* (from 13 to 10 per cent) and *Materials Science* (from 15 to 10 per cent). The highest shares in 2011-2014 are within *Agriculture, Fisheries & Forestry* (15 per cent) and *Biology* (14 per cent), which are also the two subject fields with the highest shares throughout all periods. *Computer & Information Sciences* and *Psychology* are the two subject fields with the lowest shares in all periods, never with shares above 10 per cent.

In Table 4.10 we see that the average citation rates in the HE sectors correspond to the findings in Table 4.9: *Psychology* and *Computer & Information Sciences* have the lowest citation rates in 2011-2014, the citation rates in *Chemistry* and *Materials Science* have fallen, and the highest citation rates are found in *Agriculture, Fisheries & Forestry* and *Biology* – closely followed by *Humanities*.

Table 4.10: Average citation rate for the Nordic HE sectors combined in the different subject fields*

Subject field	Average citation rate				
	1999-2002	2003-2006	2007-2010	2011-2014	Total
Agriculture, Fisheries & Forestry	1.28	1.30	1.31	1.35	1.31
Biology	1.24	1.23	1.24	1.26	1.24
Biomedicine & Molecular Biosciences	0.87	0.96	1.03	1.06	0.98
Business Studies & Economics	0.73	0.83	0.90	1.04	0.92
Chemistry	1.30	1.25	1.21	1.07	1.20
Clinical Medicine	1.04	1.06	1.12	1.14	1.10
Computer & Information Sciences	1.04	0.91	0.97	0.92	0.95
Engineering	1.29	1.18	1.17	1.19	1.20
Geosciences	1.11	1.14	1.16	1.11	1.13
Health Sciences	1.05	1.05	1.08	1.07	1.06
Humanities	0.77	0.83	1.11	1.24	1.08
Materials Science	1.34	1.32	1.29	1.06	1.22
Mathematics & Statistics	1.37	1.28	1.07	1.16	1.20
Physics	1.13	1.12	1.17	1.17	1.15
Psychology	0.78	0.74	0.91	0.98	0.88
Social Sciences	0.96	0.97	1.01	1.04	1.01

*Data from Clarivate Analytics

Table 4.11 shows that many of the highest shares of highly cited publications are from smaller HEIs, with a relatively low publication number in that field. The highest shares in e.g. Denmark are Aalborg University's 20 per cent share in *Engineering*, which is based on 631 fractionalised publications, Copenhagen Business School's share in *Humanities* (31 per cent, based on 44 fractionalised publications) and the Technical University of Denmark's share in *Social Sciences* (22 per cent, 64 fractionalised publications). In the case of Aalborg, the high share is in the university's primary research area – in the latter two, they are not.

Table 4.11: Share of highly cited publications across subject fields (2011-2014)*

University	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering
Aalborg University			9 %	12 %	3 %	10 %	6 %	20 %
Aarhus University	18 %	14 %	10 %	7 %	14 %	13 %	4 %	9 %
Copenhagen Business School				13 %				
Roskilde University			14 %					
Technical University of Denmark	19 %	18 %	14 %		15 %	12 %	11 %	15 %
University of Copenhagen	16 %	14 %	13 %	12 %	9 %	16 %	11 %	8 %
University of Southern Denmark		15 %	9 %	8 %	4 %	11 %		13 %
Aalborg University Hospitals			8 %			10 %		
Aarhus University Hospitals			10 %			12 %		
Copenhagen University Hospitals			10 %			13 %		
University of Southern Denmark Hospitals			9 %			10 %		
HES Other								
Other	16 %	12 %	13 %	11 %	10 %	15 %		12 %
HES Total	17 %	15 %	11 %	11 %	12 %	13 %	8 %	16 %
Denmark	17 %	14 %	12 %	11 %	12 %	13 %	8 %	15 %
Aalto University	11 %		9 %	10 %	12 %	11 %	9 %	10 %
Hanken School of Economics				17 %				
Lappeenranta University of Technology				10 %	7 %			10 %
Tampere University of Technology			6 %		5 %		11 %	12 %
University of Eastern Finland	9 %	13 %	11 %		7 %	11 %		5 %
University of Helsinki	14 %	12 %	11 %	6 %	9 %	12 %	14 %	13 %
University of Jyväskylä		9 %	5 %	3 %	12 %	4 %		8 %
University of Lapland								
University of Oulu	9 %	14 %	6 %	6 %	8 %	10 %	16 %	14 %
University of Tampere			10 %			11 %		
University of Turku	16 %	13 %	10 %	12 %	3 %	12 %	3 %	6 %
University of Vaasa				11 %				
Åbo Akademi University		7 %	8 %		7 %			8 %
Helsinki University Hospital			8 %			11 %		
Kuopio University Hospital			12 %			11 %		
Oulu University Hospital			11 %			9 %		
Tampere University Hospital			9 %			10 %		
Turku University Hospital			9 %			16 %		
HES Other			8 %			12 %		
Other	13 %	15 %	10 %	6 %	6 %	10 %	9 %	10 %
HES Total	12 %	12 %	10 %	10 %	9 %	11 %	10 %	10 %
Finland	12 %	12 %	10 %	9 %	8 %	11 %	10 %	10 %

Table 4.11 (cont.): Share of highly cited publications across subject fields (2011-2014)*

University	Geosciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	12 %	9 %	14 %	8 %	14 %	6 %		11 %
Aarhus University	12 %	12 %	18 %	13 %	7 %	16 %	12 %	14 %
Copenhagen Business School			31 %					15 %
Roskilde University						14 %		13 %
Technical University of Denmark	14 %	12 %		13 %	14 %	18 %		22 %
University of Copenhagen	13 %	12 %	11 %	15 %	14 %	17 %	15 %	12 %
University of Southern Denmark	19 %	10 %	15 %		10 %	18 %	7 %	15 %
Aalborg University Hospitals		8 %						
Aarhus University Hospitals		16 %						
Copenhagen University Hospitals		13 %						
University of Southern Denmark Hospitals		10 %						
HES Other								
Other	11 %	12 %	9 %	6 %		14 %	11 %	10 %
HES Total	14 %	12 %	16 %	12 %	12 %	17 %	12 %	13 %
Denmark	13 %	12 %	15 %	12 %	11 %	16 %	11 %	13 %
Aalto University	12 %			16 %	8 %	13 %		11 %
Hanken School of Economics								
Lappeenranta University of Technology				9 %		10 %		
Tampere University of Technology				7 %		9 %		
University of Eastern Finland	8 %	11 %	4 %	9 %	10 %	7 %		6 %
University of Helsinki	10 %	10 %	11 %	18 %	14 %	11 %	8 %	8 %
University of Jyväskylä		9 %	19 %	7 %	13 %	9 %	7 %	10 %
University of Lapland								
University of Oulu	5 %	6 %		7 %	9 %	4 %		15 %
University of Tampere		5 %	12 %				6 %	10 %
University of Turku	6 %	12 %	9 %		9 %	9 %	11 %	12 %
University of Vaasa								
Åbo Akademi University				9 %				8 %
Helsinki University Hospital		12 %						
Kuopio University Hospital								
Oulu University Hospital								
Tampere University Hospital								
Turku University Hospital								
HES Other		8 %				13 %		
Other	8 %	10 %	10 %	8 %		9 %	12 %	10 %
HES Total	9 %	9 %	13 %	11 %	10 %	10 %	8 %	10 %
Finland	9 %	10 %	13 %	11 %	11 %	10 %	8 %	10 %

Table 4.11 (cont.): Share of highly cited publications across subject fields (2011-2014)*

University	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering
Agricultural University of Iceland								
Reykjavik University								6 %
University of Akureyri								
University of Iceland	7 %	6 %	11 %		6 %	11 %		12 %
Landspítali University Hospital						8 %		
HES Other								
Other	5 %		25 %			17 %		
HES Total	8 %	6 %	10 %		5 %	9 %		10 %
Iceland	7 %	7 %	13 %		5 %	10 %		9 %
Nord University								
Norwegian Business School				11 %				
Norwegian School of Economics and Business Administration				11 %				
Norwegian School of Sport Sciences								
Norwegian University of Life Sciences	12 %	13 %	8 %					12 %
Norwegian University of Science and Technology	15 %	13 %	12 %	10 %	7 %	10 %	11 %	10 %
Oslo and Akershus University College of Applied Sciences								
University College of Southeast Norway								8 %
University of Agder								13 %
University of Bergen	11 %	10 %	8 %		7 %	10 %	11 %	5 %
University of Oslo	17 %	14 %	9 %	8 %	7 %	11 %	11 %	11 %
University of Stavanger								13 %
University of Tromsø	14 %	11 %	8 %		9 %	9 %		
St. Olavs Hospital			8 %			8 %		
University Hospital North Norway			8 %			9 %		
Bergen University Hospital			8 %			12 %		
Oslo University Hospital			8 %			11 %		
HES Other		7 %						12 %
Other	14 %	14 %	8 %	10 %	7 %	11 %	18 %	10 %
HES Total	13 %	12 %	9 %	9 %	7 %	11 %	10 %	10 %
Norway	14 %	13 %	9 %	9 %	7 %	11 %	11 %	10 %

Table 4.11 (cont.): Share of highly cited publications across subject fields (2011-2014)*

University	Geosciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland								
Reykjavik University								
University of Akureyri								
University of Iceland	12 %	8 %	11 %			7 %		7 %
Landspítali University Hospital								
HES Other								
Other	8 %							
HES Total	11 %	10 %	11 %			6 %	6 %	6 %
Iceland	10 %	9 %	9 %			6 %	6 %	7 %
Nord University								
Norwegian Business School								
Norwegian School of Economics and Business Administration								
Norwegian School of Sport Sciences		20 %						
Norwegian University of Life Sciences	10 %							11 %
Norwegian University of Science and Technology	7 %	13 %	9 %	8 %	17 %	10 %	6 %	11 %
Oslo and Akershus University College of Applied Sciences		7 %						9 %
University College of Southeast Norway		9 %						
University of Agder		8 %			10 %			4 %
University of Bergen	14 %	8 %	12 %		10 %	3 %	10 %	10 %
University of Oslo	13 %	9 %	13 %	4 %	11 %	10 %	10 %	11 %
University of Stavanger		13 %						10 %
University of Tromsø	11 %	10 %	12 %			4 %		5 %
St. Olavs Hospital		12 %						
University Hospital North Norway		13 %						
Bergen University Hospital		11 %						
Oslo University Hospital		10 %					12 %	
HES Other	7 %	10 %	8 %					3 %
Other	13 %	10 %	13 %	8 %	15 %	8 %	10 %	12 %
HES Total	11 %	10 %	11 %	7 %	12 %	9 %	8 %	9 %
Norway	12 %	10 %	11 %	7 %	12 %	9 %	8 %	10 %

Table 4.11 (cont.): Share of highly cited publications across subject fields (2011-2014)*

University	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering
Blekinge Institute of Technology							16 %	20 %
Borås University College								
Chalmers University of Technology			17 %	8 %	11 %		5 %	13 %
Gävle University College								
Jönköping University				16 %				
Karlstad University								6 %
Karolinska Institutet		15 %	13 %		11 %	14 %		
Linköping University			8 %	14 %	13 %	9 %	9 %	14 %
Linnaeus University		14 %	5 %					12 %
Luleå University of Technology					12 %			7 %
Lund University	14 %	17 %	10 %	11 %	9 %	10 %	8 %	12 %
Malmö University College						11 %		
Mid Sweden University								12 %
Mälardalen University College								17 %
Royal Institute of Technology (KTH)	16 %		9 %	14 %	12 %	8 %	9 %	11 %
Stockholm School of Economics				13 %				
Stockholm University	12 %	14 %	8 %	10 %	17 %	8 %		20 %
Swedish University of Agricultural Sciences	15 %	15 %	7 %		5 %			7 %
Södertörns University College								
Umeå University	23 %	16 %	10 %	6 %	9 %	10 %		10 %
University of Gothenburg	18 %	15 %	10 %	10 %	11 %	12 %		10 %
Uppsala University	16 %	17 %	12 %	8 %	13 %	11 %	8 %	10 %
Örebro University			4 %			10 %		
Karolinska University Hospital			9 %			14 %		
Linköping University Hospital						10 %		
Sahlgrenska University Hospital			12 %			11 %		
Skåne University Hospital			12 %			11 %		
University Hospital of Umeå						13 %		
Uppsala University Hospital			10 %			13 %		
Örebro University Hospital			14 %			10 %		
HES Other						8 %		11 %
Other	13 %	10 %	11 %	9 %	7 %	12 %	11 %	10 %
HES Total	15 %	15 %	11 %	10 %	12 %	12 %	9 %	12 %
Sweden	15 %	15 %	11 %	10 %	11 %	12 %	9 %	11 %

Table 4.11 (cont.): Share of highly cited publications across subject fields (2011-2014)*

University	Geosciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology								
Borås University College								
Chalmers University of Technology	10 %			10 %	9 %	14 %		14 %
Gävle University College		6 %						
Jönköping University		7 %						
Karlstad University		10 %						12 %
Karolinska Institutet		13 %					18 %	11 %
Linköping University	12 %	9 %	16 %	11 %	8 %	11 %	17 %	8 %
Linnaeus University		6 %				1 %		9 %
Luleå University of Technology	2 %	4 %		5 %		3 %		
Lund University	13 %	10 %	12 %	9 %	8 %	12 %	8 %	12 %
Malmö University College		11 %						5 %
Mid Sweden University		5 %		4 %				14 %
Mälardalen University College								
Royal Institute of Technology (KTH)	7 %	2 %	8 %	11 %	14 %	11 %		11 %
Stockholm School of Economics								
Stockholm University	15 %	6 %	12 %	16 %	11 %	13 %	6 %	11 %
Swedish University of Agricultural Sciences	9 %	6 %						7 %
Södertörns University College			11 %					5 %
Umeå University	12 %	9 %	10 %	13 %	9 %	11 %	9 %	7 %
University of Gothenburg	10 %	10 %	9 %		13 %	9 %	7 %	9 %
Uppsala University	11 %	12 %	7 %	12 %	13 %	10 %	10 %	10 %
Örebro University		11 %					8 %	11 %
Karolinska University Hospital		15 %						
Linköping University Hospital								
Sahlgrenska University Hospital		12 %						
Skåne University Hospital		13 %						
University Hospital of Umeå								
Uppsala University Hospital								
Örebro University Hospital								
HES Other		8 %						7 %
Other	10 %	9 %	7 %	7 %		8 %	9 %	11 %
HES Total	11 %	10 %	11 %	10 %	10 %	11 %	10 %	10 %
Sweden	11 %	10 %	10 %	10 %	10 %	11 %	10 %	10 %

*Data from Clarivate Analytics

We then show, in Table 4.12, the numbers for field normalised citation rates, i.e. average citation rates in the same subjects as in Table 4.11.

The citation rates vary a great deal between the HEIs, but just as importantly, they also vary *within* the HEIs depending on field. This lends credence to the suggestion that detailed analysis is needed alongside composite measures to get a better understanding of a HEI's performance. However, as the aggregated HEI citation scores are broken down into the 16 subject fields, we also see more variations and uncertainties emerging in these specific indicators. Each subset will contain fewer publications upon which indicators are calculated, thus creating larger variation due to highly cited articles, which will tend to have disproportionate influence in smaller data sets. For this reason, one should be careful in interpreting the meaning of these differences.

Once again, we illustrate some of the difficulties that can emerge when combining high citation rates with low publication volumes with examples from Denmark; four out of the 13 university values of 1.5 or above in the table are found at universities with less than 100 fractionalised publications in the field, i.e. less than 25 papers published on average per year. Furthermore, no university exceeds a value of 1.5 in the two larger, medicine related fields *Clinical Medicine* and *Biomedicine & Molecular Biosciences*.

Among each country's largest university, University of Copenhagen's highest citation rate in 2011-2014 is found in *Physics* (citation rate 1.61, based on 527 fractionalised publications), University of Helsinki in *Mathematics & Statistics* (citation rate 1.57, based on 133 factionalised publications), University of Iceland in *Humanities* (citation rate 1.95, based on 20 fractionalised publications), University of Oslo in *Agriculture, Fisheries & Forestry* (citation rate 1.15, based on 82 fractionalised publications) and Lund University in *Biology* (citation rate 1.45, based on 324 fractionalised publications). By comparison, at all these universities it is *Biomedicine & Molecular Biosciences* that is the largest subject field, where the numbers of fractionalised publications are in the range from three times as voluminous (in Denmark) to eight times as voluminous in (Finland).

Tables 4.13 to 4.28 show the results (share of top 10 papers and average citation rate) for each HEI, in each subject field, across four time periods. In the tables, the HEIs are not listed by country, but according to their citation rates in the latest period (2011-2014).

Table 4.12: Citation rates of HEIs (2011-2014)*

University	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering
Aalborg University			0.93	1.18	0.55	0.95	0.85	1.95
Aarhus University	1.48	1.30	1.06	0.91	1.31	1.20	0.58	0.98
Copenhagen Business School				1.29				
Roskilde University			1.04					
Technical University of Denmark	1.71	1.52	1.26		1.46	1.38	1.06	1.33
University of Copenhagen	1.45	1.32	1.20	1.08	1.00	1.35	1.15	1.04
University of Southern Denmark		1.29	1.00	0.99	0.81	1.11		1.19
Aalborg University Hospitals			0.77			0.95		
Aarhus University Hospitals			0.93			1.18		
Copenhagen University Hospitals			0.98			1.21		
University of Southern Denmark Hospitals			0.96			1.04		
HES Other								
Other	1.42	1.27	1.18	1.06	1.06	1.22		1.19
HES Total	1.49	1.34	1.11	1.11	1.19	1.21	0.90	1.45
Denmark	1.48	1.33	1.12	1.10	1.18	1.21	0.90	1.42
Aalto University	1.13		0.88	1.06	1.12	1.13	0.99	1.01
Hanken School of Economics				1.66				
Lappeenranta University of Technology				1.10	0.65			1.06
Tampere University of Technology			0.72		0.79		1.08	1.14
University of Eastern Finland	1.09	1.17	1.01		0.77	1.10		0.76
University of Helsinki	1.29	1.10	1.09	0.80	0.96	1.18	0.98	1.12
University of Jyväskylä		1.05	0.72	0.71	1.27	0.71		0.93
University of Lapland								
University of Oulu	0.97	1.24	0.79	0.92	0.82	1.05	1.24	1.16
University of Tampere			1.01			1.10		
University of Turku	1.43	1.18	0.90	1.24	0.60	1.06	0.44	0.67
University of Vaasa				0.97				
Åbo Akademi University		1.19	0.99		0.83			0.93
Helsinki University Hospital			1.02			1.10		
Kuopio University Hospital			1.07			1.07		
Oulu University Hospital			1.12			1.01		
Tampere University Hospital			0.96			1.02		
Turku University Hospital			1.03			1.27		
HES Other			1.03			1.16		
Other	1.20	1.21	0.99	0.81	0.84	1.09	0.88	1.07
HES Total	1.19	1.12	0.99	1.06	0.93	1.09	0.98	1.02
Finland	1.20	1.13	0.99	1.02	0.92	1.09	0.97	1.03

Table 4.12 (cont.): Citation rates of HEIs (2011-2014)*

University	Geosciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	1.00	0.95	1.54	0.92	1.23	0.81		1.13
Aarhus University	1.19	1.26	1.60	1.18	0.88	1.25	1.16	1.16
Copenhagen Business School			2.32					1.44
Roskilde University						1.11		1.07
Technical University of Denmark	1.33	1.10		1.34	1.64	1.64		1.71
University of Copenhagen	1.27	1.27	1.42	1.32	1.27	1.61	1.13	1.11
University of Southern Denmark	1.81	1.06	1.37		0.89	1.55	0.82	1.22
Aalborg University Hospitals		1.01						
Aarhus University Hospitals		1.66						
Copenhagen University Hospitals		1.25						
University of Southern Denmark Hospitals		1.08						
HES Other								
Other	0.95	1.25	0.79	0.79		1.41	0.92	1.07
HES Total	1.28	1.22	1.62	1.24	1.17	1.49	1.06	1.19
Denmark	1.20	1.22	1.53	1.21	1.16	1.48	1.05	1.18
Aalto University	0.94			1.36	1.11	1.29		1.06
Hanken School of Economics								
Lappeenranta University of Technology				0.92		0.82		
Tampere University of Technology				0.74		1.06		
University of Eastern Finland	0.93	1.22	0.56	0.72	1.32	0.88		0.81
University of Helsinki	1.05	1.00	1.01	1.50	1.57	1.24	0.95	0.82
University of Jyväskylä		1.03	2.27	0.97	1.32	0.95	0.85	1.07
University of Lapland								
University of Oulu	0.66	0.79		0.76	0.86	0.63		1.13
University of Tampere		0.72	0.86				1.01	0.82
University of Turku	0.75	1.11	0.90		0.88	0.91	1.05	1.11
University of Vaasa								
Åbo Akademi University				0.99				0.93
Helsinki University Hospital		1.17						
Kuopio University Hospital								
Oulu University Hospital								
Tampere University Hospital								
Turku University Hospital								
HES Other		0.87				1.33		
Other	0.95	1.04	1.17	0.86		0.91	1.02	0.98
HES Total	0.97	1.00	1.30	1.06	1.16	1.09	0.93	0.96
Finland	0.96	1.01	1.30	1.03	1.16	1.07	0.94	0.96

Table 4.12 (cont.): Citation rates of HEIs (2011-2014)*

University	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Bio-sciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering
Agricultural University of Iceland								
Reykjavik University								0.51
University of Akureyri								
University of Iceland	0.88	0.77	1.13		0.74	0.93		1.14
Landspítali University Hospital					0.84			
HES Other								
Other	0.82		2.51			1.69		
HES Total	0.88	0.77	1.05		0.69	0.88		0.85
Iceland	0.85	0.78	1.36		0.71	1.00		0.83
Nord University								
Norwegian Business School				0.93				
Norwegian School of Economics and Business Administration				1.05				
Norwegian School of Sport Sciences								
Norwegian University of Life Sciences	1.28	1.14	0.94					1.23
Norwegian University of Science and Technology	1.39	1.13	1.09	1.29	0.87	1.04	0.89	1.10
Oslo and Akershus University College of Applied Sciences								
University College of Southeast Norway								0.96
University of Agder								1.61
University of Bergen	1.11	1.06	0.90		0.81	1.00	1.05	0.70
University of Oslo	1.51	1.24	0.92	0.85	0.82	1.08	1.05	1.16
University of Stavanger								0.98
University of Tromsø	1.31	1.05	0.92		0.97	1.00		
St. Olavs Hospital			0.77			1.02		
University Hospital North Norway			0.96			1.02		
Bergen University Hospital			0.88			1.12		
Oslo University Hospital			0.88			1.15		
HES Other		0.96						1.03
Other	1.33	1.21	0.85	1.07	0.79	1.04	1.48	1.05
HES Total	1.32	1.13	0.92	0.99	0.84	1.08	0.94	1.07
Norway	1.33	1.16	0.91	1.01	0.83	1.07	1.05	1.07

Table 4.12 (cont.): Citation rates of HEIs (2011-2014)*

University	Geosciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland								
Reykjavik University								
University of Akureyri								
University of Iceland	1.14	0.94	1.95			0.80		0.76
Landspítali University Hospital								
HES Other								
Other	0.92							
HES Total	1.11	1.06	1.89			0.75	0.88	0.79
Iceland	1.05	1.01	1.55			0.74	0.83	0.84
Nord University								
Norwegian Business School								
Norwegian School of Economics and Business Administration								
Norwegian School of Sport Sciences		1.73						
Norwegian University of Life Sciences	1.05							1.22
Norwegian University of Science and Technology	0.81	1.25	1.05	0.98	1.79	0.99	0.81	1.21
Oslo and Akershus University College of Applied Sciences		0.92						0.88
University College of Southeast Norway		0.96						
University of Agder		1.04			1.11			0.68
University of Bergen	1.26	0.96	1.14		1.08	0.71	1.05	1.10
University of Oslo	1.26	1.00	1.30	0.91	1.10	1.03	1.14	1.05
University of Stavanger		1.30						0.98
University of Tromsø	1.04	1.02	1.16			0.64		0.77
St. Olavs Hospital		1.18						
University Hospital North Norway		1.32						
Bergen University Hospital		1.13						
Oslo University Hospital		1.12					1.04	
HES Other	0.88	0.97	0.60					0.59
Other	1.18	1.16	1.26	0.92	1.65	0.96	0.97	1.15
HES Total	1.10	1.11	1.10	0.94	1.26	0.95	0.96	1.00
Norway	1.14	1.12	1.12	0.93	1.30	0.95	0.96	1.04

Table 4.12 (cont.): Citation rates of HEIs (2011-2014)*

University	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering
Blekinge Institute of Technology							1.11	1.52
Borås University College								
Chalmers University of Technology			1.28	0.80	1.02		0.71	1.22
Gävle University College								
Jönköping University				1.28				
Karlstad University								0.82
Karolinska Institutet		1.81	1.28		0.95	1.28		
Linköping University			0.92	1.14	1.31	1.01	0.77	1.64
Linnaeus University		1.36	0.79					1.16
Luleå University of Technology					0.92			0.92
Lund University	1.41	1.45	1.01	1.13	1.03	1.03	0.78	1.33
Malmö University College						1.04		
Mid Sweden University								0.91
Mälardalen University College								1.36
Royal Institute of Technology (KTH)	1.33		0.99	1.13	1.12	0.86	0.96	1.15
Stockholm School of Economics				1.27				
Stockholm University	1.35	1.46	0.98	1.03	1.53	1.03		1.67
Swedish University of Agricultural Sciences	1.30	1.35	0.83		0.89			0.87
Södertörns University College								
Umeå University	1.88	1.43	1.06	0.88	0.92	1.01		1.04
University of Gothenburg	1.39	1.43	1.13	0.91	1.07	1.22		1.11
Uppsala University	1.30	1.44	1.12	0.90	1.18	1.11	0.87	1.01
Örebro University			0.65			1.10		
Karolinska University Hospital			1.04			1.23		
Linköping University Hospital						1.04		
Sahlgrenska University Hospital			1.25			1.09		
Skåne University Hospital			1.13			1.07		
University Hospital of Umeå						1.12		
Uppsala University Hospital			0.99			1.27		
Örebro University Hospital			1.30			1.12		
HES Other						0.80		1.09
Other	1.22	1.17	1.12	0.97	0.86	1.14	0.93	1.15
HES Total	1.34	1.41	1.10	1.02	1.13	1.15	0.89	1.19
Sweden	1.32	1.38	1.10	1.01	1.10	1.15	0.90	1.19

Table 4.12 (cont.): Citation rates of HEIs (2011-2014)*

University	Geosciences	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology								
Borås University College								
Chalmers University of Technology	1.00			0.93	0.91	1.18		1.19
Gävle University College		0.63						
Jönköping University		0.86						
Karlstad University		1.07						1.09
Karolinska Institutet		1.19					1.42	1.12
Linköping University	1.17	0.98	1.51	1.06	0.79	1.05	1.27	0.97
Linnaeus University		0.81				0.38		0.95
Luleå University of Technology	0.62	0.60		0.76		0.51		
Lund University	1.14	0.94	1.02	1.09	1.11	1.25	0.83	1.16
Malmö University College		1.03						0.79
Mid Sweden University		0.83		0.43				1.18
Mälardalen University College								
Royal Institute of Technology (KTH)	0.78	0.45	1.04	1.02	1.28	1.06		1.05
Stockholm School of Economics								
Stockholm University	1.27	0.77	1.16	1.29	1.25	1.42	0.77	1.14
Swedish University of Agricultural Sciences	1.06	0.73						0.81
Södertörns University College			0.98					0.60
Umeå University	1.19	0.89	0.98	1.12	0.80	1.06	0.88	0.81
University of Gothenburg	1.05	1.06	0.85		1.20	0.83	0.81	0.98
Uppsala University	1.06	1.11	0.77	1.25	1.25	1.01	1.05	1.22
Örebro University		1.01					0.86	0.91
Karolinska University Hospital		1.26						
Linköping University Hospital								
Sahlgrenska University Hospital		1.16						
Skåne University Hospital		1.06						
University Hospital of Umeå								
Uppsala University Hospital								
Örebro University Hospital								
HES Other		0.83						0.91
Other	1.13	1.01	0.60	0.82		0.80	0.86	1.00
HES Total	1.07	1.00	1.01	1.02	1.10	1.09	0.99	1.03
Sweden	1.08	1.00	0.97	0.99	1.10	1.07	0.98	1.03

*Data from Clarivate Analytics

Table 4.13: Share of highly cited papers and field normalised citation rates - Agriculture, Fisheries & Forestry*

Organisation	Share of highly cited				Average citation rate			
	1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
SWE Umeå University	24 %	20 %	20 %	23 %	1.98	1.68	1.61	1.88
DEN Technical University of Denmark	20 %	19 %	18 %	19 %	1.83	1.62	1.59	1.71
NOR University of Oslo	11 %	10 %	12 %	17 %	0.95	0.93	1.26	1.51
DEN Aarhus University	14 %	15 %	13 %	18 %	1.31	1.35	1.27	1.48
DEN University of Copenhagen	14 %	14 %	16 %	16 %	1.32	1.31	1.48	1.45
FIN University of Turku	13 %	11 %	17 %	16 %	1.28	1.25	1.36	1.43
DEN Other (Non HES)	15 %	14 %	15 %	16 %	1.35	1.44	1.42	1.42
SWE Lund University	12 %	11 %	11 %	14 %	1.17	1.23	1.19	1.41
NOR Norwegian University of Science and Technology	7 %	8 %	9 %	15 %	0.91	1.00	1.12	1.39
SWE University of Gothenburg	8 %	11 %	12 %	18 %	0.93	1.19	1.20	1.39
SWE Stockholm University	12 %	12 %	11 %	12 %	1.49	1.37	1.27	1.35
NOR Other (Non HES)	16 %	14 %	17 %	14 %	1.35	1.32	1.42	1.33
SWE Royal Institute of Technology (KTH)		18 %	14 %	16 %		1.50	1.26	1.33
NOR University of Tromsø	17 %	9 %	20 %	14 %	1.34	1.18	1.61	1.31
SWE Swedish University of Agricultural Sciences	15 %	13 %	14 %	15 %	1.25	1.28	1.33	1.30
SWE Uppsala University	11 %	10 %	11 %	16 %	1.07	1.11	1.14	1.30
FIN University of Helsinki	14 %	13 %	14 %	14 %	1.33	1.38	1.28	1.29
NOR Norwegian University of Life Sciences	14 %	14 %	14 %	12 %	1.25	1.34	1.30	1.28
SWE Other (Non HES)	13 %	14 %	13 %	13 %	1.20	1.40	1.27	1.22
FIN Other (Non HES)	11 %	10 %	12 %	13 %	1.06	1.04	1.20	1.20
FIN Aalto University				11 %				1.13
NOR University of Bergen	13 %	13 %	11 %	11 %	1.17	1.15	1.14	1.11
FIN University of Eastern Finland	9 %	13 %	10 %	9 %	1.19	1.23	1.03	1.09
FIN University of Oulu	4 %	6 %	13 %	9 %	0.67	0.88	1.09	0.97
ICE University of Iceland				7 %				0.88
ICE Other (Non HES)		10 %	7 %	5 %		1.11	0.85	0.82
DEN Aalborg University	20 %	16 %	13 %		1.67	1.42	1.19	
FIN University of Jyväskylä		12 %				1.10		

*Data from Clarivate Analytics

Table 4.14: Share of highly cited papers and field normalised citation rates – Biology*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
SWE	Karolinska Institutet			18 %	15 %			1.71	1.81
DEN	Technical University of Denmark	15 %	17 %	19 %	18 %	1.40	1.45	1.60	1.52
SWE	Stockholm University	14 %	14 %	15 %	14 %	1.46	1.34	1.34	1.46
SWE	Lund University	13 %	14 %	15 %	17 %	1.26	1.32	1.30	1.45
SWE	Uppsala University	16 %	15 %	15 %	17 %	1.50	1.40	1.38	1.44
SWE	University of Gothenburg	14 %	13 %	13 %	15 %	1.28	1.24	1.36	1.43
SWE	Umeå University	19 %	15 %	15 %	16 %	1.82	1.28	1.34	1.43
SWE	Linnaeus University				14 %				1.36
SWE	Swedish University of Agricultural Sciences	15 %	18 %	14 %	15 %	1.38	1.53	1.41	1.35
DEN	University of Copenhagen	11 %	11 %	14 %	14 %	1.18	1.13	1.24	1.32
DEN	Aarhus University	12 %	15 %	15 %	14 %	1.16	1.38	1.37	1.30
DEN	University of Southern Denmark	17 %	15 %	10 %	15 %	1.37	1.33	1.28	1.29
DEN	Other (Non HES)	10 %	13 %	12 %	12 %	1.03	1.14	1.18	1.27
FIN	University of Oulu	12 %	8 %	12 %	14 %	0.98	0.96	1.22	1.24
NOR	University of Oslo	13 %	12 %	12 %	14 %	1.21	1.25	1.13	1.24
NOR	Other (Non HES)	10 %	13 %	11 %	14 %	1.04	1.17	1.09	1.21
FIN	Other (Non HES)	6 %	9 %	10 %	15 %	0.76	0.98	1.05	1.21
FIN	Åbo Akademi University				7 %				1.19
FIN	University of Turku	14 %	11 %	10 %	13 %	1.29	1.28	1.18	1.18
SWE	Other (Non HES)	11 %	11 %	9 %	10 %	1.24	1.10	0.93	1.17
FIN	University of Eastern Finland	6 %	5 %	7 %	13 %	0.94	0.92	0.89	1.17
NOR	Norwegian University of Life Sciences	8 %	9 %	9 %	13 %	0.87	0.97	1.12	1.14
NOR	Norwegian University of Science and Technology	10 %	9 %	12 %	13 %	1.08	1.01	1.09	1.13
FIN	University of Helsinki	12 %	14 %	12 %	12 %	1.09	1.28	1.21	1.10
NOR	University of Bergen	10 %	11 %	10 %	10 %	0.96	1.08	0.99	1.06
NOR	University of Tromsø	10 %	11 %	12 %	11 %	0.91	1.05	1.22	1.05
FIN	University of Jyväskylä	9 %	10 %	10 %	9 %	1.03	1.06	1.00	1.05
NOR	HES Other			7 %	7 %			0.85	0.96
ICE	University of Iceland				6 %				0.77
ICE	Other (Non HES)		6 %				0.95		

*Data from Clarivate Analytics

Table 4.15: Share of highly cited papers and field normalised citation rates – Biomedicine & Molecular Biosciences*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
ICE	Other (Non HES)		15 %	35 %	25 %		1.97	3.17	2.51
SWE	Örebro University Hospital			6 %	14 %			0.96	1.30
SWE	Chalmers University of Technology	4 %	8 %	10 %	17 %	0.65	0.86	0.87	1.28
SWE	Karolinska Institutet	11 %	11 %	13 %	13 %	1.09	1.13	1.23	1.28
DEN	Technical University of Denmark	10 %	13 %	14 %	14 %	1.07	1.19	1.22	1.26
SWE	Sahlgrenska University Hospital	6 %	9 %	8 %	12 %	0.78	0.84	0.96	1.25
DEN	University of Copenhagen	7 %	9 %	13 %	13 %	0.82	0.96	1.19	1.20
DEN	Other (Non HES)	9 %	11 %	11 %	13 %	0.99	1.08	1.12	1.18
SWE	University of Gothenburg	7 %	9 %	8 %	10 %	0.85	0.94	0.90	1.13
SWE	Skåne University Hospital	8 %	8 %	8 %	12 %	0.87	0.91	0.97	1.13
ICE	University of Iceland	4 %	5 %	9 %	11 %	0.60	0.65	1.12	1.13
SWE	Uppsala University	7 %	9 %	10 %	12 %	0.86	0.98	1.00	1.12
FIN	Oulu University Hospital			8 %	11 %			0.83	1.12
SWE	Other (Non HES)	10 %	11 %	11 %	11 %	1.00	1.08	1.05	1.12
NOR	Norwegian University of Science and Technology	7 %	9 %	11 %	12 %	0.76	1.06	1.09	1.09
FIN	University of Helsinki	9 %	9 %	10 %	11 %	1.00	0.96	1.14	1.09
FIN	Kuopio University Hospital	6 %	7 %	9 %	12 %	0.81	0.85	0.92	1.07
SWE	Umeå University	9 %	11 %	10 %	10 %	0.94	1.04	0.96	1.06
DEN	Aarhus University	9 %	9 %	11 %	10 %	0.93	0.90	1.05	1.06
SWE	Karolinska University Hospital	6 %	9 %	10 %	9 %	0.81	0.95	1.03	1.04
DEN	Roskilde University		8 %		14 %		0.90		1.04
FIN	Turku University Hospital	7 %	9 %	9 %	9 %	0.87	0.84	0.94	1.03
FIN	HES Other				8 %				1.03
FIN	Helsinki University Hospital	10 %	10 %	11 %	8 %	0.94	0.96	1.11	1.02
SWE	Lund University	7 %	8 %	10 %	10 %	0.84	0.90	0.99	1.01
FIN	University of Tampere	8 %	7 %	7 %	10 %	0.87	0.77	0.85	1.01
FIN	University of Eastern Finland	6 %	6 %	11 %	11 %	0.79	0.78	0.98	1.01
DEN	University of Southern Denmark	15 %	18 %	13 %	9 %	1.38	1.79	1.22	1.00
SWE	Royal Institute of Technology (KTH)	6 %	8 %	12 %	9 %	0.85	0.92	1.04	0.99
SWE	Uppsala University Hospital	4 %	8 %	6 %	10 %	0.65	0.81	0.82	0.99
FIN	Åbo Akademi University	7 %	5 %	7 %	8 %	0.82	0.76	0.92	0.99
FIN	Other (Non HES)	7 %	8 %	9 %	10 %	0.86	0.87	0.96	0.99
SWE	Stockholm University	8 %	12 %	11 %	8 %	0.89	1.19	1.18	0.98
DEN	Copenhagen University Hospitals	6 %	10 %	9 %	10 %	0.77	0.98	1.01	0.98
NOR	University Hospital North Norway			8 %	8 %			1.01	0.96
DEN	University of Southern Denmark Hospitals	5 %	8 %	9 %	9 %	0.66	0.82	0.87	0.96
FIN	Tampere University Hospital	8 %	6 %	6 %	9 %	0.83	0.75	0.81	0.96

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
NOR	Norwegian University of Life Sciences	5 %	6 %	8 %	8 %	0.70	0.77	0.93	0.94
DEN	Aarhus University Hospitals	7 %	7 %	9 %	10 %	0.77	0.79	0.92	0.93
DEN	Aalborg University	3 %	5 %	5 %	9 %	0.66	0.64	0.69	0.93
NOR	University of Oslo	8 %	9 %	9 %	9 %	0.93	1.07	0.94	0.92
NOR	University of Tromsø	4 %	7 %	8 %	8 %	0.61	0.86	0.92	0.92
SWE	Linköping University	7 %	5 %	7 %	8 %	0.73	0.69	0.82	0.92
FIN	University of Turku	6 %	7 %	8 %	10 %	0.77	0.78	0.84	0.90
NOR	University of Bergen	7 %	7 %	9 %	8 %	0.85	0.85	0.98	0.90
NOR	Bergen University Hospital	5 %	4 %	7 %	8 %	0.68	0.65	0.80	0.88
NOR	Oslo University Hospital	8 %	12 %	8 %	8 %	0.88	1.08	0.95	0.88
FIN	Aalto University	4 %	6 %	10 %	9 %	0.68	0.71	0.96	0.88
NOR	Other (Non HES)	6 %	7 %	7 %	8 %	0.69	0.82	0.84	0.85
SWE	Swedish University of Agricultural Sciences	5 %	8 %	6 %	7 %	0.59	0.81	0.77	0.83
SWE	Linnaeus University		9 %	7 %	5 %		0.93	0.68	0.79
FIN	University of Oulu	8 %	8 %	7 %	6 %	0.83	0.80	0.86	0.79
DEN	Aalborg University Hospitals			5 %	8 %			0.64	0.77
NOR	St. Olavs Hospital	5 %	6 %	9 %	8 %	0.63	0.73	0.84	0.77
FIN	University of Jyväskylä	3 %	3 %	3 %	5 %	0.60	0.61	0.61	0.72
FIN	Tampere University of Technology			11 %	6 %			0.87	0.72
SWE	Örebro University				4 %				0.65
ICE	Landsþítali University Hospital		14 %				1.31		
SWE	Linköping University Hospital	3 %	4 %	9 %		0.58	0.59	0.77	
SWE	University Hospital of Umeå	5 %	6 %	7 %		0.70	0.64	0.84	

*Data from Clarivate Analytics

Table 4.16: Share of highly cited papers and field normalised citation rates – Business Studies & Economics*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
FIN	Hanken School of Economics			14 %	17 %			1.02	1.66
NOR	Norwegian University of Science and Technology		4 %	7 %	10 %		0.71	0.92	1.29
DEN	Copenhagen Business School	6 %	19 %	9 %	13 %	0.89	1.42	1.10	1.29
SWE	Jönköping University				16 %				1.28
SWE	Stockholm School of Economics	10 %	10 %	13 %	13 %	0.96	0.99	1.35	1.27
FIN	University of Turku			10 %	12 %			0.83	1.24
DEN	Aalborg University	5 %	5 %	7 %	12 %	0.65	0.81	0.88	1.18
SWE	Linköping University				14 %				1.14
SWE	Lund University	6 %	9 %	10 %	11 %	0.81	0.92	0.89	1.13
SWE	Royal Institute of Technology (KTH)				14 %				1.13
FIN	Lappeenranta University of Technology				10 %				1.10
DEN	University of Copenhagen	11 %	10 %	5 %	12 %	0.93	0.92	0.72	1.08
NOR	Other (Non HES)	2 %	4 %	7 %	10 %	0.52	0.69	0.81	1.07
DEN	Other (Non HES)		7 %	12 %	11 %		0.73	1.00	1.06
FIN	Aalto University	10 %	6 %	11 %	10 %	0.99	0.83	1.07	1.06
NOR	Norwegian School of Economics and Business Administration	1 %	6 %	6 %	11 %	0.50	0.81	0.72	1.05
SWE	Stockholm University	15 %	18 %	14 %	10 %	1.64	1.23	1.21	1.03
DEN	University of Southern Denmark			3 %	8 %			0.63	0.99
FIN	University of Vaasa				11 %				0.97
SWE	Other (Non HES)	7 %	8 %	10 %	9 %	0.84	0.75	1.00	0.97
NOR	Norwegian Business School		10 %	5 %	11 %		0.94	0.77	0.93
FIN	University of Oulu				6 %				0.92
DEN	Aarhus University	4 %		8 %	7 %	0.54		0.84	0.91
SWE	University of Gothenburg	5 %	6 %	7 %	10 %	0.73	0.81	0.88	0.91
SWE	Uppsala University	7 %	3 %	7 %	8 %	0.83	0.61	0.87	0.90
SWE	Umeå University			6 %	6 %			0.63	0.88
NOR	University of Oslo		5 %	11 %	8 %		0.86	0.92	0.85
FIN	Other (Non HES)	9 %	3 %	5 %	6 %	0.78	0.52	0.76	0.81
SWE	Chalmers University of Technology				8 %				0.80
FIN	University of Helsinki		8 %	3 %	6 %		0.65	0.51	0.80
FIN	University of Jyväskylä				3 %				0.71

*Data from Clarivate Analytics

Table 4.17: Share of highly cited papers and field normalised citation rates - Chemistry*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
SWE	Stockholm University	16 %	23 %	18 %	17 %	1.51	1.94	1.53	1.53
DEN	Technical University of Denmark	17 %	18 %	19 %	15 %	1.47	1.66	1.80	1.46
SWE	Linköping University	17 %	13 %	19 %	13 %	1.58	1.16	1.53	1.31
DEN	Aarhus University	22 %	28 %	23 %	14 %	1.93	2.30	1.89	1.31
FIN	University of Jyväskylä	5 %	6 %	9 %	12 %	0.83	0.89	1.04	1.27
SWE	Uppsala University	20 %	16 %	13 %	13 %	1.68	1.46	1.27	1.18
FIN	Aalto University	10 %	11 %	11 %	12 %	1.09	1.17	1.16	1.12
SWE	Royal Institute of Technology (KTH)	15 %	12 %	16 %	12 %	1.33	1.15	1.38	1.12
SWE	University of Gothenburg	12 %	10 %	9 %	11 %	1.20	1.00	0.93	1.07
DEN	Other (Non HES)	19 %	12 %	14 %	10 %	1.69	1.29	1.66	1.06
SWE	Lund University	16 %	13 %	14 %	9 %	1.56	1.31	1.24	1.03
SWE	Chalmers University of Technology	15 %	12 %	13 %	11 %	1.26	1.09	1.17	1.02
DEN	University of Copenhagen	12 %	12 %	8 %	9 %	1.22	1.11	0.89	1.00
NOR	University of Tromsø	19 %	13 %	11 %	9 %	1.39	1.20	0.94	0.97
FIN	University of Helsinki	13 %	13 %	12 %	9 %	1.22	1.23	1.22	0.96
SWE	Karolinska Institutet	15 %	9 %	10 %	11 %	2.15	1.09	1.81	0.95
SWE	Luleå University of Technology	31 %	5 %	6 %	12 %	2.92	0.80	0.89	0.92
SWE	Umeå University	12 %	10 %	6 %	9 %	1.15	1.21	0.95	0.92
SWE	Swedish University of Agricultural Sciences	12 %	10 %	4 %	5 %	1.12	1.08	0.92	0.89
NOR	Norwegian University of Science and Technology	5 %	9 %	11 %	7 %	0.65	0.83	0.98	0.87
SWE	Other (Non HES)	15 %	10 %	11 %	7 %	1.45	1.11	1.09	0.86
FIN	Other (Non HES)	8 %	9 %	9 %	6 %	0.92	0.87	0.95	0.84
FIN	Åbo Akademi University	3 %	12 %	8 %	7 %	0.76	1.14	1.04	0.83
NOR	University of Oslo	11 %	9 %	10 %	7 %	1.11	0.99	0.96	0.82
FIN	University of Oulu	2 %	2 %	5 %	8 %	0.59	0.67	0.58	0.82
NOR	University of Bergen	7 %	12 %	6 %	7 %	0.82	1.03	0.95	0.81
DEN	University of Southern Denmark	18 %	12 %	10 %	4 %	1.63	1.20	1.01	0.81
FIN	Tampere University of Technology	7 %	6 %	8 %	5 %	0.77	0.80	0.83	0.79
NOR	Other (Non HES)	6 %	10 %	12 %	7 %	0.91	1.02	1.05	0.79
FIN	University of Eastern Finland	4 %	3 %	8 %	7 %	0.73	0.60	0.84	0.77
ICE	University of Iceland				6 %				0.74
FIN	Lappeenranta University of Technology				7 %				0.65
FIN	University of Turku	6 %	9 %	6 %	3 %	0.75	0.95	0.75	0.60
DEN	Aalborg University			3 %	3 %			0.67	0.55

*Data from Clarivate Analytics

Table 4.18: Share of highly cited papers and field normalised citation rates - Computer & Information Sciences*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
NOR	Other (Non HES)	6 %	18 %	16 %	18 %	0.91	1.46	1.66	1.48
FIN	University of Oulu				16 %				1.24
DEN	University of Copenhagen	15 %	13 %	11 %	11 %	1.46	1.38	1.08	1.15
SWE	Blekinge Institute of Technology				16 %				1.11
FIN	Tampere University of Technology			13 %	11 %			1.18	1.08
DEN	Technical University of Denmark	12 %	14 %	12 %	11 %	1.18	1.86	1.09	1.06
NOR	University of Bergen		11 %	10 %	11 %		1.19	1.01	1.05
NOR	University of Oslo			9 %	11 %			0.95	1.05
FIN	Aalto University	17 %	10 %	8 %	9 %	2.19	0.93	0.95	0.99
FIN	University of Helsinki		6 %	8 %	14 %		0.91	1.38	0.98
SWE	Royal Institute of Technology (KTH)	6 %	8 %	7 %	9 %	1.22	0.76	0.79	0.96
SWE	Other (Non HES)	13 %	11 %	10 %	11 %	1.67	1.10	1.07	0.93
NOR	Norwegian University of Science and Technology	7 %	7 %	9 %	11 %	0.78	0.74	1.05	0.89
FIN	Other (Non HES)	11 %	12 %	12 %	9 %	1.15	1.24	1.16	0.88
SWE	Uppsala University	10 %	10 %	13 %	8 %	1.81	1.13	1.07	0.87
DEN	Aalborg University	9 %	7 %	6 %	6 %	1.15	0.90	0.75	0.85
SWE	Lund University	5 %	8 %	16 %	8 %	0.88	0.90	1.59	0.78
SWE	Linköping University	3 %	6 %	8 %	9 %	0.63	0.74	0.86	0.77
SWE	Chalmers University of Technology	11 %	9 %	5 %	5 %	1.08	0.76	0.58	0.71
DEN	Aarhus University		10 %	6 %	4 %		0.92	0.80	0.58
FIN	University of Turku		4 %	3 %	3 %		0.51	0.36	0.44
FIN	HES Other			5 %				0.54	
FIN	University of Tampere			5 %				0.69	

*Data from Clarivate Analytics

Table 4.19 Share of highly cited papers and field normalised citation rates – Engineering*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
DEN	Aalborg University	17 %	13 %	16 %	20 %	1.71	1.33	1.55	1.95
SWE	Stockholm University	19 %	20 %	17 %	20 %	1.70	2.01	1.38	1.67
SWE	Linköping University	12 %	11 %	13 %	14 %	1.23	1.22	1.21	1.64
NOR	University of Agder				13 %				1.61
SWE	Blekinge Institute of Technology				20 %				1.52
SWE	Mälardalen University College				17 %				1.36
DEN	Technical University of Denmark	17 %	18 %	16 %	15 %	1.63	1.64	1.64	1.33
SWE	Lund University	14 %	13 %	14 %	12 %	1.34	1.37	1.30	1.33
NOR	Norwegian University of Life Sciences				12 %				1.23
SWE	Chalmers University of Technology	16 %	13 %	13 %	13 %	1.46	1.20	1.18	1.22
DEN	Other (Non HES)	14 %	17 %	14 %	12 %	1.40	1.57	1.38	1.19
DEN	University of Southern Denmark			7 %	13 %			1.00	1.19
FIN	University of Oulu	11 %	13 %	9 %	14 %	1.21	1.15	0.95	1.16
SWE	Linnaeus University				12 %				1.16
NOR	University of Oslo	12 %	15 %	11 %	11 %	1.35	1.50	1.08	1.16
SWE	Other (Non HES)	11 %	10 %	9 %	10 %	1.16	1.04	0.99	1.15
SWE	Royal Institute of Technology (KTH)	16 %	12 %	11 %	11 %	1.38	1.19	1.11	1.15
FIN	Tampere University of Technology	7 %	9 %	10 %	12 %	0.72	0.90	1.01	1.14
ICE	University of Iceland				12 %				1.14
FIN	University of Helsinki	13 %	14 %	9 %	13 %	1.35	1.37	1.01	1.12
SWE	University of Gothenburg	13 %	10 %	15 %	10 %	1.31	1.06	1.39	1.11
NOR	Norwegian University of Science and Technology	16 %	15 %	12 %	10 %	1.35	1.32	1.15	1.10
SWE	HES Other			9 %	11 %			0.81	1.09
FIN	Other (Non HES)	12 %	11 %	9 %	10 %	1.14	1.09	0.92	1.07
FIN	Lappeenranta University of Technology	4 %	13 %	5 %	10 %	0.73	1.04	0.81	1.06
NOR	Other (Non HES)	11 %	13 %	9 %	10 %	1.17	1.28	1.01	1.05
SWE	Umeå University		11 %	9 %	10 %		1.15	0.94	1.04
DEN	University of Copenhagen	16 %	18 %	15 %	8 %	1.49	1.69	1.42	1.04
NOR	HES Other			11 %	12 %			1.05	1.03
SWE	Uppsala University	18 %	10 %	11 %	10 %	1.65	1.08	1.11	1.01
FIN	Aalto University	11 %	9 %	10 %	10 %	1.18	0.87	1.01	1.01
NOR	University of Stavanger		14 %	6 %	13 %		1.08	0.79	0.98
DEN	Aarhus University	10 %	18 %	17 %	9 %	1.43	1.55	1.35	0.98
NOR	University College of Southeast Norway				8 %				0.96
FIN	University of Jyväskylä			9 %	8 %			1.03	0.93
FIN	Åbo Akademi University	7 %	11 %	12 %	8 %	0.84	1.03	1.21	0.93
SWE	Luleå University of Technology	9 %	6 %	9 %	7 %	0.91	0.79	0.92	0.92
SWE	Mid Sweden University			11 %	12 %			1.17	0.91
SWE	Swedish University of Agricultural Sciences	12 %	6 %	8 %	7 %	1.11	0.85	0.96	0.87

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
SWE	Karlstad University				6 %				0.82
FIN	University of Eastern Finland	8 %	10 %	10 %	5 %	0.77	1.13	1.26	0.76
NOR	University of Bergen	9 %	7 %	10 %	5 %	1.01	0.92	1.14	0.70
FIN	University of Turku	11 %	9 %	7 %	6 %	0.95	0.94	0.71	0.67
ICE	Reykjavik University				6 %				0.51

*Data from Clarivate Analytics

Table 4.20: Share of highly cited papers and field normalised citation rates – Geosciences*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
DEN	University of Southern Denmark				19 %				1.81
DEN	Technical University of Denmark	11 %	10 %	14 %	14 %	1.08	1.13	1.28	1.33
DEN	University of Copenhagen	12 %	16 %	13 %	13 %	1.14	1.42	1.31	1.27
SWE	Stockholm University	14 %	17 %	14 %	15 %	1.43	1.69	1.37	1.27
NOR	University of Bergen	16 %	14 %	13 %	14 %	1.34	1.29	1.24	1.26
NOR	University of Oslo	12 %	10 %	13 %	13 %	1.12	1.15	1.23	1.26
SWE	Umeå University	22 %	23 %	12 %	12 %	1.70	1.68	1.15	1.19
DEN	Aarhus University	10 %	15 %	13 %	12 %	1.07	1.41	1.28	1.19
NOR	Other (Non HES)	9 %	11 %	11 %	13 %	0.92	1.10	1.10	1.18
SWE	Linköping University		4 %		12 %		0.71		1.17
ICE	University of Iceland	16 %	8 %	9 %	12 %	1.55	1.04	1.11	1.14
SWE	Lund University	13 %	11 %	13 %	13 %	1.09	1.01	1.22	1.14
SWE	Other (Non HES)	10 %	11 %	11 %	10 %	1.01	1.13	1.11	1.13
SWE	Uppsala University	8 %	9 %	9 %	11 %	0.93	0.79	0.93	1.06
SWE	Swedish University of Agricultural Sciences	8 %	11 %	11 %	9 %	1.01	1.12	1.16	1.06
FIN	University of Helsinki	12 %	11 %	11 %	10 %	1.11	1.07	1.05	1.05
NOR	Norwegian University of Life Sciences	10 %	11 %	13 %	10 %	0.95	0.98	1.18	1.05
SWE	University of Gothenburg	10 %	8 %	12 %	10 %	1.02	0.94	1.26	1.05
NOR	University of Tromsø	10 %	11 %	9 %	11 %	1.07	1.06	1.00	1.04
DEN	Aalborg University			10 %	12 %			0.90	1.00
SWE	Chalmers University of Technology	6 %	9 %	13 %	10 %	0.70	0.91	1.05	1.00
FIN	Other (Non HES)	7 %	9 %	7 %	8 %	0.85	0.88	0.84	0.95
DEN	Other (Non HES)	10 %	10 %	10 %	11 %	0.95	1.02	0.96	0.95
FIN	Aalto University			11 %	12 %			1.09	0.94
FIN	University of Eastern Finland	9 %	12 %	11 %	8 %	1.00	1.10	1.22	0.93
ICE	Other (Non HES)		12 %	7 %	8 %		1.23	0.99	0.92
NOR	HES Other			12 %	7 %			1.30	0.88
NOR	Norwegian University of Science and Technology	5 %	7 %	8 %	7 %	0.61	0.80	0.87	0.81
SWE	Royal Institute of Technology (KTH)	2 %	8 %	5 %	7 %	0.65	0.72	0.66	0.78
FIN	University of Turku	14 %	8 %	8 %	6 %	1.08	0.91	0.90	0.75
FIN	University of Oulu	4 %	7 %	6 %	5 %	0.58	0.78	0.70	0.66
SWE	Luleå University of Technology	7 %	7 %	7 %	2 %	0.74	0.83	0.84	0.62
FIN	University of Jyväskylä	8 %				0.95			

*Data from Clarivate Analytics

Table 4.21: Share of highly cited papers and field normalised citation rates – Health Sciences*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
NOR	Norwegian School of Sport Sciences		26 %	19 %	20 %		1.91	1.49	1.73
DEN	Aarhus University Hospitals	8 %	10 %	19 %	16 %	1.11	1.18	1.50	1.66
NOR	University Hospital North Norway			18 %	13 %			1.45	1.32
NOR	University of Stavanger				13 %				1.30
DEN	University of Copenhagen	13 %	15 %	13 %	12 %	1.20	1.42	1.18	1.27
DEN	Aarhus University	9 %	8 %	10 %	12 %	0.97	1.03	1.01	1.26
SWE	Karolinska University Hospital	11 %	11 %	16 %	15 %	1.11	1.16	1.27	1.26
DEN	Copenhagen University Hospitals	15 %	17 %	17 %	13 %	1.46	1.37	1.35	1.25
DEN	Other (Non HES)	10 %	11 %	11 %	12 %	1.12	1.08	1.13	1.25
NOR	Norwegian University of Science and Technology	8 %	12 %	12 %	13 %	0.93	1.07	1.11	1.25
FIN	University of Eastern Finland	15 %	11 %	11 %	11 %	1.45	1.10	1.13	1.22
SWE	Karolinska Institutet	11 %	12 %	11 %	13 %	1.07	1.17	1.10	1.19
NOR	St. Olavs Hospital				12 %				1.18
FIN	Helsinki University Hospital	9 %	6 %	11 %	12 %	1.03	0.89	1.02	1.17
SWE	Sahlgrenska University Hospital	11 %	8 %	14 %	12 %	1.16	1.05	1.24	1.16
NOR	Other (Non HES)	9 %	10 %	12 %	10 %	1.06	1.14	1.09	1.16
NOR	Bergen University Hospital			9 %	11 %			0.99	1.13
NOR	Oslo University Hospital	18 %	12 %	11 %	10 %	1.21	1.09	1.22	1.12
FIN	University of Turku	9 %	8 %	9 %	12 %	1.08	0.83	1.09	1.11
SWE	Uppsala University	10 %	11 %	13 %	12 %	1.02	1.03	1.13	1.11
DEN	Technical University of Denmark		7 %	10 %	12 %		0.71	0.96	1.10
DEN	University of Southern Denmark Hospitals				10 %				1.08
SWE	Karlstad University				10 %				1.07
DEN	University of Southern Denmark	10 %	10 %	10 %	10 %	0.99	1.05	1.07	1.06
SWE	University of Gothenburg	12 %	6 %	13 %	10 %	1.13	0.90	1.21	1.06
SWE	Skåne University Hospital	8 %	9 %	11 %	13 %	0.92	0.94	1.05	1.06
NOR	University of Agder				8 %				1.04
FIN	Other (Non HES)	12 %	9 %	12 %	10 %	1.15	1.01	1.21	1.04
FIN	University of Jyväskylä	11 %	9 %	9 %	9 %	1.12	1.00	0.96	1.03
SWE	Malmö University College				11 %				1.03
NOR	University of Tromsø		7 %	11 %	10 %		0.78	1.01	1.02
SWE	Örebro University			13 %	11 %			1.18	1.01
DEN	Aalborg University Hospitals				8 %				1.01
SWE	Other (Non HES)	9 %	9 %	11 %	9 %	0.97	0.92	1.10	1.01
FIN	University of Helsinki	10 %	10 %	8 %	10 %	1.04	1.10	1.02	1.00
NOR	University of Oslo	8 %	8 %	12 %	9 %	0.95	0.92	1.14	1.00
SWE	Linköping University	9 %	10 %	6 %	9 %	0.95	0.93	0.81	0.98

		Share of highly cited				Average citation rate			
Organisation		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
NOR	HES Other			7 %	10 %			0.83	0.97
NOR	University of Bergen	7 %	9 %	10 %	8 %	0.96	1.00	1.03	0.96
NOR	University College of Southeast Norway				9 %				0.96
DEN	Aalborg University			7 %	9 %			0.96	0.95
ICE	University of Iceland		7 %	7 %	8 %		0.95	0.95	0.94
SWE	Lund University	8 %	8 %	10 %	10 %	0.96	0.89	0.99	0.94
NOR	Oslo and Akershus University College of Applied Sciences		3 %	8 %	7 %		0.88	0.99	0.92
SWE	Umeå University	8 %	10 %	10 %	9 %	0.93	1.09	0.95	0.89
FIN	HES Other				8 %				0.87
SWE	Jönköping University			4 %	7 %			0.86	0.86
SWE	Mid Sweden University			7 %	5 %			0.81	0.83
SWE	HES Other	9 %	10 %	8 %	8 %	0.92	1.02	0.93	0.83
SWE	Linnaeus University			4 %	6 %			0.77	0.81
FIN	University of Oulu	15 %	10 %	9 %	6 %	1.22	0.79	1.21	0.79
SWE	Stockholm University	9 %	6 %	7 %	6 %	0.82	0.86	1.00	0.77
SWE	Swedish University of Agricultural Sciences				6 %				0.73
FIN	University of Tampere	6 %	6 %	13 %	5 %	0.78	0.92	1.28	0.72
SWE	Gävle University College				6 %				0.63
SWE	Luleå University of Technology				4 %				0.60
SWE	Royal Institute of Technology (KTH)				2 %				0.45
SWE	Uppsala University Hospital	5 %		9 %		0.78		1.00	

*Data from Clarivate Analytics

Table 4.22: Share of highly cited papers and field normalised citation rates – Humanities*

		Share of highly cited				Average citation rate			
Organisation		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
DEN	Copenhagen Business School				31 %				2.32
FIN	University of Jyväskylä			13 %	19 %			1.55	2.27
ICE	University of Iceland				11 %				1.95
DEN	Aarhus University	10 %	6 %	15 %	18 %	0.99	0.53	1.63	1.60
DEN	Aalborg University				14 %				1.54
SWE	Linköping University			14 %	16 %			1.22	1.51
DEN	University of Copenhagen	11 %	10 %	11 %	11 %	0.91	0.96	1.10	1.42
DEN	University of Southern Denmark			13 %	15 %			1.31	1.37
NOR	University of Oslo	10 %	9 %	10 %	13 %	0.84	0.79	0.99	1.30
NOR	Other (Non HES)			12 %	13 %			1.44	1.26
FIN	Other (Non HES)			12 %	10 %			1.55	1.17
SWE	Stockholm University	6 %	5 %	11 %	12 %	0.61	0.42	1.03	1.16
NOR	University of Tromsø			6 %	12 %			0.71	1.16
NOR	University of Bergen		6 %	13 %	12 %		0.42	1.08	1.14
NOR	Norwegian University of Science and Technology			16 %	9 %			1.38	1.05
SWE	Royal Institute of Technology (KTH)			15 %	8 %			1.54	1.04
SWE	Lund University	10 %	8 %	9 %	12 %	0.82	0.84	0.86	1.02
FIN	University of Helsinki	6 %	7 %	11 %	11 %	0.53	0.77	1.22	1.01
SWE	Umeå University			8 %	10 %			0.83	0.98
SWE	Södertörns University College				11 %				0.98
FIN	University of Turku		5 %	5 %	9 %		0.61	0.50	0.90
FIN	University of Tampere			12 %	12 %			1.08	0.86
SWE	University of Gothenburg	1 %	6 %	11 %	9 %	0.03	0.65	0.86	0.85
DEN	Other (Non HES)	12 %	15 %	14 %	9 %	1.29	1.70	1.38	0.79
SWE	Uppsala University	11 %	6 %	10 %	7 %	1.30	0.54	1.03	0.77
SWE	Other (Non HES)	4 %	4 %	5 %	7 %	0.38	0.28	0.52	0.60
NOR	HES Other				8 %				0.60
FIN	University of Eastern Finland				4 %				0.56

*Data from Clarivate Analytics

Table 4.23: Share of highly cited papers and field normalised citation rates – Materials Science*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
FIN	University of Helsinki	29 %	21 %	15 %	18 %	2.13	1.57	1.44	1.50
FIN	Aalto University	14 %	14 %	12 %	16 %	1.36	1.28	1.22	1.36
DEN	Technical University of Denmark	18 %	21 %	19 %	13 %	1.47	1.93	2.62	1.34
DEN	University of Copenhagen			19 %	15 %			1.59	1.32
SWE	Stockholm University	14 %	21 %	15 %	16 %	1.84	1.54	1.39	1.29
SWE	Uppsala University	17 %	14 %	10 %	12 %	1.50	1.35	1.05	1.25
DEN	Aarhus University			24 %	13 %			1.96	1.18
SWE	Umeå University				13 %				1.12
SWE	Lund University	13 %	18 %	15 %	9 %	1.17	1.65	1.54	1.09
SWE	Linköping University	20 %	18 %	17 %	11 %	1.72	1.53	1.47	1.06
SWE	Royal Institute of Technology (KTH)	16 %	12 %	11 %	11 %	1.45	1.17	1.03	1.02
FIN	Åbo Akademi University	11 %	26 %	13 %	9 %	1.08	2.49	1.18	0.99
NOR	Norwegian University of Science and Technology	11 %	14 %	12 %	8 %	1.12	1.51	1.15	0.98
FIN	University of Jyväskylä				7 %				0.97
SWE	Chalmers University of Technology	13 %	12 %	10 %	10 %	1.30	1.07	1.05	0.93
DEN	Aalborg University		3 %	7 %	8 %		0.57	0.86	0.92
NOR	Other (Non HES)	17 %	12 %	12 %	8 %	1.36	1.14	1.19	0.92
FIN	Lappeenranta University of Technology				9 %				0.92
NOR	University of Oslo			11 %	4 %			1.05	0.91
FIN	Other (Non HES)	10 %	8 %	7 %	8 %	1.00	0.83	0.71	0.86
SWE	Other (Non HES)	17 %	10 %	10 %	7 %	1.52	1.01	0.99	0.82
DEN	Other (Non HES)			10 %	6 %			1.16	0.79
SWE	Luleå University of Technology	15 %	8 %	13 %	5 %	1.32	0.84	1.20	0.76
FIN	University of Oulu		9 %	9 %	7 %		0.79	0.92	0.76
FIN	Tampere University of Technology	6 %	14 %	11 %	7 %	0.86	1.01	0.87	0.74
FIN	University of Eastern Finland			7 %	9 %			0.88	0.72
SWE	Mid Sweden University				4 %				0.43
SWE	University of Gothenburg	12 %	11 %			1.03	1.14		

*Data from Clarivate Analytics

Table 4.24: Share of highly cited papers and field normalised citation rates – Mathematics & Statistics*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
NOR	Norwegian University of Science and Technology	17 %	15 %	18 %	17 %	1.95	1.47	1.60	1.79
NOR	Other (Non HES)	13 %	11 %	14 %	15 %	1.01	1.44	1.11	1.65
DEN	Technical University of Denmark	13 %	16 %	14 %	14 %	1.47	1.50	1.30	1.64
FIN	University of Helsinki	13 %	11 %	15 %	14 %	1.10	1.33	1.94	1.57
FIN	University of Eastern Finland			15 %	10 %			1.57	1.32
FIN	University of Jyväskylä	10 %	9 %	13 %	13 %	1.11	1.18	1.14	1.32
SWE	Royal Institute of Technology (KTH)	21 %	15 %	8 %	14 %	2.77	1.20	0.91	1.28
DEN	University of Copenhagen	20 %	16 %	9 %	14 %	1.63	1.44	1.04	1.27
SWE	Uppsala University	14 %	12 %	9 %	13 %	1.96	1.21	0.81	1.25
SWE	Stockholm University	14 %	16 %	9 %	11 %	1.26	1.33	0.95	1.25
DEN	Aalborg University		10 %	11 %	14 %		1.01	0.92	1.23
SWE	University of Gothenburg	11 %	11 %	7 %	13 %	1.11	1.12	0.94	1.20
SWE	Lund University	14 %	23 %	13 %	8 %	1.44	2.31	1.48	1.11
NOR	University of Agder				10 %				1.11
FIN	Aalto University	16 %	13 %	11 %	8 %	1.32	1.19	1.02	1.11
NOR	University of Oslo	16 %	15 %	11 %	11 %	1.34	1.41	1.17	1.10
NOR	University of Bergen	13 %	17 %	10 %	10 %	1.82	1.32	1.04	1.08
SWE	Chalmers University of Technology	11 %	12 %	8 %	9 %	1.09	1.10	0.96	0.91
DEN	University of Southern Denmark	15 %	18 %		10 %	1.43	1.50		0.89
DEN	Aarhus University	8 %	19 %	9 %	7 %	1.07	1.58	1.03	0.88
FIN	University of Turku		8 %	7 %	9 %		0.80	0.66	0.88
FIN	University of Oulu	3 %		10 %	9 %	0.46		1.36	0.86
SWE	Umeå University	6 %	11 %	4 %	9 %	0.89	1.17	0.54	0.80
SWE	Linköping University	13 %	13 %	9 %	8 %	1.33	1.18	0.83	0.79
SWE	Other (Non HES)		8 %	9 %			0.98	0.79	

*Data from Clarivate Analytics

Table 4.25: Share of highly cited papers and field normalised citation rates – Physics*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
DEN	Technical University of Denmark	17 %	20 %	18 %	18 %	1.53	1.60	1.65	1.64
DEN	University of Copenhagen	13 %	14 %	17 %	17 %	1.19	1.26	1.50	1.61
DEN	University of Southern Denmark	15 %	12 %	17 %	18 %	1.38	1.25	1.65	1.55
SWE	Stockholm University	10 %	9 %	13 %	13 %	0.99	1.04	1.32	1.42
DEN	Other (Non HES)	17 %	26 %	11 %	14 %	1.55	2.13	1.18	1.41
FIN	HES Other	18 %	17 %	13 %	13 %	1.71	1.42	1.19	1.33
FIN	Aalto University	11 %	15 %	11 %	13 %	1.07	1.25	1.06	1.29
DEN	Aarhus University	19 %	15 %	18 %	16 %	1.72	1.50	1.46	1.25
SWE	Lund University	13 %	14 %	12 %	12 %	1.23	1.26	1.15	1.25
FIN	University of Helsinki	12 %	13 %	9 %	11 %	1.29	1.19	1.09	1.24
SWE	Chalmers University of Technology	11 %	10 %	11 %	14 %	1.05	1.04	1.08	1.18
DEN	Roskilde University			30 %	14 %			2.03	1.11
SWE	Royal Institute of Technology (KTH)	10 %	10 %	11 %	11 %	0.96	0.96	1.12	1.06
SWE	Umeå University	11 %	8 %	11 %	11 %	1.07	0.81	1.07	1.06
FIN	Tampere University of Technology	9 %	5 %	7 %	9 %	0.89	0.69	0.79	1.06
SWE	Linköping University	14 %	11 %	16 %	11 %	1.25	1.02	1.32	1.05
NOR	University of Oslo	11 %	13 %	11 %	10 %	1.05	1.13	1.04	1.03
SWE	Uppsala University	10 %	11 %	10 %	10 %	0.97	1.06	1.03	1.01
NOR	Norwegian University of Science and Technology	9 %	11 %	13 %	10 %	0.92	1.05	1.20	0.99
NOR	Other (Non HES)	8 %	10 %	8 %	8 %	0.82	0.94	0.95	0.96
FIN	University of Jyväskylä	8 %	9 %	18 %	9 %	0.89	0.98	1.37	0.95
FIN	Other (Non HES)	7 %	8 %	8 %	9 %	0.74	0.86	0.79	0.91
FIN	University of Turku	3 %	6 %	10 %	9 %	0.47	0.65	1.01	0.91
FIN	University of Eastern Finland	5 %	5 %	4 %	7 %	0.63	0.72	0.65	0.88
SWE	University of Gothenburg	13 %	12 %	8 %	9 %	1.21	1.10	0.87	0.83
FIN	Lappeenranta University of Technology		3 %	3 %	10 %		0.43	0.58	0.82
DEN	Aalborg University	10 %	13 %	13 %	6 %	1.16	1.35	1.17	0.81
SWE	Other (Non HES)	11 %	7 %	10 %	8 %	1.01	0.79	1.07	0.80
ICE	University of Iceland	5 %	10 %	11 %	7 %	0.63	0.85	1.09	0.80
NOR	University of Bergen	8 %	9 %	6 %	3 %	0.74	0.90	0.86	0.71
NOR	University of Tromsø		9 %	6 %	4 %		1.01	0.90	0.64
FIN	University of Oulu	5 %	3 %	6 %	4 %	0.69	0.61	0.65	0.63
SWE	Luleå University of Technology	9 %	9 %	4 %	3 %	0.91	0.81	0.49	0.51
SWE	Linnaeus University		10 %	4 %	1 %		0.67	0.55	0.38

*Data from Clarivate Analytics

Table 4.26: Share of highly cited papers and field normalised citation rates – Psychology*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
SWE	Karolinska Institutet	17 %	11 %	16 %	18 %	1.56	1.02	1.38	1.42
SWE	Linköping University			7 %	17 %			0.88	1.27
DEN	Aarhus University		4 %	18 %	12 %		0.60	1.27	1.16
NOR	University of Oslo	4 %	3 %	5 %	10 %	0.68	0.64	0.78	1.14
DEN	University of Copenhagen		10 %	7 %	15 %		1.14	0.75	1.13
FIN	University of Turku	10 %	10 %	6 %	11 %	0.89	0.94	0.94	1.05
SWE	Uppsala University	8 %	10 %	7 %	10 %	0.97	0.90	0.96	1.05
NOR	University of Bergen	5 %	7 %	13 %	10 %	0.66	0.70	1.14	1.05
NOR	Oslo University Hospital				12 %				1.04
FIN	Other (Non HES)	5 %	8 %	11 %	12 %	0.63	0.81	1.02	1.02
FIN	University of Tampere				6 %				1.01
NOR	Other (Non HES)	5 %	3 %	6 %	10 %	0.67	0.53	0.81	0.97
FIN	University of Helsinki	9 %	5 %	8 %	8 %	0.80	0.70	0.90	0.95
DEN	Other (Non HES)	5 %			11 %	0.55			0.92
SWE	Umeå University		5 %	6 %	9 %		0.74	0.93	0.88
SWE	Örebro University				8 %				0.86
SWE	Other (Non HES)	6 %	3 %	9 %	9 %	0.66	0.65	1.01	0.86
FIN	University of Jyväskylä	3 %	8 %	4 %	7 %	0.43	0.93	0.74	0.85
SWE	Lund University	2 %	1 %	6 %	8 %	0.48	0.49	0.81	0.83
DEN	University of Southern Denmark				7 %				0.82
NOR	Norwegian University of Science and Technology		3 %	8 %	6 %		0.62	0.83	0.81
SWE	University of Gothenburg	6 %	4 %	7 %	7 %	0.71	0.64	0.75	0.81
SWE	Stockholm University	4 %	4 %	7 %	6 %	0.64	0.59	0.80	0.77
NOR	University of Tromsø	5 %	10 %	4 %		0.73	0.94	0.56	

*Data from Clarivate Analytics

Table 4.27: Share of highly cited papers and field normalised citation rates – Social Sciences*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
DEN	Technical University of Denmark				22 %				1.71
DEN	Copenhagen Business School		14 %	11 %	15 %		1.11	1.08	1.44
DEN	University of Southern Denmark			12 %	15 %			1.16	1.22
NOR	Norwegian University of Life Sciences			12 %	11 %			1.27	1.22
SWE	Uppsala University	12 %	12 %	14 %	10 %	1.24	1.24	1.18	1.22
NOR	Norwegian University of Science and Technology	9 %	8 %	10 %	11 %	0.90	0.77	0.98	1.21
SWE	Chalmers University of Technology				14 %				1.19
SWE	Mid Sweden University				14 %				1.18
DEN	Aarhus University	20 %	6 %	11 %	14 %	1.26	0.80	1.11	1.16
SWE	Lund University	9 %	8 %	14 %	12 %	0.86	0.93	1.19	1.16
NOR	Other (Non HES)	8 %	14 %	14 %	12 %	0.91	1.19	1.29	1.15
SWE	Stockholm University	9 %	8 %	12 %	11 %	1.06	1.07	1.36	1.14
FIN	University of Oulu			6 %	15 %			0.85	1.13
DEN	Aalborg University		14 %	13 %	11 %		1.58	1.11	1.13
SWE	Karolinska Institutet			12 %	11 %			1.17	1.12
DEN	University of Copenhagen	9 %	10 %	8 %	12 %	1.06	0.95	0.89	1.11
FIN	University of Turku	4 %	7 %	10 %	12 %	0.69	0.79	0.98	1.11
NOR	University of Bergen	10 %	9 %	9 %	10 %	0.96	1.00	0.94	1.10
SWE	Karlstad University				12 %				1.09
DEN	Roskilde University		12 %	9 %	13 %		1.15	1.09	1.07
FIN	University of Jyväskylä		8 %	7 %	10 %		0.84	0.87	1.07
DEN	Other (Non HES)	12 %	10 %	11 %	10 %	1.12	1.10	1.06	1.07
FIN	Aalto University			13 %	11 %			1.21	1.06
NOR	University of Oslo	11 %	13 %	10 %	11 %	1.21	1.15	1.09	1.05
SWE	Royal Institute of Technology (KTH)		8 %	13 %	11 %		0.77	1.12	1.05
SWE	Other (Non HES)	10 %	13 %	10 %	11 %	0.88	1.22	1.01	1.00
NOR	University of Stavanger			6 %	10 %			0.92	0.98
FIN	Other (Non HES)	4 %	7 %	7 %	10 %	0.63	0.75	0.85	0.98
SWE	University of Gothenburg	9 %	9 %	10 %	9 %	0.86	0.96	1.07	0.98
SWE	Linköping University		4 %	7 %	8 %		0.75	0.97	0.97
SWE	Linnaeus University			7 %	9 %			0.71	0.95
FIN	Åbo Akademi University			6 %	8 %			0.82	0.93
SWE	HES Other			9 %	7 %			0.77	0.91
SWE	Örebro University			11 %	11 %			1.08	0.91
NOR	Oslo and Akershus University College of Applied Sciences		4 %	6 %	9 %		0.58	0.93	0.88
FIN	University of Helsinki	6 %	10 %	9 %	8 %	0.86	0.89	0.83	0.82
FIN	University of Tampere	11 %	12 %	5 %	10 %	1.04	1.07	0.76	0.82

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
SWE	Swedish University of Agricultural Sciences			5 %	7 %			0.83	0.81
SWE	Umeå University	6 %	8 %	9 %	7 %	0.68	0.93	0.95	0.81
FIN	University of Eastern Finland			4 %	6 %			0.54	0.81
SWE	Malmö University College				5 %				0.79
NOR	University of Tromsø			8 %	5 %			0.97	0.77
ICE	University of Iceland			4 %	7 %			0.68	0.76
NOR	University of Agder				4 %				0.68
SWE	Södertörns University College				5 %				0.60
NOR	HES Other			4 %	3 %			0.67	0.59

*Data from Clarivate Analytics

4.2.3 Clinical Medicine – the largest subject field

Table 4.28 is not different from Tables 4.13-4.27 in the preceding sections, but we have separated out *Clinical Medicine* as its very large publication volume and its many subcategories may warrant a more detailed analysis. Based on a very low number of fractionalised publications in the period 2011-2014, both the highest citation rate and share of highly cited papers are found in Icelandic institutions outside the HE sector. The Technical University of Denmark (DTU) is second on the citation indicator, but *Clinical Medicine* only contributes to 2 per cent of the university's total production, representing e.g. only 10 per cent of the publication volume of *Engineering* at DTU. Third in the citation rate rank come the University of Copenhagen and Karolinska Institutet, universities where *Clinical Medicine* is a significant part of the publications. The share of highly cited papers correspond reasonably well with the distribution of universities and hospitals by their citation rates.

Table 4.28: Share of highly cited papers and field normalised citation rates – Clinical Medicine*

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
ICE	Other (Non HES)		18 %	14 %	17 %		1.35	2.08	1.69
DEN	Technical University of Denmark		11 %	12 %	12 %		0.94	1.13	1.38
DEN	University of Copenhagen	11 %	15 %	14 %	16 %	1.08	1.24	1.25	1.35
SWE	Karolinska Institutet	13 %	12 %	13 %	14 %	1.19	1.18	1.20	1.28
SWE	Uppsala University Hospital	9 %	9 %	11 %	13 %	1.00	0.95	1.15	1.27
FIN	Turku University Hospital	9 %	11 %	10 %	16 %	0.97	0.92	1.06	1.27
SWE	Karolinska University Hospital	11 %	11 %	11 %	14 %	1.14	1.17	1.19	1.23
DEN	Other (Non HES)	13 %	12 %	13 %	15 %	1.17	1.13	1.19	1.22
SWE	University of Gothenburg	11 %	12 %	13 %	12 %	1.12	1.13	1.23	1.22
DEN	Copenhagen University Hospitals	11 %	14 %	15 %	13 %	1.13	1.26	1.36	1.21
DEN	Aarhus University	12 %	13 %	14 %	13 %	1.06	1.23	1.27	1.20
DEN	Aarhus University Hospitals	10 %	10 %	12 %	12 %	0.98	1.00	1.16	1.18
FIN	University of Helsinki	15 %	13 %	12 %	12 %	1.32	1.22	1.16	1.18
FIN	HES Other			18 %	12 %			1.70	1.16
NOR	Oslo University Hospital	9 %	9 %	10 %	11 %	0.99	1.07	1.05	1.15
SWE	Other (Non HES)	12 %	11 %	12 %	12 %	1.17	1.11	1.15	1.14
FIN	Aalto University			7 %	11 %			0.90	1.13
SWE	University Hospital of Umeå	10 %	11 %	11 %	13 %	0.97	1.04	0.98	1.12
NOR	Bergen University Hospital	10 %	10 %	13 %	12 %	1.09	0.98	1.32	1.12
SWE	Örebro University Hospital	13 %	10 %	10 %	10 %	1.23	1.03	1.19	1.12
DEN	University of Southern Denmark	15 %	10 %	13 %	11 %	1.32	1.00	1.22	1.11
SWE	Uppsala University	9 %	8 %	10 %	11 %	0.98	0.95	1.09	1.11

Organisation		Share of highly cited				Average citation rate			
		1999-2002	2003-2006	2007-2010	2011-2014	1999-2002	2003-2006	2007-2010	2011-2014
FIN	University of Tampere	10 %	8 %	10 %	11 %	1.00	0.96	1.08	1.10
FIN	University of Eastern Finland	12 %	12 %	11 %	11 %	1.35	1.17	1.14	1.10
SWE	Örebro University			5 %	10 %			0.81	1.10
FIN	Helsinki University Hospital	10 %	11 %	10 %	11 %	1.10	1.11	1.04	1.10
FIN	Other (Non HES)	11 %	10 %	11 %	10 %	1.16	1.07	1.11	1.09
SWE	Sahlgrenska University Hospital	10 %	11 %	12 %	11 %	1.07	1.15	1.17	1.09
NOR	University of Oslo	8 %	10 %	11 %	11 %	0.91	0.99	1.08	1.08
SWE	Skåne University Hospital	8 %	8 %	9 %	11 %	0.91	0.95	1.00	1.07
FIN	Kuopio University Hospital	9 %	10 %	9 %	11 %	1.01	1.01	1.07	1.07
FIN	University of Turku	9 %	9 %	10 %	12 %	0.99	0.98	1.03	1.06
FIN	University of Oulu	9 %	8 %	8 %	10 %	0.96	0.93	0.97	1.05
DEN	University of Southern Denmark Hospitals	11 %	10 %	11 %	10 %	1.10	0.98	1.09	1.04
NOR	Other (Non HES)	7 %	10 %	11 %	11 %	0.92	1.00	1.11	1.04
SWE	Linköping University Hospital	8 %	8 %	7 %	10 %	0.96	0.98	0.98	1.04
NOR	Norwegian University of Science and Technology	10 %	9 %	9 %	10 %	1.01	0.96	1.01	1.04
SWE	Malmö University College	10 %	11 %	8 %	11 %	0.90	0.85	1.00	1.04
SWE	Stockholm University	7 %	6 %	10 %	8 %	0.74	0.84	1.11	1.03
SWE	Lund University	9 %	8 %	9 %	10 %	1.02	0.89	0.99	1.03
NOR	University Hospital North Norway	6 %	6 %	12 %	9 %	0.69	0.95	1.12	1.02
FIN	Tampere University Hospital	9 %	6 %	8 %	10 %	0.95	0.84	0.97	1.02
NOR	St. Olavs Hospital	8 %	10 %	11 %	8 %	0.94	1.09	1.08	1.02
SWE	Linköping University	6 %	6 %	9 %	9 %	0.81	0.82	1.03	1.01
FIN	Oulu University Hospital	8 %	8 %	8 %	9 %	0.95	0.91	0.88	1.01
SWE	Umeå University	11 %	11 %	10 %	10 %	1.03	1.03	1.06	1.01
NOR	University of Bergen	7 %	9 %	11 %	10 %	0.87	0.95	1.03	1.00
NOR	University of Tromsø	4 %	6 %	9 %	9 %	0.72	0.94	0.96	1.00
DEN	Aalborg University Hospitals	7 %	7 %	7 %	10 %	0.92	0.86	0.90	0.95
DEN	Aalborg University	4 %	4 %	6 %	10 %	0.61	0.73	0.85	0.95
ICE	University of Iceland	8 %	9 %	10 %	11 %	0.93	0.86	0.97	0.93
SWE	Royal Institute of Technology (KTH)			6 %	8 %			0.77	0.86
ICE	Landspítali University Hospital	13 %	13 %	10 %	8 %	1.14	1.15	0.87	0.84
SWE	HES Other			9 %	8 %			0.94	0.80
FIN	University of Jyväskylä		3 %	7 %	4 %		0.80	0.69	0.71

*Data from Clarivate Analytics

Table 4.29 shows the distribution of subject categories in *Clinical Medicine* by each country's HE sector.

Table 4.29: Number of publications within the subject categories in Clinical Medicine in the Nordic HE sectors, 2011-2014*

Subject	Denmark	Finland	Iceland	Norway	Sweden
Allergy	75	30	1	10	97
Andrology	29	4		4	15
Anesthesiology	252	80	7	77	201
Audiology & Speech-Language Pathology	48	40	1	14	79
Cardiac & Cardiovascular Systems	663	213	14	303	686
Clinical Neurology	436	308	9	423	689
Critical Care Medicine	81	45	1	47	124
Dentistry, Oral Surgery & Medicine	220	233	4	165	515
Dermatology	250	52	3	39	199
Emergency Medicine	69	32	4	66	99
Endocrinology & Metabolism	850	361	11	233	921
Gastroenterology & Hepatology	340	156	18	169	408
Geriatrics & Gerontology	92	118	7	61	195
Hematology	238	77	8	129	379
Infectious Diseases	245	105	13	101	304
Medicine, General & Internal	960	186	91	187	611
Neuroimaging	22	29	0	15	26
Obstetrics & Gynecology	328	161	7	234	435
Oncology	704	357	18	597	1324
Ophthalmology	199	93	22	59	209
Orthopedics	218	111	4	156	315
Otorhinolaryngology	68	100	0	37	169
Pediatrics	228	261	12	182	540
Peripheral Vascular Disease	196	136	10	133	414
Psychiatry	365	233	17	400	565
Radiology, Nuclear Medicine & Medical Imaging	295	180	1	187	452
Respiratory System	195	75	10	96	207
Rheumatology	184	74	8	166	353
Surgery	345	293	4	230	592
Transplantation	30	29	1	29	75
Tropical Medicine	21	3	0	11	21
Urology & Nephrology	213	92	12	95	351

*Data from Clarivate Analytics

If we ignore the broad general category of *Medicine, General & Internal*, Denmark's three largest categories are *Endocrinology & Metabolism* (10 per cent of the publications), *Oncology* (8.3 per cent) and *Cardiac & Cardiovascular Systems* (7.8 per cent). In Finland, *Endocrinology & Metabolism* is the largest category (8.5 per cent), closely followed by *Oncology* (8.4 per cent) and *Clinical Neurology* (7.2 per cent). In Iceland, the largest category is *Ophthalmology* (6.9 per cent), followed by *Gastroenterology & Hepatology* and *Oncology* (both 5.7 per cent). In Norway, *Oncology* is the largest category (12.8 per cent), followed by *Clinical Neurology* (9.1 per cent) and *Psychiatry* (8.6 per cent). In Sweden, the largest category is *Oncology* (11.4 per cent), followed by *Endocrinology & Metabolism* (8.0 per cent) and *Clinical Neurology* (6.0 per cent). There are plenty of examples where countries differ very much as to the representation of a specific category, e.g. *Pediatrics* (from 2.7 per cent in Denmark to 6.1 per cent in Finland) or *Rheumatology* (from 3.6 per cent in Norway to 1.7 per cent in Finland). The main picture, though, is a core of four subject categories that are highly present in all countries: *Cardiac & Cardiovascular Systems*, *Clinical Neurology*, *Endocrinology & Metabolism* and *Oncology*.

In Table 4.30 we see that the shares of highly cited papers do not follow the same patterns as the publication volumes did. Denmark's categories with the largest shares of highly cited papers are *Obstetrics & Gynecology*, *Surgery* and *Anesthesiology* – all three rather small compared to the three most important Danish categories in *Clinical Medicine*. In Finland, 16 per cent of the highly cited papers are found within both *Obstetrics & Gynecology* and *Orthopedics*, and 15 per cent in *Pediatrics* (which is one of Finland's most active research fields). In Norway, *Pediatrics* and *Emergency Medicine* (both 17 per cent) have the highest shares, followed by *Surgery* (16 per cent). Finally, in Sweden, *Clinical Neurology* has the highest share (15 per cent), followed by five categories with 14 per cent.

Table 4.30 Share of highly cited papers within subject categories in Clinclal Medicine in the Nordic HE sectors, 2011-2014*

Subject	Denmark	Finland	Iceland	Norway	Sweden
Allergy	7 %				11 %
Andrology					
Anesthesiology	19 %	8 %		9 %	11 %
Audiology & Speech-Language Pathology	11 %				10 %
Cardiac & Cardiovascular Systems	13 %	11 %		10 %	12 %
Clinical Neurology	13 %	12 %		10 %	15 %
Critical Care Medicine	12 %	9 %		14 %	7 %
Dentistry, Oral Surgery & Medicine	14 %	11 %		7 %	14 %
Dermatology	17 %	5 %			14 %
Emergency Medicine	17 %			17 %	13 %
Endocrinology & Metabolism	11 %	9 %		8 %	11 %
Gastroenterology & Hepatology	11 %	9 %		8 %	9 %
Geriatrics & Gerontology	10 %	8 %		10 %	10 %
Hematology	9 %	6 %		6 %	11 %
Infectious Diseases	9 %	8 %		6 %	7 %
Medicine, General & Internal	11 %	16 %	2 %	16 %	22 %
Neuroimaging					
Obstetrics & Gynecology	20 %	16 %		13 %	13 %
Oncology	11 %	11 %		9 %	8 %
Ophthalmology	16 %	7 %		8 %	6 %
Orthopedics	14 %	16 %		14 %	14 %
Otorhinolaryngology	15 %	10 %			13 %
Pediatrics	11 %	15 %		17 %	11 %
Peripheral Vascular Disease	11 %	13 %		8 %	10 %
Psychiatry	15 %	6 %		8 %	11 %
Radiology, Nuclear Medicine & Medical Imaging	16 %	13 %		12 %	9 %
Respiratory System	13 %	8 %		11 %	7 %
Rheumatology	9 %	8 %		9 %	13 %
Surgery	20 %	13 %		16 %	14 %
Transplantation					11 %
Tropical Medicine					
Urology & Nephrology	12 %	13 %		14 %	14 %

*Data from Clarivate Analytics

Table 4.31 Mean citation rate within subject categories in Clinical Medicine in the Nordic HE sectors, 2011-2014*

Subject	Denmark	Finland	Iceland	Norway	Sweden
Allergy	1.02				1.20
Andrology					
Anesthesiology	1.40	1.01		1.06	0.95
Audiology & Speech-Language Pathology	1.11				0.95
Cardiac & Cardiovascular Systems	1.36	0.97		1.05	1.28
Clinical Neurology	1.19	1.19		1.06	1.31
Critical Care Medicine	1.18	1.05		1.23	0.93
Dentistry, Oral Surgery & Medicine	1.31	1.07		0.91	1.25
Dermatology	1.54	0.98			1.25
Emergency Medicine	1.49			1.54	1.31
Endocrinology & Metabolism	1.12	1.07		0.89	1.12
Gastroenterology & Hepatology	1.06	1.05		0.90	1.00
Geriatrics & Gerontology	1.01	0.91		0.99	0.93
Hematology	1.00	0.85		0.76	1.05
Infectious Diseases	0.98	0.92		0.79	0.93
Medicine, General & Internal	1.08	1.49	0.44	1.57	1.85
Neuroimaging					
Obstetrics & Gynecology	1.65	1.38		1.21	1.15
Oncology	1.02	0.92		0.95	0.88
Ophthalmology	1.30	0.82		0.85	0.85
Orthopedics	1.30	1.33		1.24	1.29
Otorhinolaryngology	1.37	1.23			1.14
Pediatrics	1.17	1.28		1.37	1.11
Peripheral Vascular Disease	1.17	1.11		0.96	1.01
Psychiatry	1.29	0.86		0.88	1.14
Radiology, Nuclear Medicine & Medical Imaging	1.29	1.09		1.28	0.97
Respiratory System	1.20	1.00		0.95	0.97
Rheumatology	1.01	0.85		1.09	1.23
Surgery	1.57	1.22		1.34	1.29
Transplantation					1.06
Tropical Medicine					
Urology & Nephrology	1.04	1.14		1.45	1.27

*Data from Clarivate Analytics

Finally, in Table 4.31 we show the average citation rates of the Nordic HE sectors across the subcategories of *Clinical Medicine*. The “rank order” of each country’s most cited categories are by and large not very different from the results in Table 4.30. Excluding the category *Medicine, General & Internal* again, the four most cited categories of the Nordic HE sectors are *Obstetrics & Gynecology* in Denmark (citation rate 1.65), *Surgery* in Denmark (1.57), *Dermatology* in Denmark (1.54) and *Emergency Medicine* in Norway (1.54).

5. CONCLUSIONS

This report is both an update and an extension of two previous reports with the same title: “*Comparing Research at Nordic Universities using Bibliometric Indicators*” from 2011 and 2014. With the current report's use of more years, more institutions and more subject fields, the figures are not directly comparable to the figures in the former two. Therefore, we would like to emphasise that the current report *replaces* the former two.

The main conclusion of the report is that we find relatively stable differences between the Nordic universities, university colleges and university hospitals. Some of these differences represent an expected diversity. We find different research profiles and specialisations, and we find institutions with different volumes of research activity. By describing these differences, we want to bring attention to dimensions that one-dimensional “world” rankings of universities cannot capture.

On the other hand, we also find relatively stable differences with regard to citation indicators. With our method of field normalising the citation rates, we can in fact compare higher education institutions of different sizes and research profiles using citation indicators. We observe that some Nordic higher education institutions score on a very high international level with regard to citation impact and shares of highly cited papers, at least in some of the major areas of research, while most Nordic institutions do not, although the majority of them perform above the world average. Hence, we have a relatively stable picture which shows that “world class” research is being conducted at a few Nordic institutions, but not at most of them. This observation raises new questions that the present report is not intended to answer: How can we explain such stable differences? What have the few most-cited institutions done to achieve their high impact on international research? What can other Nordic institutions do to achieve the same?

Our work with the former reports was experimental and developed within a specific project for Nordic collaboration on bibliometrics with timely and efficient funding from NordForsk. If the present updating is found to be useful, we suggest further updating in the future, but also further indicator development, partly because the traditional bibliometric data sources are now expanding and being supplemented by new types of data sources. These developments may improve the representation of the Social Sciences and Humanities in future versions of this report.

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APPENDICES

Appendix 1: Methodological considerations

The data source for the present report is the bibliometric database at the Swedish Research Council, which contains data from the Clarivate Analytics indices *Science Citation Index Expanded*, *Social Sciences Citation Index* and *Arts & Humanities Citation Index*.¹³ The analyses cover a 16-year time period from 1999-2014. Publications have been restricted to include only research articles and reviews, as defined by Clarivate Analytics. These are combined into a single document when calculating the field normalised citation values. We use the data cleaning techniques developed at the Swedish Research Council (see Swedish Research Council, 2017).

Bibliometric indicators play a crucial role in most university rankings, especially rankings that rely upon publication and citation indicators. A main challenge when constructing these rankings, however, involves the allocation of publications at institution levels. The allocation is based on the information given in the author addresses in each publication. In these addresses, a particular institution name may be spelled in a variety of different ways or it may be lacking entirely. As a consequence, it is difficult to provide a correct and reliable allocation of articles at the institution level. Knowledge of the countries' research systems is required in order to do this in a satisfactory way. All the examples below are addresses that belong to the University of Oslo (Norway) but would most likely not have been picked up by outsiders:

- IASAM, Inst Gen Practice & Prevent Med, Oslo, Norway
- Fredrik Holsts Hus, Sect Med Eth, N-0318 Oslo, Norway
- Akershus Fac Div, Akershus, Norway
- Hlth Econ Res Programme Oslo, Ctr Hlth Adm, NO-0027 Oslo, Norway

The data cleaning method developed in Sweden has been an important asset to this report, and offers a good approach to handling the address difficulties seen above. Network members from each country have manually checked all addresses from their respective countries and assigned them to the relevant higher education institutions according to a set of rules developed in Sweden. This has enabled the network to get a complete picture of the institutions' research that would not have been possible if data were retrieved by researchers from outside the Nordic countries, as they would not have similar knowledge of the institutions and "hidden content" in many of the hard-to-identify addresses used by the universities over a 16-year period.¹⁴

13 Certain data included herein are derived from the Science Citation Index Expanded, Social Science Citation Index and Arts & Humanities Citation Index, prepared by Clarivate Analytics®, Philadelphia, Pennsylvania, USA, © Copyright Clarivate Analytics® 2016. All rights reserved.

14 Approximately 2 per cent of the author addresses of Danish institutions has not been standardised. These are treated as belonging to the non-higher education sector (referred to as Other in this report), although, most likely, a large share of them belong to the HE sector. The very low number of fractionalised publications that these unstandardised addresses account for (approximately 20 publications per year) is too low to have any effect on the results in this report, neither on the publication output indicators nor on the citation impact indicators.

The 250 journal subject categories used by Clarivate Analytics have been grouped into 16 main subject fields (see Appendix 2): *Agriculture, Fisheries & Forestry* (includes 12 subject categories), *Biology* (11 subjects), *Biomedicine & Molecular Biosciences* (24 subjects), *Business Studies & Economics* (4 subjects), Chemistry (9 subjects), *Clinical Medicine* (32 subjects), *Computer & Information Sciences* (6 subjects), *Engineering* (27 subjects), *Geosciences* (10 subjects), *Health Sciences* (15 subjects), *Humanities* (31 subjects), *Materials Science* (9 subjects), *Mathematics & Statistics* (5 subjects), *Physics* (15 subjects), *Psychology* (11 subjects) and *Social Sciences* (29 subjects).

Figure A.1 below shows the share of references in each of the subject fields that goes to publications within the database. This gives us an estimate of how well the literature relevant to the different subject fields are represented in the database.

For publications in *Clinical Medicine*, 81 per cent of all references point to publications in the database. Hence, *Clinical Medicine* is fairly well represented in the database whereas in *Humanities*, only 13 per cent of all references point to other publications in the database, meaning that most of the literature relevant in *Humanities* is not covered by this report.

One methodological difficulty of comparing countries by the subject fields used here, or indeed by using any such grouping of subjects, is that there may be large variations within each subject field. This is particularly significant in the subject field *Agriculture, Fisheries & Forestry*, which has different meanings within the Nordic countries.

Figure A.1: Share of references in each subject field that goes to publications in the database, 2011-2014.

*Data from Clarivate Analytics

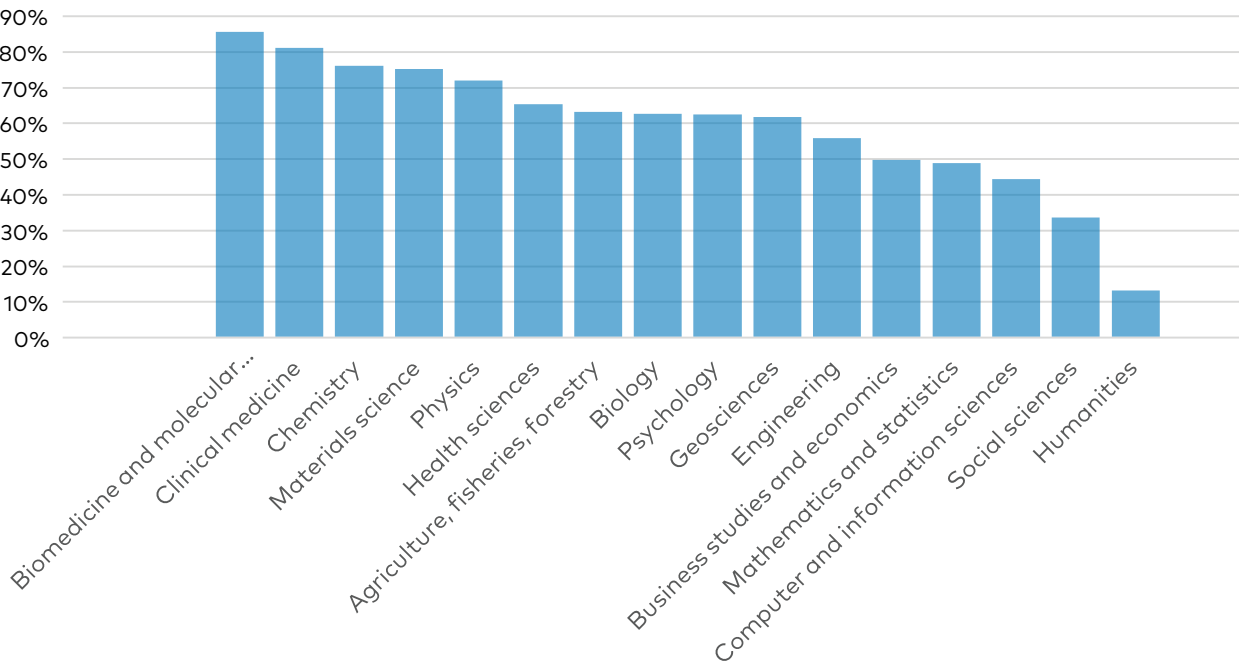


Table A.1: Proportion of Agriculture, Fisheries & Forestry fields in the HE sectors of the Nordic countries, publication years 2011-2014*

Agriculture, Fisheries & Forestry	Denmark	Finland	Iceland	Norway	Sweden
Agricultural Economics & Policy	1 %	0 %	0 %	1 %	1 %
Agriculture, Dairy & Animal Science	12 %	3 %	9 %	12 %	9 %
Agriculture, Multidisciplinary	5 %	4 %	24 %	2 %	3 %
Agronomy	5 %	3 %	1 %	2 %	5 %
Fisheries	5 %	3 %	20 %	19 %	4 %
Food Science & Technology	20 %	15 %	13 %	11 %	9 %
Forestry	3 %	28 %	2 %	8 %	20 %
Horticulture	2 %	1 %	1 %	2 %	1 %
Plant Sciences	15 %	23 %	11 %	17 %	20 %
Soil Science	8 %	4 %	5 %	3 %	7 %
Water Resources	5 %	5 %	7 %	6 %	8 %
Veterinary Sciences	18 %	12 %	9 %	17 %	13 %
Total	100 %	100 %	100 %	100 %	100 %

*Data from Clarivate Analytics

Table A.1 illustrates how the dominant themes in Agriculture, Fisheries & Forestry differ in the Nordic countries. As expected, *Fisheries* is Norway's largest sub-field (19 per cent) and Iceland's second largest (20 per cent), but is of limited importance in Denmark, Finland and Sweden. Similarly, *Forestry* is an important sub-field in Finland (28 per cent, i.e. Finland's largest category) and Sweden (20 per cent, joint largest with *Plant Sciences*), but is less so in the other countries. *Food Science & Technology*, *Plant Sciences* and *Veterinary Sciences* all make large contributions to this broad field in all Nordic countries, although to varying degree. To very roughly summarise the key differences within Agriculture, Fisheries & Forestry, it can be said that Denmark is more focused on food and animals, Finland on forestry and plants, Iceland and Norway on fish (and agriculture and plants, respectively), and Sweden on forestry and plant sciences.

Many publications are nationally or internationally co-authored, and are the result of collaborative efforts involving more than one university. Different principles and counting methods can be applied in bibliometric studies to deal with this. The most common is "whole" counting, i.e. with no fractional attribution of credit (every university gets full credit for all papers co-authored with another institution). An alternative is fractionalised counting where the credit is divided equally between all the contributing author addresses. For example, if an article has one author address from Aarhus University and one from Aalborg University, each university will receive a value of 0.5 papers. One can argue that these counting methods are complementary: the whole or integer count gives the number of papers in which the university "participated", while the fractionalised counting gives a sense of the number of papers "creditable" to the university, assuming that all authors made equal contributions to a co-authored paper and that all contributions add up to one (Moed, 2005).

We apply a fractionalised counting scheme where all the basic units (addresses) in a publication share one credit, and where a university gets one fraction each time it appears in the address list. For example, in an article with three addresses from the University of Helsinki, one from Lund University and one from Harvard University, the University of Helsinki receives three-fifths, Lund University one-fifth and Harvard one-fifth of the credit for the article. Citations to the articles are allocated in the same way. Most large-scale national bibliometric analyses do not use fractionalisation. Hence, the figures in our report will deviate from some other published indicators, such as those presented in institutional reports, which are often based on whole counts of each university's contributions to nationally and internationally co-authored articles. The number of

publications is much lower when each university only receives its fractionalised share of each publication.¹⁵ This also holds for the citation indicators (Chapter 4).

Another note of caution relates to small data sets, which are more vulnerable to fluctuations. Highly skewed distributions, which are common in bibliometrics, influence relative citation rates, meaning that a few highly cited papers can influence average citation rates considerably, especially when the data set is small. Changes in small research areas or at small universities may be more visible, but less important. Increases and decreases in publication and citation patterns may also be influenced by changes in the selection of journals indexed in the citation databases, which determines the “world size” of the research area.

Higher education institutions included in the report

In Table A.2 we list the institutions that are included in our analysis, indicating whether their publication activity is above the required threshold for their individual results to appear in tables and figures (*HES*), or whether they did not meet the threshold so that their publications only appear in the joint category *HES Other*.¹⁶ Some of the university hospitals were aggregated into groups according to Table A.2.

Table A.2: Higher education institutions included in the report

Country	Organisation	OrganisationType	Selection
Denmark	Aalborg University	University	HES
Denmark	Aalborg University Hospitals ^A	University Hospital	HES
Denmark	Aarhus University	University	HES
Denmark	Aarhus University Hospitals ^B	University Hospital	HES
Denmark	Copenhagen Business School	University	HES
Denmark	Copenhagen University Hospitals ^C	University Hospital	HES
Denmark	Roskilde University	University	HES
Denmark	Technical University of Denmark	University	HES
Denmark	University of Copenhagen	University	HES
Denmark	University of Southern Denmark	University	HES
Denmark	University of Southern Denmark Hospitals ^D	University Hospital	HES
Denmark	Aarhus School of Architecture	University	HES Other
Denmark	Copenhagen School of Design and Technology	Academy	HES Other
Denmark	IT University of Copenhagen	University	HES Other
Denmark	The Royal Danish Academy of Fine Arts Schools of Architecture, Design and Conservation	Academy	HES Other
Denmark	University College Lillebælt	University College	HES Other
Denmark	University College of Northern Denmark	University College	HES Other
Denmark	University College of Southern Denmark	University College	HES Other
Denmark	University College Zealand	University College	HES Other
Denmark	VIA University College	University College	HES Other
Denmark	University of the Faroe Islands	University	HES Other
Finland	Aalto University	University	HES
Finland	Hanken School of Economics	University	HES
Finland	Helsinki University Hospital ^E	University Hospital	HES
Finland	Kuopio University Hospital ^F	University Hospital	HES
Finland	Lappeenranta University of Technology	University	HES
Finland	Tampere University Hospital ^G	University Hospital	HES

15 When whole counts are used, a university with a high share of national or international co-publications will have a higher publication count than a university with a low share of external co-publications, all other things being equal.

16 In Denmark, two university colleges were not part of the author standardisation process, and are thus treated as “Other” institutions in our analyses, although they belong to the HE sector. These are: University College Copenhagen and Metropolitan University College.

Finland	Tampere University of Technology	University	HES
Finland	University of Eastern Finland	University	HES
Finland	University of Helsinki	University	HES
Finland	University of Lapland	University	HES
Finland	University of Oulu	University	HES
Finland	University of Tampere	University	HES
Finland	University of Turku	University	HES
Finland	University of Vaasa	University	HES
Finland	Åbo Akademi University	University	HES
Finland	Aboa Centre for Economics	Research Institute	HES Other
Finland	Åland University of Applied Sciences	University College	HES Other
Finland	Arcada University of Applied Sciences	University College	HES Other
Finland	BioMediTech	Research Institute	HES Other
Finland	Centria University of Applied Sciences	University College	HES Other
Finland	Diaconia University of Applied Sciences	University College	HES Other
Finland	FINCA	Research Institute	HES Other
Finland	Haaga-Helia University of Applied Sciences	University College	HES Other
Finland	HAMK University of Applied Sciences	University College	HES Other
Finland	Helsinki Brain Research Center	Research Institute	HES Other
Finland	Helsinki Center of Economic Research	Research Institute	HES Other
Finland	Helsinki Institute for Information Technology	Research Institute	HES Other
Finland	Helsinki Institute of Physics	Research Institute	HES Other
Finland	Humak University of Applied Sciences	University College	HES Other
Finland	Jyväskylä University of Applied Sciences	University College	HES Other
Finland	Kajaani University of Applied Sciences	University College	HES Other
Finland	Karelia University Of Applied Sciences	University College	HES Other
Finland	Kymenlaakso University of Applied Science	University College	HES Other
Finland	Lahti University of Applied Sciences	University College	HES Other
Finland	Lapland University of Applied Sciences	University College	HES Other
Finland	Laurea University of Applied Sciences	University College	HES Other
Finland	Metropolia University of Applied Sciences	University College	HES Other
Finland	Mikkeli University of Applied Sciences	University College	HES Other
Finland	Novia University of Applied Sciences	University College	HES Other
Finland	Oulu University Hospital	University Hospital	HES
Finland	Oulu University of Applied Sciences	University College	HES Other
Finland	Police University College	University College	HES Other
Finland	Saimaa University of Applied Sciences	University College	HES Other
Finland	Satakunta University of Applied Sciences	University College	HES Other
Finland	Savonia University of Applied Sciences	University College	HES Other
Finland	Seinäjoki University of Applied Sciences	University College	HES Other
Finland	Tampere University of Applied Science	University College	HES Other
Finland	Turku Centre for biotechnology	Research Institute	HES Other
Finland	Turku Centre for Computer Science	Research Institute	HES Other
Finland	Turku Clinical Biomaterials Centre	Research Institute	HES Other
Finland	Turku PET Centre	Research Institute	HES Other
Finland	Turku University Hospital ^H	University Hospital	HES
Finland	Turku University of Applied Science	University College	HES Other
Finland	University Consortium Chydenius	Research Institute	HES Other
Finland	University of Jyväskylä	University	HES
Finland	University of the Arts	University	HES Other
Finland	Vaasa University of Applied Sciences	University College	HES Other
Iceland	Agricultural University of Iceland	University	HES
Iceland	Landspítali University Hospital	University Hospital	HES

Iceland	Reykjavik University	University	HES
Iceland	University of Akureyri	University	HES
Iceland	University of Iceland	University	HES
Iceland	Icelandic Academy of the Arts	University	HES Other
Iceland	University of Bifröst	University	HES Other
Iceland	University of Holar	University	HES Other
Norway	Nord University	University	HES
Norway	Norwegian Business School	University College	HES
Norway	Norwegian School of Economics and Business Administration	University College	HES
Norway	Norwegian School of Sport Sciences	University College	HES
Norway	Norwegian University of Life Sciences	University	HES
Norway	Norwegian University of Science and Technology	University	HES
Norway	Oslo and Akershus University College of Applied Sciences	University College	HES
Norway	St. Olavs Hospital	University Hospital	HES
Norway	University College of Southeast Norway	University College	HES
Norway	University Hospital North Norway	University Hospital	HES
Norway	University of Agder	University	HES
Norway	University of Bergen	University	HES
Norway	University of Oslo	University	HES
Norway	University of Stavanger	University	HES
Norway	University of Tromsø	University	HES
Norway	Akershus University Hospital	University Hospital	HES Other
Norway	Bergen University College	University College	HES Other
Norway	Diakonova University College	University College	HES Other
Norway	Bergen University Hospital	University Hospital	HES
Norway	Hedmark University of Applied Sciences	University College	HES Other
Norway	Kristiania University College	University College	HES Other
Norway	Lillehammer University College	University College	HES Other
Norway	Lovisenberg Diaconal College	University College	HES Other
Norway	Molde University College	University College	HES Other
Norway	NLA University College	University College	HES Other
Norway	Norwegian Academy of Music	University College	HES Other
Norway	Norwegian School of ICT	University College	HES Other
Norway	Norwegian School of Theology	University College	HES Other
Norway	Oslo University Hospital	University Hospital	HES
Norway	Queen Maud University College	University College	HES Other
Norway	Sami University of Applied Sciences	University College	HES Other
Norway	Sogn & Fjordane University College	University College	HES Other
Norway	Stavanger University Hospital	University Hospital	HES Other
Norway	Stord Haugesund University College	University College	HES Other
Norway	The Norwegian Defence University College	University College	HES Other
Norway	The Norwegian Police University College	University College	HES Other
Norway	The Oslo School of Architecture and Design (AHO)	University College	HES Other
Norway	The University Centre in Svalbard (UNIS)	University	HES Other
Norway	UNIK – University Graduate Center	University	HES Other
Norway	VID Specialised University	University College	HES Other
Norway	Volda University College	University College	HES Other
Norway	Østfold University College	University College	HES Other
Sweden	Blekinge Institute of Technology	University College	HES
Sweden	Borås University College	University College	HES
Sweden	Chalmers University of Technology	University	HES
Sweden	Gävle University College	University College	HES
Sweden	Jönköping University	University College	HES

Sweden	Karlstad University	University	HES
Sweden	Karolinska Institutet	University	HES
Sweden	Karolinska University Hospital	University Hospital	HES
Sweden	Linköping University	University	HES
Sweden	Linköping University Hospital	University Hospital	HES
Sweden	Linnaeus University	University	HES
Sweden	Luleå University of Technology	University	HES
Sweden	Lund University	University	HES
Sweden	Malmö University College	University College	HES
Sweden	Mid Sweden University	University	HES
Sweden	Mälardalen University College	University College	HES
Sweden	Royal Institute of Technology (KTH)	University	HES
Sweden	Sahlgrenska University Hospital	University Hospital	HES
Sweden	Skåne University Hospital	University Hospital	HES
Sweden	Stockholm University	University	HES
Sweden	Swedish University of Agricultural Sciences	University	HES
Sweden	Södertörns University College	University College	HES
Sweden	Umeå University	University	HES
Sweden	University Hospital of Umeå	University Hospital	HES
Sweden	University of Gothenburg	University	HES
Sweden	Uppsala University	University	HES
Sweden	Uppsala University Hospital	University Hospital	HES
Sweden	Örebro University	University	HES
Sweden	Örebro University Hospital	University Hospital	HES
Sweden	Dalarna University College	University College	HES Other
Sweden	Ersta Sköndal University College	Other HEI	HES Other
Sweden	Halmstad University College	University College	HES Other
Sweden	Kristianstad University College	University College	HES Other
Sweden	Skövde University College	University College	HES Other
Sweden	Sophiahemmet University College	Other HEI	HES Other
Sweden	Stockholm University of the Arts	University College	HES Other
Sweden	Swedish National Defence College	University College	HES Other
Sweden	Swedish Red Cross University College	Other HEI	HES Other
Sweden	Swedish School of Sport and Health Sciences	University College	HES Other
Sweden	The Erica Foundation	Other HEI	HES Other
Sweden	University College of Arts, Crafts and Design	University College	HES Other
Sweden	University College West	University College	HES Other
Sweden	Örebro School of Theology	Other HEI	HES Other

Footnotes, Table A.2

- A Aalborg University Hospitals include: Aalborg Sygehus, Aalborg Psykiatriske Sygehus.
- B Aarhus University Hospitals include: Amtssygehuset, Børne- og Ungdomspsykiatrisk Hospital, Kommunehospital, Marselisborg Hospital, Psykiatrisk Hospital Risskov, Skanderborg, Skejby Sygehus, Århus Sygehus.
- C Copenhagen University Hospitals include: Amager, Bispebjerg, Bornholm, Frederiksberg, Frederikssund, Gentofte, Glostrup, Helsingør, Herlev, Hillerød (Hørsholm), Holbæk, Hovedstaden Psykiatri, Hvidovre, Kommunehospital, Køge, Næstved, Nykøbing F, Rigshospitalet, Ringsted, Roskilde, Sct. Hans., Slagelse.
- D University of Southern Denmark Hospitals include: Center Hospital Lillebælt, Odense Universitetshospital, Ringe, Svenborg sygehus, Sygehusenheden Nyborg.
- E Helsinki University Hospital includes: Children's Castle, Children's Hospital, Department of Oncology, Eye and Ear Hospital, Hospital for Children and Adolescents, Jorvi Hospital, Kätilöopisto Maternity Hospital, Meilahti Tower Hospital, Meilahti Triangle Hospital, Peijas Hospital, Psychiatrycenter, Skin and Allergy Hospital, Surgical Hospital, Töölö Hospital and Women's Hospital.
- F Kuopio University Hospital includes: Puijo Hospital, Alava Hospital, Julkula Hospital.
- G Tampere University Hospital includes: Tampere University Central Hospital, Pitkämäki Hospital, Heart Center.
- H Turku University Hospital includes: Surgical Hospital in Turku, Loimaa Hospital, Salo Hospital, Vakka-Suomi Hospital.

Self-citations

The citation analyses in this report are based on citation data in which self-citations have been excluded. Author names in the citing and the cited publications are compared, and a citation is considered a self-citation and excluded if any of the names are the same in the publication (see Swedish Research Council, 2017, for more details). In a previous report based on the time period 2000-2009, we investigated differences in citation rates when self-citations were included/excluded (Piro et al., 2011). There were large differences in (field normalised) self-citations for some universities, but overall the difference was relatively small for the whole Nordic data set (1.8 per cent).

Appendix 2: Main subject fields

The 250 subject categories used by Clarivate Analytics were grouped into 16 main subject fields for our analyses. The category *Multidisciplinary Sciences* has been incorporated into other categories.¹⁷

Clarivate Analytics name	NORIA subject field
Agricultural Economics & Policy	Agriculture, Fisheries & Forestry
Agriculture, Dairy & Animal Science	Agriculture, Fisheries & Forestry
Agriculture, Multidisciplinary	Agriculture, Fisheries & Forestry
Agronomy	Agriculture, Fisheries & Forestry
Fisheries	Agriculture, Fisheries & Forestry
Food Science & Technology	Agriculture, Fisheries & Forestry
Forestry	Agriculture, Fisheries & Forestry
Horticulture	Agriculture, Fisheries & Forestry
Plant Sciences	Agriculture, Fisheries & Forestry
Soil Science	Agriculture, Fisheries & Forestry
Water Resources	Agriculture, Fisheries & Forestry
Veterinary Sciences	Agriculture, Fisheries & Forestry
Biodiversity Conservation	Biology
Biology	Biology
Ecology	Biology
Entomology	Biology
Evolutionary Biology	Biology
Limnology	Biology
Marine & Freshwater Biology	Biology
Mathematical & Computational Biology	Biology
Mycology	Biology
Ornithology	Biology
Zoology	Biology
Anatomy & Morphology	Biomedicine & Molecular Biosciences
Behavioral Sciences	Biomedicine & Molecular Biosciences
Biochemical Research Methods	Biomedicine & Molecular Biosciences
Biochemistry & Molecular Biology	Biomedicine & Molecular Biosciences
Biophysics	Biomedicine & Molecular Biosciences
Biotechnology & Applied Microbiology	Biomedicine & Molecular Biosciences
Cell & Tissue engineering	Biomedicine & Molecular Biosciences

Cell Biology	Biomedicine & Molecular Biosciences
Chemistry, Medicinal	Biomedicine & Molecular Biosciences
Developmental Biology	Biomedicine & Molecular Biosciences
Genetics & Heredity	Biomedicine & Molecular Biosciences
Immunology	Biomedicine & Molecular Biosciences
Medical Laboratory Technology	Biomedicine & Molecular Biosciences
Medicine, Research & Experimental	Biomedicine & Molecular Biosciences
Microbiology	Biomedicine & Molecular Biosciences
Microscopy	Biomedicine & Molecular Biosciences
Neurosciences	Biomedicine & Molecular Biosciences
Parasitology	Biomedicine & Molecular Biosciences
Pathology	Biomedicine & Molecular Biosciences
Pharmacology & Pharmacy	Biomedicine & Molecular Biosciences
Physiology	Biomedicine & Molecular Biosciences
Reproductive Biology	Biomedicine & Molecular Biosciences
Toxicology	Biomedicine & Molecular Biosciences
Virology	Biomedicine & Molecular Biosciences
Business	Business Studies & Economics
Business, Finance	Business Studies & Economics
Economics	Business Studies & Economics
Management	Business Studies & Economics
Chemistry, Analytical	Chemistry
Chemistry, Applied	Chemistry
Chemistry, Inorganic & Nuclear	Chemistry
Chemistry, Multidisciplinary	Chemistry
Chemistry, Organic	Chemistry
Chemistry, Physical	Chemistry
Crystallography	Chemistry
Electrochemistry	Chemistry
Polymer Science	Chemistry
Allergy	Clinical Medicine
Andrology	Clinical Medicine
Anesthesiology	Clinical Medicine
Audiology & Speech-Language Pathology	Clinical Medicine
Cardiac & Cardiovascular Systems	Clinical Medicine
Clinical Neurology	Clinical Medicine
Critical Care Medicine	Clinical Medicine
Dentistry, Oral Surgery & Medicine	Clinical Medicine
Dermatology	Clinical Medicine
Emergency Medicine	Clinical Medicine
Endocrinology & Metabolism	Clinical Medicine
Gastroenterology & Hepatology	Clinical Medicine
Geriatrics & Gerontology	Clinical Medicine
Hematology	Clinical Medicine
Infectious Diseases	Clinical Medicine
Medicine, General & Internal	Clinical Medicine
Neuroimaging	Clinical Medicine
Obstetrics & Gynecology	Clinical Medicine
Oncology	Clinical Medicine
Ophthalmology	Clinical Medicine
Orthopedics	Clinical Medicine

¹⁷ This category includes publications in general scientific journals such as PLOS ONE, Nature, Science and Proceedings of the National Academy of Sciences of the United States of America (PNAS).

Otorhinolaryngology	Clinical Medicine
Pediatrics	Clinical Medicine
Peripheral Vascular Disease	Clinical Medicine
Psychiatry	Clinical Medicine
Radiology, Nuclear Medicine & Medical Imaging	Clinical Medicine
Respiratory System	Clinical Medicine
Rheumatology	Clinical Medicine
Surgery	Clinical Medicine
Transplantation	Clinical Medicine
Tropical Medicine	Clinical Medicine
Urology & Nephrology	Clinical Medicine
Computer Science, Artificial Intelligence	Computer & Information Sciences
Computer Science, Cybernetics	Computer & Information Sciences
Computer Science, Information Systems	Computer & Information Sciences
Computer Science, Interdisciplinary Applications	Computer & Information Sciences
Computer Science, Software Engineering	Computer & Information Sciences
Computer Science, Theory & Methods	Computer & Information Sciences
Agricultural Engineering	Engineering
Automation & Control Systems	Engineering
Computer Science, Hardware & Architecture	Engineering
Construction & Building Technology	Engineering
Energy & Fuels	Engineering
Engineering, Aerospace	Engineering
Engineering, Biomedical	Engineering
Engineering, Chemical	Engineering
Engineering, Civil	Engineering
Engineering, Electrical & Electronic	Engineering
Engineering, Environmental	Engineering
Engineering, Geological	Engineering
Engineering, Industrial	Engineering
Engineering, Manufacturing	Engineering
Engineering, Marine	Engineering
Engineering, Mechanical	Engineering
Engineering, Multidisciplinary	Engineering
Engineering, Ocean	Engineering
Engineering, Petroleum	Engineering
Instruments & Instrumentation	Engineering
Metallurgy & Metallurgical Engineering	Engineering
Mining & Mineral Processing	Engineering
Operations Research & Management Science	Engineering
Robotics	Engineering
Telecommunications	Engineering
Thermodynamics	Engineering
Transportation Science & Technology	Engineering
Environmental Sciences	Geosciences
Geochemistry & Geophysics	Geosciences
Geography, Physical	Geosciences
Geology	Geosciences
Geosciences, Multidisciplinary	Geosciences
Meteorology & Atmospheric Sciences	Geosciences
Mineralogy	Geosciences

Oceanography	Geosciences
Paleontology	Geosciences
Remote Sensing	Geosciences
Gerontology	Health Sciences
Health Care Sciences & Services	Health Sciences
Health Policy & Services	Health Sciences
Integrative & Complementary Medicine	Health Sciences
Medical Ethics	Health Sciences
Medical Informatics	Health Sciences
Medicine, Legal	Health Sciences
Nursing	Health Sciences
Nutrition & Dietetics	Health Sciences
Primary Health Care	Health Sciences
Public, Environmental & Occupational Health	Health Sciences
Rehabilitation	Health Sciences
Social Sciences, Biomedical	Health Sciences
Sport Sciences	Health Sciences
Substance Abuse	Health Sciences
Archaeology	Humanities
Architecture	Humanities
Art	Humanities
Asian Studies	Humanities
Classics	Humanities
Cultural Studies	Humanities
Dance	Humanities
Ethics	Humanities
Film, Radio, Television	Humanities
Folklore	Humanities
History	Humanities
History & Philosophy of Science	Humanities
History of Social Sciences	Humanities
Humanities, Multidisciplinary	Humanities
Language & Linguistics	Humanities
Linguistics	Humanities
Literary Reviews	Humanities
Literary Theory & Criticism	Humanities
Literature	Humanities
Literature, African, Australian, Canadian	Humanities
Literature, American	Humanities
Literature, British Isles	Humanities
Literature, German, Dutch, Scandinavian	Humanities
Literature, Romance	Humanities
Literature, Slavic	Humanities
Medieval & Renaissance Studies	Humanities
Music	Humanities
Philosophy	Humanities
Poetry	Humanities
Religion	Humanities
Theater	Humanities
Materials Science, Biomaterials	Materials Science
Materials Science, Ceramics	Materials Science

Materials Science, Characterization & Testing	Materials Science
Materials Science, Coatings & Films	Materials Science
Materials Science, Composites	Materials Science
Materials Science, Multidisciplinary	Materials Science
Materials Science, Paper & Wood	Materials Science
Materials Science, Textiles	Materials Science
Nanoscience & Nanotechnology	Materials Science
Logic	Mathematics & Statistics
Mathematics	Mathematics & Statistics
Mathematics, Applied	Mathematics & Statistics
Mathematics, Interdisciplinary Applications	Mathematics & Statistics
Statistics & Probability	Mathematics & Statistics
Acoustics	Physics
Astronomy & Astrophysics	Physics
Imaging Science & Photographic Technology	Physics
Mechanics	Physics
Nuclear Science & Technology	Physics
Optics	Physics
Physics, Applied	Physics
Physics, Atomic, Molecular & Chemical	Physics
Physics, Condensed Matter	Physics
Physics, Fluids & Plasmas	Physics
Physics, Mathematical	Physics
Physics, Multidisciplinary	Physics
Physics, Nuclear	Physics
Physics, Particles & Fields	Physics
Spectroscopy	Physics
Psychology	Psychology
Psychology, Applied	Psychology
Psychology, Biological	Psychology
Psychology, Clinical	Psychology
Psychology, Developmental	Psychology
Psychology, Educational	Psychology
Psychology, Experimental	Psychology
Psychology, Mathematical	Psychology
Psychology, Multidisciplinary	Psychology
Psychology, Psychoanalysis	Psychology
Psychology, Social	Psychology
Anthropology	Social Sciences
Area Studies	Social Sciences
Communication	Social Sciences
Criminology & Penology	Social Sciences
Demography	Social Sciences
Education & Educational Research	Social Sciences
Education, Scientific Disciplines	Social Sciences
Education, Special	Social Sciences
Environmental Studies	Social Sciences
Ergonomics	Social Sciences
Ethnic Studies	Social Sciences
Family Studies	Social Sciences
Geography	Social Sciences

Hospitality, Leisure, Sport & Tourism	Social Sciences
Industrial Relations & Labor	Social Sciences
Information Science & Library Science	Social Sciences
International Relations	Social Sciences
Law	Social Sciences
Planning & Development	Social Sciences
Political Science	Social Sciences
Public Administration	Social Sciences
Social Issues	Social Sciences
Social Sciences, Interdisciplinary	Social Sciences
Social Sciences, Mathematical Methods	Social Sciences
Social Work	Social Sciences
Sociology	Social Sciences
Transportation	Social Sciences
Urban Studies	Social Sciences
Women's Studies	Social Sciences

Appendix 3: The total production in the world in the different subject fields

Subject field*	1999	2002	2005	2008	2011	2014
Agriculture, Fisheries & Forestry	39480	42750	47314	62236	70103	76105
Biology	25014	26883	31260	39790	45442	50766
Biomedicine & Molecular Biosciences	144631	146635	161607	187540	215716	235705
Business Studies & Economics	8939	9692	11357	17716	22535	23667
Chemistry	78697	83258	97707	109510	127981	141718
Clinical Medicine	148552	151341	171197	207644	234421	263422
Computer & Information Sciences	10718	11443	14320	18833	23119	28880
Engineering	56757	60314	73311	96515	118448	146399
General science journals	1162	344	354	546	1061	2644
Geosciences	27823	30945	36721	47327	54775	69240
Health Sciences	21231	22849	27516	39422	49846	60197
Humanities	18561	18412	17927	25761	33072	35820
Materials Science	24241	25399	29900	40898	49787	65453
Mathematics & Statistics	21968	24195	28341	37213	41495	47232
Physics	97406	103973	118456	134787	142547	153522
Psychology	14102	14186	15542	20373	24061	27950
Social Sciences	22339	22706	25563	38084	48216	54607
Total	761621	795325	908392	1124197	1302625	1483327

*Data from Clarivate Analytics

Appendix 4: The HE sectors' contribution to the national publication output

Tables A.3–A.7 provide two types of information at the national level. First, they show each higher education institution's (HEI) contribution to the scientific output within the 16 subject fields; second, they show each HEI's contribution to the total publication output for their respective country (in the column Total). The darker the colour, the larger the contribution of each university (or hospital) to the national publication output, both within each subject field and in terms of the national level output in total.

Table A.3: Danish HE sector's share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering	Geosciences
Aalborg University	1.7	1.7	2.5	5.0	3.2	1.4	19.9	24.6	3.7
Aarhus University	30.5	31.6	13.8	26.4	23.1	6.7	14.9	6.9	23.3
Copenhagen Business School	0.1	0.0	0.0	26.2	0.0	0.0	2.3	0.4	0.1
Roskilde University	0.5	2.1	0.6	1.6	1.5	0.1	1.9	0.2	1.1
Technical University of Denmark	14.4	13.2	8.8	4.4	30.9	1.2	22.7	46.7	19.0
University of Copenhagen	40.1	38.2	34.9	14.6	23.5	21.1	17.1	4.1	25.3
University of Southern Denmark	1.7	5.1	6.6	14.7	8.1	4.9	7.3	4.0	4.2
Aalborg University Hospitals	0.1	0.1	1.0	0.0	0.1	2.6	0.5	0.4	0.2
Aarhus University Hospitals	0.4	0.5	5.1	0.0	0.3	15.4	0.1	0.4	0.2
Copenhagen University Hospitals	0.4	0.7	10.8	0.1	0.7	27.3	0.3	0.4	0.6
University of Southern Denmark Hospitals	0.0	0.1	2.2	0.0	0.2	5.8	0.0	0.1	0.1
HES Other	0.1	0.3	0.0	0.1	0.1	0.0	7.6	0.1	0.2
Other	10.0	6.3	13.6	7.0	8.4	13.4	5.4	11.6	22.1
HES Total	90.0	93.7	86.4	93.1	91.6	86.6	94.7	88.4	77.9

The University of Copenhagen is the largest university in *Denmark* with 25 per cent of the national Danish research output in the period 2011-2014. Aarhus University and the Technical University of Denmark (DTU) are the second and third largest universities with 16 per cent and 14 per cent, respectively. In fourth place is the conglomerate of Copenhagen University Hospitals, with 10 per cent of the national production. Here, Rigshospitalet in Copenhagen emerges as the most significant institution by far in terms of output.

Table A.3 (cont.): Danish HE sector's share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences	Total
Aalborg University	3.8	5.2	8.5	7.6	4.9	7.7	10.3	5.0
Aarhus University	11.4	28.6	17.1	25.9	20.5	31.6	22.6	15.9
Copenhagen Business School	0.4	4.6	0.0	0.4	0.0	2.1	7.8	1.2
Roskilde University	0.6	4.0	0.8	1.4	2.0	0.8	7.6	1.1
Technical University of Denmark	2.9	0.4	52.0	15.3	35.9	1.7	3.7	13.6
University of Copenhagen	25.4	33.5	8.5	35.7	22.5	22.3	26.6	25.3
University of Southern Denmark	14.2	11.5	4.7	9.5	8.0	9.9	10.1	6.7
Aalborg University Hospitals	2.0	0.0	0.1	0.1	0.1	0.7	0.2	1.1
Aarhus University Hospitals	6.2	0.3	0.7	0.1	0.3	5.3	0.2	5.6
Copenhagen University Hospitals	13.2	0.1	0.3	0.1	0.5	8.0	0.8	10.3
University of Southern Denmark Hospitals	2.0	0.0	0.1	0.0	0.0	1.0	0.0	2.1
HES Other	0.2	1.0	0.0	1.1	0.1	0.0	0.7	0.2
Other	18.0	10.7	7.2	2.8	5.3	8.9	9.4	11.9
HES Total	82.0	89.3	92.8	97.3	94.7	91.2	90.6	88.1

*Data from Clarivate Analytics

The universities in Copenhagen and Aarhus have comparable profiles based on research output. They have relatively high shares of the national output in most fields, which indicates their diversity and size, and also reflects the age and status of these "old" universities. On the surface DTU can be considered a specialised institution with a very strong emphasis on *Engineering* and *Materials Science*. However, as Table A.3 demonstrates, DTU actually has the largest research output in Denmark in *Physics* and *Chemistry*, making the university's profile more complex. The "youngest" universities in Denmark - Aalborg, Southern Denmark and Roskilde - have low shares of the overall research production, although their shares in other disciplines such as *Humanities* and *Social Sciences* are quite high. In the field *Business Studies & Economics*, the University of Southern Denmark contributes 15 per cent to the national output, which is only lower than Aarhus University and Copenhagen Business Schools – both 26 per cent. The Danish HE sector accounts for 88 per cent of the Danish publication output. The output of *Other* national institutions (i.e. institutions not part of the HE sector) is particularly high in *Geosciences* (22 per cent) and *Health Sciences* (18 per cent) – and especially low in *Mathematics & Statistics* (3 per cent).

Table A.4: Finnish HE sector's share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering	Geosciences
Aalto University	2.5	1.1	2.9	21.0	18.2	1.2	25.7	28.2	4.5
Hanken School of Economics	0.1	0.0	0.0	11.6	0.0	0.0	0.7	0.2	0.0
Lappeenranta University of Technology	1.2	0.3	0.2	5.8	2.9	0.0	2.2	8.8	1.7
Tampere University of Technology	0.2	1.2	1.7	3.0	6.1	0.3	10.9	12.1	1.5
University of Eastern Finland	10.6	6.3	10.1	2.0	6.1	5.5	4.3	3.6	6.7
University of Helsinki	32.2	37.5	29.6	7.0	18.1	11.8	6.3	3.6	28.7
University of Jyväskylä	1.8	10.2	3.2	5.5	10.9	1.5	5.7	2.6	2.3
University of Lapland	0.2	0.6	0.0	0.8	0.0	0.0	0.0	0.0	0.9
University of Oulu	4.1	6.9	5.9	5.9	5.1	5.4	8.3	9.1	6.4
University of Tampere	0.1	0.6	3.6	3.0	0.3	5.3	5.0	0.4	0.2
University of Turku	5.2	12.6	8.9	8.3	8.6	7.3	9.5	2.5	3.2
University of Vaasa	0.1	0.0	0.1	6.4	0.0	0.0	0.6	0.8	0.1
Åbo Akademi University	1.4	2.8	2.9	1.9	11.5	0.5	4.1	5.9	2.0
Helsinki University Hospital	0.1	0.2	4.6	0.0	0.1	18.4	0.1	0.2	0.0
Kuopio University Hospital	0.1	0.1	2.0	0.2	0.1	3.9	0.1	0.2	0.0
Oulu University Hospital	0.0	0.1	1.3	0.0	0.0	5.0	0.0	0.1	0.0
Tampere University Hospital	0.0	0.1	2.1	0.0	0.1	5.4	0.1	0.1	0.0
Turku University Hospital	0.0	0.0	1.6	0.0	0.0	4.9	0.1	0.1	0.0
HES Other	0.9	1.3	1.1	2.5	0.7	1.2	5.1	1.2	0.6
Other	39.3	18.1	18.2	14.9	11.0	22.2	11.2	20.5	41.0
HES Total	60.7	81.9	81.8	85.1	89.0	77.8	88.7	79.5	59.0

The dominant position of the University of Helsinki in *Finnish* research is clearly demonstrated in Table A.4. In 10 of the 16 subject fields under consideration, the University of Helsinki holds the top position in terms of research output in Finland. It produces more than 25 per cent of Finland's output in seven of the other subject fields, and in *Humanities*, almost half of all publications in Finland. Helsinki University Hospital is clearly the largest contributor to *Clinical Medicine*. In all other subject fields (*Business Studies & Economics*, *Chemistry*, *Computer & Information Sciences*, *Engineering*, *Materials Science* and *Physics*), Aalto University has the largest publication output in Finland.

Table A.4 (cont.): Finnish HE sector's share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences	Total
Aalto University	0.6	4.1	26.1	16.7	26.9	5.1	6.0	10.3
Hanken School of Economics	0.1	0.2	0.0	0.2	0.0	0.3	1.2	0.5
Lappeenranta University of Technology	0.1	0.1	5.2	1.0	2.7	0.4	0.9	1.9
Tampere University of Technology	0.4	0.3	9.8	4.0	8.4	0.3	1.0	3.6
University of Eastern Finland	8.1	5.3	4.2	6.3	4.7	3.8	5.9	6.3
University of Helsinki	14.1	44.0	7.8	25.6	15.4	26.8	25.5	19.7
University of Jyväskylä	7.5	10.4	4.1	15.2	10.7	18.6	11.1	5.8
University of Lapland	0.3	1.4	0.0	0.1	0.0	0.1	2.3	0.3
University of Oulu	4.8	4.5	8.3	10.8	7.4	3.2	7.1	6.3
University of Tampere	8.1	6.2	0.4	3.2	0.1	7.4	10.3	3.2
University of Turku	7.4	10.5	3.5	9.3	7.3	11.5	8.4	7.3
University of Vaasa	0.1	0.4	0.0	1.3	0.1	0.2	0.6	0.4
Åbo Akademi University	1.3	4.7	9.8	2.3	1.0	3.9	3.6	3.1
Helsinki University Hospital	2.7	0.0	0.1	0.0	0.1	2.1	0.2	4.3
Kuopio University Hospital	2.0	0.1	0.0	0.0	0.1	0.5	0.2	1.2
Oulu University Hospital	1.6	0.1	0.0	0.0	0.1	1.1	0.2	1.2
Tampere University Hospital	1.5	0.0	0.1	0.0	0.0	1.4	0.1	1.4
Turku University Hospital	2.1	0.1	0.1	0.0	0.0	0.7	0.1	1.3
HES Other	2.3	1.9	1.3	1.4	3.8	1.0	1.6	1.6
Other	35.1	5.7	19.2	2.6	11.3	11.7	13.8	20.2
HES Total	64.9	94.4	80.9	97.5	88.7	88.3	86.2	79.8

*Data from Clarivate Analytics

Unlike Denmark (Table A.3), the publication output in Finland is not equally concentrated in the HE sector. Twenty per cent of the Finnish national output, compared to 12 per cent in Denmark, comes from *Other* institutions. It is particularly within three fields that a substantial part of Finland's publication activity takes place outside the HE sector: in *Geosciences* (41 per cent), *Agriculture, Fisheries & Forestry* (39 per cent) and *Health Sciences* (35 per cent). This is mostly due to publications of governmental research institutes, and in *Health Sciences* it is also due to other hospitals and private companies. Conversely, the HE sector has almost a national monopoly on publications in *Mathematics & Statistics* (98 per cent), *Chemistry* and *Computer & Information Sciences* (89 per cent), *Physics* and *Psychology* (both 88 per cent).

In *Iceland* (Table A.5), there are two organisations responsible for producing 68 per cent of all publications: the University of Iceland (with 55 per cent) and its university hospital – Landspítali (with 13 per cent). This indicates the importance of health research in this comparison. The university hospital has produced 14 per cent of all publications in *Biomedicine & Molecular Biosciences*, 21 per cent of all publications in *Health Sciences* and 10 per cent of all publications in *Psychology* (in addition to its contribution of 44 per cent of all publications in *Clinical Medicine*).

Table A.5: Icelandic HE sector’s share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering	Geosciences
Agricultural University of Iceland	14.9	3.5	0.1	0.0	0.0	0.0	0.0	0.0	2.2
Reykjavik University	0.3	1.5	4.5	32.1	0.4	0.7	65.0	38.0	0.9
University of Akureyri	1.5	0.2	3.2	9.1	7.9	1.0	3.1	2.0	1.0
University of Iceland	35.9	53.0	55.6	56.8	79.9	40.5	28.2	42.4	64.4
Landspítali University Hospital	2.0	0.5	14.5	2.0	1.1	43.6	0.1	0.5	0.7
HES Other	3.4	6.7	1.0	0.9	0.0	0.0	0.0	0.0	0.0
Other	42.1	34.2	21.2	6.2	10.8	14.3	4.6	17.4	30.9
HES Total	57.9	65.5	79.0	94.7	89.3	85.8	96.4	82.9	69.1

The other HEIs are relatively small in Iceland – both in size and in relative contributions. Nevertheless, Reykjavik University has high shares of the publication output in several fields, especially in *Computer & Information Sciences* (65 per cent).

As in Finland, the HE sector contributes 80 per cent of the national publication output. The subject fields where other types of organisations (*Other*) have large shares of the output are primarily *Agriculture, Fisheries & Forestry* (42 per cent), *Biology* (34 per cent) and *Geosciences* (30 per cent). It is somewhat surprising that institutions outside of the HE sector contribute 25 per cent of the output in *Humanities*. In all other Nordic countries, the HE sector accounts for 89-94 per cent in this subject field.

Table A.5 (cont.): Icelandic HE sector’s share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences	Total
Agricultural University of Iceland	0.0	0.1	0.0	0.0	0.0	0.0	0.6	1.5
Reykjavik University	4.1	1.2	10.6	38.4	11.6	12.8	8.4	7.6
University of Akureyri	7.0	1.7	0.0	0.0	1.3	1.5	10.3	2.7
University of Iceland	52.5	71.0	68.8	53.0	84.7	61.8	66.8	54.9
Landspítali University Hospital	20.9	0.1	0.9	1.9	0.0	10.2	1.8	13.0
HES Other	0.0	0.6	0.0	0.0	0.0	0.9	1.5	0.9
Other	15.2	25.4	20.3	7.8	2.5	13.5	10.8	19.4
HES Total	84.5	74.7	80.2	93.4	97.6	87.3	89.3	80.6

*Data from Clarivate Analytics

In Norway (Table A.6), the university hospitals contribute 13 per cent of the total national production. Their contribution to *Clinical Medicine* is 42 per cent, and Oslo University Hospital alone accounts for 15 per cent of the publications in *Biomedicine & Molecular Biosciences*. Contrary to Denmark, Finland and Iceland, the output is spread more evenly across the largest universities, with the universities in Oslo, Bergen and the Norwegian University of Science and Technology in Trondheim contributing 17, 15 and 10 per cent of the total output respectively. In *Agriculture, Fisheries & Forestry*, the Norwegian University of Life Sciences has the largest production (30 per cent of the national output).

A.6: Norwegian HE sector’s share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering	Geosciences
Nord University	1.6	1.5	0.9	1.2	0.0	0.1	0.5	0.1	0.2
Norwegian Business School	0.0	0.0	0.0	14.6	0.0	0.0	1.0	0.2	0.1
Norwegian School of Economics and Business Administration	0.4	0.1	0.0	11.4	0.0	0.0	0.3	0.5	0.1
Norwegian School of Sport Sciences	0.0	0.0	0.5	0.1	0.1	0.6	0.0	0.1	0.0
Norwegian University of Life Sciences	29.6	10.2	7.9	2.7	2.6	0.4	1.4	1.8	4.0
Norwegian University of Science and Technology	6.7	9.7	9.2	9.8	27.8	7.9	26.2	42.0	9.7
Oslo and Akershus University College of Applied Sciences	0.2	0.2	0.4	1.9	0.2	0.6	1.1	0.2	0.2
University College of Southeast Norway	0.3	0.7	0.2	0.9	1.5	0.4	2.3	2.4	0.4
University of Agder	0.2	0.1	0.2	2.8	0.1	0.2	6.0	3.8	0.1
University of Bergen	4.8	12.2	12.1	4.7	8.3	10.1	20.0	4.7	14.7
University of Oslo	4.9	15.4	21.4	9.8	29.7	15.5	12.8	5.3	16.0
University of Stavanger	1.1	0.4	0.5	4.9	1.4	0.4	1.3	6.0	0.7
University of Tromsø	4.3	8.8	6.6	3.5	7.3	5.0	3.8	1.3	6.5
St. Olavs Hospital	0.1	0.0	1.5	0.0	0.1	3.9	0.0	0.2	0.0
University Hospital North Norway	0.0	0.1	1.2	0.0	0.0	2.8	0.8	0.0	0.0
Bergen University Hospital	0.1	0.2	4.2	0.3	0.2	9.6	0.1	0.1	0.0
Oslo University Hospital	0.2	0.6	15.4	0.3	1.2	25.8	0.5	0.6	0.1
HES Other	1.5	3.5	0.5	4.0	0.2	0.6	2.5	1.6	2.5
Other	44.1	36.2	17.1	27.3	19.4	16.0	19.3	29.0	44.7
HES Total	55.9	63.8	82.9	72.7	80.6	84.0	80.7	71.0	55.4

Compared to all other Nordic countries, Norway differs because of its very large institute sector, which is the main source of the HE sector’s relatively low share (75 per cent) of the national publication output, comparatively speaking. *Other* institutions are particularly active in *Geosciences* (44 per cent), *Agriculture, Fisheries & Forestry* (44 per cent) and *Biology* (36 per cent), while the HE sector has very high shares of the output in *Mathematics & Statistics* (90 per cent), *Humanities* (90 per cent), *Physics* (85 per cent) and *Clinical Medicine* (84 per cent).

Table A.6 (cont.): Norwegian HE sector’s share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences	Total
Nord University	1.4	0.6	0.0	0.2	0.0	0.2	1.4	0.7
Norwegian Business School	0.1	0.6	0.0	0.5	0.0	2.9	1.4	0.7
Norwegian School of Economics and Business Administration	0.0	1.2	0.0	1.2	0.2	0.6	1.1	0.6
Norwegian School of Sport Sciences	5.2	0.4	0.0	0.0	0.0	1.1	0.8	0.8
Norwegian University of Life Sciences	1.3	0.5	1.2	2.6	1.4	0.9	3.0	4.7
Norwegian University of Science and Technology	10.4	12.0	42.4	24.8	31.7	10.5	10.9	15.0
Oslo and Akershus University College of Applied Sciences	3.5	1.9	0.0	1.6	1.5	1.9	5.6	1.3
University College of Southeast Norway	1.9	1.8	4.3	0.6	2.1	1.1	1.1	1.0
University of Agder	1.9	3.3	0.4	6.4	0.7	1.3	2.3	1.3
University of Bergen	8.9	12.8	2.2	17.7	9.1	14.9	8.9	10.0
University of Oslo	14.7	31.2	15.5	23.8	30.0	25.3	21.3	17.1
University of Stavanger	1.6	2.3	0.7	2.9	1.4	1.7	2.8	1.6
University of Tromsø	6.8	12.3	0.8	5.0	5.1	4.3	4.5	5.5
St. Olavs Hospital	1.8	0.1	0.0	0.0	0.2	0.9	0.2	1.2
University Hospital North Norway	2.2	0.1	0.0	0.2	0.0	0.6	0.1	1.0
Bergen University Hospital	2.5	0.1	0.0	0.0	0.2	2.8	0.2	2.8
Oslo University Hospital	7.1	0.1	0.9	0.5	0.6	5.8	0.8	8.0
HES Other	5.1	8.9	0.8	2.3	1.6	2.4	5.9	2.4
Other	23.6	9.8	30.7	9.7	14.3	20.9	27.6	24.5
HES Total	76.5	90.2	69.2	90.4	85.8	79.2	72.4	75.5

*Data from Clarivate Analytics

In *Sweden*, the universities focusing on technology and a comprehensive engineering education (Chalmers University of Technology, Royal Institute of Technology, Linköping University and Luleå University of Technology) clearly dominate the subject fields related to *Engineering* and the natural sciences. There has, however, been a broadening of their publishing output in terms of subject fields, following a change of focus among these institutions. Sweden's only exclusively medical university, Karolinska Institutet, primarily publishes within the fields of *Biomedicine & Molecular Biosciences*, *Clinical Medicine* and *Health Sciences*, as would be expected, but Karolinska Institutet also has Sweden’s largest share of publications in *Psychology* (18 per cent).

Table A.7: Swedish HE sector’s share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Agriculture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineering	Geosciences
Blekinge Institute of Technology	0.0	0.0	0.0	0.4	0.0	0.1	5.6	0.9	0.1
Borås University College	0.1	0.0	0.2	0.5	1.0	0.1	1.6	0.6	0.2
Chalmers University of Technology	1.0	1.9	2.0	3.8	11.1	0.3	11.2	16.7	3.8
Gävle University College	0.1	0.0	0.1	0.3	0.0	0.1	0.3	0.6	0.3
Jönköping University	0.0	0.0	0.0	3.6	0.0	0.3	0.6	0.4	0.0
Karlstad University	0.6	0.9	0.2	2.6	0.6	0.1	0.2	0.9	0.4
Karolinska Institutet	0.6	2.1	21.9	0.2	2.5	22.1	1.1	0.5	1.0
Linköping University	1.5	1.8	3.6	4.9	4.9	4.7	11.1	6.9	2.1
Linnaeus University	0.8	2.3	0.7	2.4	0.7	0.2	0.9	1.0	1.3
Luleå University of Technology	1.4	0.1	0.2	2.5	2.0	0.1	2.0	6.0	3.5
Lund University	8.5	14.6	12.6	12.2	13.5	12.6	9.4	11.0	11.5
Malmö University College	0.0	0.1	0.2	0.2	0.7	1.2	0.5	0.3	0.1
Mid Sweden University	0.6	0.4	0.2	1.3	0.5	0.2	0.8	1.3	0.4
Mälardalen University College	0.2	0.0	0.0	0.4	0.1	0.1	2.9	1.2	0.4
Royal Institute of Technology (KTH)	2.1	1.2	2.4	4.6	17.4	0.6	16.1	22.8	5.6
Stockholm School of Economics	0.0	0.0	0.0	7.8	0.0	0.0	0.1	0.1	0.0
Stockholm University	3.6	12.4	4.8	10.4	12.2	1.0	2.4	1.4	18.6
Swedish University of Agricultural Sciences	51.5	21.4	4.0	1.8	2.0	0.2	0.8	1.9	8.8
Södertörns University College	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.1	0.2
Umeå University	4.1	5.9	5.7	4.7	3.4	5.1	4.6	1.7	4.7
University of Gothenburg	3.0	9.7	9.3	11.2	4.3	9.6	3.0	1.3	6.5
Uppsala University	4.3	13.7	14.0	9.2	13.3	9.2	9.7	5.9	10.5
Örebro University	0.5	0.2	0.6	1.6	0.4	0.8	1.8	0.4	1.0
Karolinska University Hospital	0.1	0.2	2.9	0.0	0.2	5.9	0.0	0.1	0.0
Linköping University Hospital	0.0	0.0	0.2	0.0	0.1	0.9	0.0	0.0	0.0
Sahlgrenska University Hospital	0.0	0.2	1.2	0.0	0.0	4.4	0.0	0.1	0.2
Skåne University Hospital	0.0	0.0	1.3	0.0	0.0	4.2	0.0	0.1	0.1
University Hospital of Umeå	0.0	0.0	0.1	0.0	0.0	0.6	0.0	0.0	0.0
Uppsala University Hospital	0.0	0.0	0.7	0.0	0.1	2.3	0.0	0.1	0.1
Örebro University Hospital	0.0	0.1	0.6	0.0	0.0	1.4	0.2	0.0	0.1
HES Other	0.2	0.8	0.3	2.0	0.1	0.6	3.2	1.5	0.5
Other	15.0	9.5	9.9	11.2	8.8	11.2	10.1	14.1	17.9
HES Total	84.9	90.5	90.1	88.8	91.2	88.8	89.9	85.9	82.1

The more general universities, which tend to be larger institutions, have a distributed profile with publications in all fields. The largest relative contribution to the subject fields is made by the Swedish University of Agricultural Sciences in the field *Agriculture, Fisheries & Forestry*, with 51 per cent of all Swedish output. The second largest percentage in the Swedish section of Table A.7 is the 23 per cent contribution made to *Engineering* by the Royal Institute of Technology (KTH). It is noticeable in Sweden how low the publication output of the university hospitals is, compared to the relatively large corresponding shares in Norway.

Table A.7 (cont.): Swedish universities and university hospitals' share of the publication volume (fractionalised) in 2011-2014 within each subject field (size level reflected by darkness of colour)*

Organisation	Health Sciences	Humanities	Materials Science	Mathematics & Statistics	Physics	Psychology	Social Sciences	Total
Blekinge Institute of Technology	0.4	0.0	0.0	0.4	0.3	0.2	0.4	0.3
Borås University College	0.6	0.4	1.5	0.2	0.2	0.1	0.9	0.4
Chalmers University of Technology	0.6	0.5	11.7	8.6	13.3	0.6	1.9	4.8
Gävle University College	1.0	0.2	0.0	0.4	0.1	1.7	0.6	0.3
Jönköping University	1.7	0.1	0.4	1.4	0.1	0.3	1.1	0.4
Karlstad University	1.1	0.7	1.2	2.0	0.6	1.1	1.8	0.7
Karolinska Institutet	19.9	0.9	1.0	1.5	0.5	18.1	2.3	11.1
Linköping University	6.2	4.4	10.5	7.2	9.2	7.9	6.4	5.3
Linnaeus University	1.1	2.7	0.8	2.8	1.0	0.8	1.7	0.9
Luleå University of Technology	1.1	0.3	5.1	3.4	1.9	0.7	1.1	1.5
Lund University	9.8	14.7	9.0	9.2	12.0	10.4	10.7	11.8
Malmö University College	0.9	2.4	0.7	0.3	0.2	0.4	1.7	0.7
Mid Sweden University	2.0	0.3	2.7	1.1	0.8	0.8	1.9	0.8
Mälardalen University College	0.8	0.4	0.2	0.3	0.1	0.6	0.9	0.4
Royal Institute of Technology (KTH)	0.9	3.3	20.2	15.8	20.2	0.6	3.8	7.2
Stockholm School of Economics	0.0	0.3	0.0	0.2	0.0	0.2	0.7	0.3
Stockholm University	3.4	20.2	3.9	7.9	8.7	10.1	13.3	6.2
Swedish University of Agricultural Sciences	0.9	0.9	1.0	1.4	0.3	0.1	2.6	4.6
Södertörns University College	0.2	3.4	0.0	0.0	0.0	0.1	1.7	0.2
Umeå University	9.2	5.6	2.2	7.3	3.2	6.9	7.0	5.0
University of Gothenburg	8.6	11.6	1.6	6.9	3.5	12.2	14.0	7.5
Uppsala University	5.9	14.7	12.3	17.5	15.0	10.6	9.7	10.6
Örebro University	1.7	0.9	0.1	0.4	0.1	5.2	3.1	0.9
Karolinska University Hospital	1.6	0.0	0.1	0.1	0.0	0.6	0.1	2.0
Linköping University Hospital	0.5	0.0	0.0	0.0	0.0	0.2	0.0	0.3
Sahlgrenska University Hospital	1.8	0.1	0.1	0.0	0.0	0.4	0.1	1.4
Skåne University Hospital	1.4	0.0	0.0	0.0	0.0	0.2	0.1	1.3
University Hospital of Umeå	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.2
Uppsala University Hospital	0.7	0.0	0.0	0.0	0.0	0.4	0.0	0.7
Örebro University Hospital	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.5
HES Other	3.6	2.4	1.2	1.0	0.3	2.8	3.0	1.1
Other	11.8	8.6	12.4	2.9	8.5	5.2	7.6	10.8
HES Total	88.2	91.4	87.6	97.1	91.5	94.8	92.4	89.2

*Data from Clarivate Analytics

The HE sector has a very high share of the total national publication output in Sweden, 89 per cent. *Other* institutions' contribution is especially strong in *Agriculture, Fisheries & Forestry* (15 per cent) and *Engineering* (14 per cent), but very low in *Psychology* (5 per cent) and *Mathematics & Statistics* (3 per cent).

Appendix 5: Number of fractionalised publications

Table A.8: Number of fractionalised publications (1999-2002)*

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Aalborg University	128	17	113	48	18	54	42	165	25	25	10	30	28	70	5	38	817
Aarhus University	416	323	637	42	236	453	39	62	226	70	67	19	112	471	29	59	3260
Copenhagen Business School	2	0		59		1	6	5	0	1	7		1		1	16	99
Roskilde University	6	34	38	9	24	6	4	6	17	1	11	1	6	17	1	32	212
Technical University of Denmark	297	102	444	12	375	34	60	486	205	26	2	143	78	688	1	20	2973
University of Copenhagen	723	433	1645	84	297	1063	51	57	340	233	140	24	128	527	31	130	5906
University of Southern Denmark	19	63	320	25	142	139	13	22	35	84	25	5	50	108	4	25	1081
Aalborg University Hospitals	0	0	33		0	130	1	3	1	10		0	0	0		1	180
Aarhus University Hospitals	3	2	205	0	4	833	1	7	1	45	0	2	1	4	14	2	1122
Copenhagen University Hospitals	5	3	575		11	1392	0	8	2	135	0		0	5	12	1	2150
University of Southern Denmark Hospitals	2	1	67	0	1	269		1	0	17			0	0	2	2	363
HES Other		1	0		0		4	1	1		2		3	0		0	13
Other	290	103	1069	39	269	889	34	225	310	188	46	39	31	294	42	87	3956
HES Total	1603	979	4076	279	1108	4375	220	823	854	646	265	224	407	1892	100	326	18177
Denmark	1893	1082	5146	318	1378	5264	255	1048	1164	834	311	263	439	2186	141	413	22133
Aalto University	22	4	91	42	184	31	79	398	38	4	9	110	65	440	7	14	1538
Hanken School of Economics				39			0	0		1			1		1	0	43
Lappeenranta University of Technology	7	0	1	3	14		8	83	5	1		8	3	13			147
Tampere University of Technology	6	1	12	1	41	16	39	181	14	6	1	69	9	105	1	3	507
University of Eastern Finland	162	101	383	3	136	268	14	47	88	94	15	15	23	89	17	21	1477
University of Helsinki	432	291	1124	28	375	629	28	51	178	154	125	55	133	375	80	111	4170
University of Jyväskylä	34	102	85	16	101	29	17	35	41	62	22	21	69	212	57	33	936
University of Lapland	2	6	1		0			0	6	1	1			1		2	19
University of Oulu	60	95	324	10	79	489	23	112	67	54	3	39	50	185	12	20	1622
University of Tampere	1	7	149	7	2	256	28	7	4	76	28	1	15	1	11	41	635
University of Turku	84	176	525	13	163	578	28	42	41	73	29	19	35	184	41	54	2086
University of Vaasa				9		1	0	3	1		2	0	2	1	2	2	23
Åbo Akademi University	10	28	106	17	149	15	21	79	23	21	8	61	18	36	17	15	625
Helsinki University Hospital	3	4	364		2	1221	2	14	1	47	0	5	0	3	12	3	1682
Kuopio University Hospital	0	2	165		2	455	2	8	1	28	1	1	0	3	7	3	679
Oulu University Hospital	0	0	31		0	224	0	2		21	0	1	0	1	3	0	284
Tampere University Hospital	0	2	136		1	381	2	4	0	36	0	1	0	0	2	1	566
Turku University Hospital	1	1	77		2	240	1	2	0	14	0	2	0	1	4	1	345
HES Other	2	3	31	1	6	38	26	12	3	18	6	6	10	85	0	4	252
Other	669	224	801	61	187	1178	46	379	426	442	25	263	23	260	51	73	5109
HES Total	827	823	3607	189	1257	4871	319	1082	511	711	251	415	435	1733	275	329	17636
Finland	1496	1048	4408	250	1444	6049	365	1461	937	1153	275	678	459	1993	326	402	22745

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Agricultural University of Iceland	12	2	1						2								17
Reykjavik University						1											1
University of Akureyri	0		0		1	1			0	2	4					1	9
University of Iceland	22	22	66	9	25	40	3	11	58	19	20	3	11	54	16	20	397
Landspítali University Hospital	0	1	33		1	100			0	12	1				2	0	150
HES Other	2	3	0														5
Other	29	30	34	3	5	37	2	5	35	11	2	2	2	1	3	6	205
HES Total	36	27	101	9	26	142	3	11	60	34	24	3	11	54	17	20	578
Iceland	65	57	134	11	31	179	6	16	95	44	25	5	14	55	20	26	784
Nord University	3	6	1	2	0	0	1	1	2	2	2		0	0		3	23
Norwegian Business School		0	1	20		1	4	2	1	1	3		1		2	14	48
Norwegian School of Economics and Business Administration	2	1		44		0	1	4	2		2		7	0	2	13	79
Norwegian School of Sport Sciences			4			8		0		17	1				5	3	38
Norwegian University of Life Sciences	382	81	169	7	18	13	2	14	48	7	1	3	3	9		10	765
Norwegian University of Science and Technology	71	133	215	22	166	183	46	250	85	46	25	87	82	196	32	71	1710
Oslo and Akershus University College of Applied Sciences		1	3	1	1	6	1	1		21	1		2	9	6	30	83
University College of Southeast Norway	4	8	4	1	3	3	5	12	3	5	7		4	1	2	2	63
University of Agder	1	2	1	3	5		1	7	7	1	1	1	6	3	1	5	45
University of Bergen	109	167	298	27	89	358	22	43	198	94	35	3	71	103	68	50	1736
University of Oslo	82	242	596	40	268	564	20	64	214	136	115	31	88	274	70	133	2936
University of Stavanger	4	6	8	10	10	4	0	29	4	2	5	1	6	3	10	6	106
University of Tromsø	68	104	151	5	57	151	3	15	73	32	22	2	20	40	42	31	814
St. Olavs Hospital	2	1	52			155	0	0	0	14				4	2	0	232
University Hospital North Norway	1	0	31		0	109				24					5	0	169
Bergen University Hospital	1	2	99		1	319	0	4	0	18		0	0	1	2	0	447
Oslo University Hospital	1	6	423	1	5	1016	1	6	0	62	0	0	1	3	9	2	1536
HES Other	10	19	7	5	3	3	4	9	22	9	18	0	6	9	6	14	144
Other	539	371	385	74	164	448	45	391	630	168	38	87	52	126	51	168	3737
HES Total	740	780	2062	186	625	2893	111	460	660	490	238	128	295	654	263	388	10973
Norway	1280	1151	2447	259	790	3341	156	851	1290	658	275	214	347	779	315	556	14710

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Blekinge Institute of Technology			0	0	0	4	17	18		5	1	0	4	9	0	4	62
Borås University College		1			1	2	2	1	0	7			0	4		4	22
Chalmers University of Technology	32	9	66	21	296	15	48	437	62	7	3	153	109	723	5	18	2004
Gävle University College	1	0	1	1	1	2	4	6	0	3	2	0	1	3	5	2	31
Jönköping University		1	1	10		9	1	7	1	13	0	2	0	1	6	6	58
Karlstad University	2	2	7	5	11	4	1	6	3	11	3	9	3	21	10	7	104
Karolinska Institutet	12	35	1997	2	80	1613	9	20	14	337	3	5	4	27	62	25	4243
Linköping University	24	18	239	17	128	276	45	200	29	139	13	108	69	374	34	35	1748
Linnaeus University	11	25	37	5	9	7	0	7	12	5	10	0	11	15	1	11	166
Luleå University of Technology	23	3	6	13	55	6	10	146	49	11	3	76	28	67	2	18	518
Lund University	233	324	1175	47	551	599	66	371	200	156	63	94	90	635	48	85	4737
Malmö University College	2	1	11		2	67	2	4	1	5	2	2	5	8	1	3	115
Mid Sweden University	13	17	11	3	26	8	4	14	11	15	2	14	9	19	2	10	178
Mälardalen University College	2	1	1	1	4	4	3	13	2	3	1	0	8	7	1	4	55
Royal Institute of Technology (KTH)	33	17	170	10	374	25	76	535	81	4	13	251	136	829	3	25	2582
Stockholm School of Economics			2	112		12	1	6	1	17	1		9		6	23	191
Stockholm University	84	212	449	63	337	69	11	43	276	78	84	43	55	354	88	133	2380
Swedish University of Agricultural Sciences	1007	291	399	7	77	38	7	74	129	15	1	20	7	7	4	11	2095
Södertörns University College	2	2	31	3	9	5		1	1	2	4	1	0	0		8	67
Umeå University	44	135	479	27	106	432	15	34	56	160	16	15	63	163	37	70	1852
University of Gothenburg	84	223	718	41	188	866	8	68	187	141	76	46	51	291	59	79	3125
Uppsala University	161	304	1117	43	427	618	42	220	234	143	64	160	104	716	82	101	4536
Örebro University	4	2	6	2	3	14	3	7	4	21			3	3	10	11	94
Karolinska University Hospital	3	7	808	1	14	1541	1	9	3	110	1	0	0	6	12	3	2520
Linköping University Hospital	1	0	81		4	282	1	2	0	37		0	0	1	2	2	415
Sahlgrenska University Hospital	1	4	220	0	7	1075	0	7	2	85		1		4	9	2	1418
Skåne University Hospital	2	4	458	1	7	1430	0	16	14	108	1	3		12	9	4	2069
University Hospital of Umeå		0	85		1	301	0	6	0	21			0	0	2	0	418
Uppsala University Hospital	3	1	238	0	1	838		8	2	52	1	1		1	9	2	1158
Örebro University Hospital		0	30			142		1	2	21	0	0		0	3	4	204
HES Other	5	5	18	11	7	26	17	20	2	40	5	6	9	11	11	10	204
Other	396	141	1122	77	428	1552	50	566	318	386	58	350	32	333	66	94	5969
HES Total	1787	1645	8860	446	2727	10332	393	2309	1377	1770	372	1011	778	4312	527	721	39367
Sweden	2184	1785	9982	523	3155	11883	444	2875	1695	2156	430	1360	810	4645	593	816	45336

*Data from Clarivate Analytics

Table A.9: Number of fractionalised publications (2003-2006)*

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Aalborg University	155	14	164	64	37	71	67	266	33	28	21	46	51	89	16	67	1189
Aarhus University	434	323	670	39	284	508	55	73	220	93	62	27	109	440	60	85	3481
Copenhagen Business School	2			82		1	4	7	0	1	17		0		3	51	168
Roskilde University	6	28	51	10	31	3	5	5	18	1	8	2	12	14	2	44	240
Technical University of Denmark	290	102	511	9	420	53	49	647	205	46	1	182	65	701	1	21	3302
University of Copenhagen	755	449	1578	85	290	1032	51	62	352	295	115	15	155	452	41	142	5868
University of Southern Denmark	19	62	406	37	178	233	19	26	34	120	33	13	54	127	6	32	1401
Aalborg University Hospitals	0	0	31		1	130	2	6	0	17	0	0	0	0	0	0	189
Aarhus University Hospitals	3	5	235	0	2	930	1	9	1	64	1	2	0	3	16	1	1272
Copenhagen University Hospitals	6	9	565	0	7	1492	1	13	1	192	0	0	2	7	16	6	2318
University of Southern Denmark Hospitals	3	1	101		1	276	0	2	1	18		1	0	1	0	0	405
HES Other				0	1	0	20	2			4		4	0		3	34
Other	270	101	1112	43	223	893	28	218	279	230	42	38	38	283	38	86	3921
HES Total	1675	994	4314	326	1252	4727	272	1118	865	875	261	288	452	1835	161	452	19866
Denmark	1945	1095	5426	369	1475	5620	301	1336	1144	1104	303	326	490	2118	199	538	23787
Aalto University	28	7	89	67	223	38	102	534	38	4	21	157	73	566	15	34	1998
Hanken School of Economics			0	33		0	1	1		0					1	9	45
Lappeenranta University of Technology	9	1	3	10	20	0	12	104	6		0	16	4	47		5	237
Tampere University of Technology	4	4	23	3	49	17	38	234	18	3	2	56	20	165	0	5	642
University of Eastern Finland	171	93	434	5	154	273	23	60	92	78	3	19	26	108	16	23	1578
University of Helsinki	475	371	1150	41	334	622	50	79	255	187	133	45	124	434	98	142	4539
University of Jyväskylä	43	106	104	13	125	46	18	34	38	72	22	20	86	202	59	46	1036
University of Lapland	2	6	0	0	0	1	0	1	13	1					0	2	27
University of Oulu	58	98	289	7	70	374	23	151	87	45	11	55	40	203	15	30	1554
University of Tampere	3	3	139	11	2	236	38	16	4	71	27	1	15	1	30	83	679
University of Turku	75	141	473	23	159	452	46	63	45	73	43	38	47	181	47	57	1964
University of Vaasa	0		0	7	1	0	2	5	1	1	3	1	6	4	0	4	36
Åbo Akademi University	21	26	122	21	179	16	14	101	26	9	9	70	20	39	11	27	709
Helsinki University Hospital	3	3	344	0	3	1161	1	12	1	53	0	3	0	3	11	4	1600
Kuopio University Hospital	1	1	119		1	331	1	6	1	25	0	0	1	3	8	0	499
Oulu University Hospital	0	0	34		0	208	0	3	0	15		1		0	5	1	270
Tampere University Hospital	1	2	137		1	303	2	3	1	30		1	0	1	9	2	493
Turku University Hospital	1	1	62	0	0	223	0	2	0	14	0	1		1	6	1	313
HES Other	6	7	36	2	12	39	34	27	10	22	7	7	11	86	7	13	326
Other	744	283	827	72	188	1190	58	496	487	509	16	200	16	281	64	98	5529
HES Total	901	868	3560	244	1333	4340	405	1435	636	705	281	490	476	2046	337	488	18545
Finland	1645	1151	4386	315	1521	5530	464	1931	1123	1214	297	691	491	2326	401	586	24074

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Agricultural University of Iceland	8	2	0		0				2					0			12
Reykjavik University			1	1	0	0	3	1	0				1		1	1	9
University of Akureyri	1	1	1		2	1		0	2	2	3				1	9	23
University of Iceland	29	36	98	5	19	63	9	10	83	42	13	6	14	51	13	23	515
Landspítali University Hospital	2	1	42		0	98		1	0	18					5	2	171
HES Other	2	6	1														8
Other	42	40	44	1	3	46	2	6	45	10	9	1	3	4	6	3	264
HES Total	41	45	144	6	21	163	12	11	88	63	16	6	15	51	21	35	738
Iceland	82	85	188	7	24	209	14	17	133	72	25	8	17	55	27	38	1002
Nord University	6	6	4	7	1	1	1	2	1	2	1		1		1	6	40
Norwegian Business School	1	0	0	46		0	9	6	1	1	2		1		4	15	88
Norwegian School of Economics and Business Administration	2	2	1	60			2	4	1	2	4		7	0	6	18	109
Norwegian School of Sport Sciences	0	0	8			23		1		52	3				3	6	96
Norwegian University of Life Sciences	377	123	185	9	24	16	1	20	67	9	2	3	9	15	1	9	869
Norwegian University of Science and Technology	64	117	226	41	214	230	57	368	110	75	22	95	96	257	48	79	2101
Oslo and Akershus University College of Applied Sciences	1	1	3	2	2	18	8	2	1	40	4	0	7	6	11	46	153
University College of Southeast Norway	3	8	2	2	2	7	4	16	3	7	1	0	1	5	2	2	66
University of Agder	1	2	1	7	5	2	7	12	3	6	9	2	11	5	2	12	86
University of Bergen	91	177	358	24	65	406	40	66	272	133	56	4	76	103	71	65	2008
University of Oslo	91	206	576	51	265	514	30	68	193	201	129	38	127	347	94	185	3117
University of Stavanger	4	3	6	13	11	9	6	41	5	7	4	1	9	2	12	14	147
University of Tromsø	85	110	173	10	55	133	7	17	85	40	27	1	19	51	41	28	881
St. Olavs Hospital	1	1	46		1	177	1	1		19		0	0	4	2	0	253
University Hospital North Norway	0	0	36		0	113	1	0		28				1	3	2	183
Bergen University Hospital	1	2	114		1	366		2	0	25	0		0	2	8	1	524
Oslo University Hospital	7	7	473	0	10	1099	3	10	0	98	0	0	2	3	14	4	1730
HES Other	12	36	8	4	1	13	3	13	28	19	9	0	2	10	6	12	176
Other	651	406	486	101	188	503	71	410	712	234	30	89	53	147	69	217	4368
HES Total	747	800	2222	276	656	3129	181	650	771	765	271	145	368	809	330	505	12626
Norway	1399	1207	2708	377	844	3633	251	1060	1484	999	301	234	421	956	398	721	16994

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Blekinge Institute of Technology	0		0	0	0	3	24	25	1	7	3	0	6	9	0	2	80
Borås University College	0	1	4	2	3	4	6	6	0	13	0	3	1	10	0	11	64
Chalmers University of Technology	26	14	98	35	335	19	49	547	62	6	2	169	156	621	2	26	2166
Gävle University College	0	1	12	2	0	6	2	10	2	15	2	1	2	2	8	4	67
Jönköping University	0		6	16	0	15	1	15	0	12		2	5	2	4	7	86
Karlstad University	8	5	14	12	17	6	1	27	6	17	6	39	10	28	7	11	213
Karolinska Institutet	20	35	1866	2	70	1753	13	20	11	494	3	3	7	28	80	38	4441
Linköping University	30	26	262	31	124	347	66	220	40	161	13	81	69	375	33	56	1934
Linnaeus University	22	39	55	11	15	13	4	22	24	16	4	11	29	44	2	20	332
Luleå University of Technology	22	1	5	13	46	8	8	153	54	20	4	54	33	72	3	14	510
Lund University	231	302	1104	60	552	709	56	360	261	212	62	106	124	661	62	114	4974
Malmö University College	1	2	10	1	9	82	2	7	1	13	5	5	3	20	5	15	183
Mid Sweden University	12	9	11	8	18	5	3	26	12	17	2	22	10	32	6	11	203
Mälardalen University College	2	2	5	5	5	9	12	15	1	17	3	2	6	5	3	4	96
Royal Institute of Technology (KTH)	43	17	178	15	486	38	75	602	105	11	22	299	138	891	9	45	2973
Stockholm School of Economics		2	2	101		8	1	4	1	8	1		6		6	32	172
Stockholm University	74	212	492	73	402	92	14	50	303	81	67	42	63	332	76	151	2525
Swedish University of Agricultural Sciences	964	294	385	12	83	32	10	68	128	17	2	22	14	9	3	15	2057
Södertörns University College	5	12	32	0	16	7	0		2	5	11		0	0	2	8	100
Umeå University	66	141	476	30	116	428	22	60	67	177	17	18	60	173	44	77	1971
University of Gothenburg	60	210	756	70	161	876	15	64	183	190	56	41	64	247	72	129	3195
Uppsala University	128	305	1169	57	444	591	58	216	223	141	72	137	145	736	87	123	4633
Örebro University	11	5	24	9	15	39	10	24	26	31		1	3	11	10	27	244
Karolinska University Hospital	6	7	631	0	13	1341	1	7	1	111	0	1	0	4	16	4	2144
Linköping University Hospital	1	1	83	0	4	264	2	6	1	36	0	1		2	2	2	403
Sahlgrenska University Hospital	1	1	200		2	897	0	8	6	71	1	1	0	6	10	2	1207
Skåne University Hospital	2	3	384	1	5	1278	2	17	14	130	2	4	0	11	11	5	1868
University Hospital of Umeå	0	1	65		2	235	1	4	1	22		0		0	4	1	336
Uppsala University Hospital	3	1	160		4	612	1	8	1	35	0	2	0	1	8	1	836
Örebro University Hospital	1	0	40	1	0	171	0	2	3	33			0	1	6	2	260
HES Other	11	13	25	18	9	34	22	36	8	61	5	13	11	26	21	23	335
Other	390	165	1104	100	437	1425	64	686	366	394	44	309	61	362	69	120	6097
HES Total	1750	1663	8551	585	2954	9921	482	2627	1547	2179	364	1080	966	4357	603	981	40610
Sweden	2140	1828	9656	685	3391	11346	546	3313	1913	2573	408	1388	1027	4719	672	1101	46707

*Data from Clarivate Analytics

Table A.10: Number of fractionalised publications (2007-2010)*

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Aalborg University	96	15	179	44	45	94	59	339	46	41	33	63	55	116	12	98	1335
Aarhus University	514	330	780	122	348	472	50	91	258	158	171	70	102	462	90	220	4237
Copenhagen Business School	2		0	177	0	1	9	12	2	3	26		2	2	3	87	326
Roskilde University	11	22	39	7	32	3	9	8	18	2	26	4	9	42	4	83	321
Technical University of Denmark	288	128	529	21	450	83	75	802	249	56	2	268	73	813	2	27	3865
University of Copenhagen	755	488	1841	111	330	1418	65	78	389	404	223	40	149	490	55	335	7173
University of Southern Denmark	22	66	388	62	147	289	27	41	39	214	78	20	39	129	18	85	1662
Aalborg University Hospitals	3		46		2	131	1	8	0	19	1		1	3	1	1	216
Aarhus University Hospitals	5	5	280	0	6	1110	1	12	2	87	4	7	0	4	21	4	1547
Copenhagen University Hospitals	7	6	600	0	7	1814	2	10	3	240	1	1	2	13	24	8	2738
University of Southern Denmark Hospitals	1	0	95	0	1	305	0	2	1	17		1	0	0	1	1	427
HES Other	1	1		2	1	1	26	4	1	1	7	0	7	0	1	6	59
Other	220	87	1021	50	175	1036	25	224	348	340	89	51	31	139	34	162	4034
HES Total	1705	1063	4777	547	1370	5722	323	1407	1008	1242	571	474	439	2072	232	953	23906
Denmark	1925	1150	5798	597	1545	6758	348	1631	1357	1583	661	524	470	2212	266	1115	27940
Aalto University	27	10	95	154	223	54	133	587	46	9	24	201	124	569	14	55	2325
Hanken School of Economics	0			52			2	5	1	1	1		2		1	10	75
Lappeenranta University of Technology	12	1	4	35	34	1	17	147	7	2	2	13	9	52	2	8	345
Tampere University of Technology	6	10	44	8	75	22	61	286	17	9	2	72	25	197	1	8	842
University of Eastern Finland	203	87	414	13	147	300	29	102	112	100	17	47	50	148	16	67	1851
University of Helsinki	513	446	1219	69	340	592	40	74	353	209	220	55	127	407	115	253	5033
University of Jyväskylä	39	132	127	36	157	65	31	57	29	114	52	31	96	283	90	94	1432
University of Lapland	1	7	0	2		0	1	1	12	6	3				0	18	52
University of Oulu	62	93	272	30	89	318	37	195	124	66	26	63	80	197	12	52	1716
University of Tampere	4	6	165	32	4	298	46	14	2	103	40	2	29	3	38	128	913
University of Turku	76	165	381	52	128	365	49	61	57	119	69	35	63	228	58	97	2003
University of Vaasa	0		0	22	1	2	5	12		0	5		12	2	1	5	67
Åbo Akademi University	26	30	114	13	194	28	36	116	28	19	22	95	23	33	26	62	865
Helsinki University Hospital	2	3	276	0	1	1085	1	8	0	45	0	4	0	3	17	5	1450
Kuopio University Hospital	1	1	87	1	1	271	1	7	0	33	0	0		3	4	0	409
Oulu University Hospital	1	1	44	0	1	234	0	3	0	23	0	0		2	7	2	317
Tampere University Hospital	0	2	108	0	1	286	1	6	0	31	0	1	0	2	8	1	447
Turku University Hospital	0	1	63		0	240	0	3	0	23	1	2	0	1	6	1	342
HES Other	13	12	32	15	8	57	42	29	6	24	16	6	14	100	5	17	395
Other	714	271	804	136	164	1276	73	503	601	678	46	167	27	286	77	163	5986
HES Total	986	1006	3446	533	1403	4218	532	1709	796	934	500	629	655	2230	420	882	20880
Finland	1699	1277	4250	669	1568	5494	605	2212	1397	1612	546	796	682	2516	498	1045	26866

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Agricultural University of Iceland	12	1	0					0	3	0							17
Reykjavik University		1	1	4	0	1	19	20	2	4	1		17	6	4	5	84
University of Akureyri	4	0	1	1	2	1		1	4	11	5			2	4	10	46
University of Iceland	37	39	105	7	37	87	7	28	121	48	37	9	24	77	34	45	742
Landspítali University Hospital	2	1	32	1	1	155	0	1	0	21	0	0	0	0	6	4	225
HES Other	4	2	1	1							2					1	9
Other	55	33	46	2	5	52	1	10	60	15	11	3	6	3	3	8	310
HES Total	58	44	140	13	39	245	26	50	130	84	45	9	41	84	49	65	1122
Iceland	113	77	185	14	44	297	27	60	190	99	56	12	46	87	51	72	1432
Nord University	22	15	13	8	0	3	4	2	3	10	4			0	3	25	111
Norwegian Business School				91		0	12	5		1	8		1		10	29	158
Norwegian School of Economics and Business Administration	4	1	0	91		0	2	10	3	2	9		8	3	4	30	165
Norwegian School of Sport Sciences	1		12			31		1		86	1			0	5	17	153
Norwegian University of Life Sciences	464	146	230	15	26	22	5	26	93	12	4	6	14	11	2	41	1117
Norwegian University of Science and Technology	81	144	299	61	266	347	97	688	166	170	58	147	165	384	72	186	3329
Oslo and Akershus University College of Applied Sciences	1	2	9	9	4	14	7	4	1	55	8	0	9	7	14	83	227
University College of Southeast Norway	6	6	3	5	3	16	7	26	4	30	3	3	8	18	5	13	155
University of Agder	2	1	7	14	3	4	10	31	1	20	11	3	11	6	4	26	155
University of Bergen	93	193	420	33	80	519	62	98	317	196	121	10	115	97	99	150	2602
University of Oslo	72	227	716	73	268	726	60	104	341	293	215	63	171	373	116	337	4156
University of Stavanger	16	6	19	33	11	21	4	106	9	25	14	2	11	9	23	54	364
University of Tromsø	74	154	219	25	56	227	14	30	113	101	75	1	28	53	42	75	1285
St. Olavs Hospital	1	1	55		1	200	1	4		29		0	0	3	8	2	303
University Hospital North Norway	1	1	40	1	1	141	1	0	0	42	0		0	1	5	5	237
Bergen University Hospital	1	2	144	1	2	489	0	2	1	46	1	0	0	2	12	2	705
Oslo University Hospital	4	5	506	1	10	1392	3	15	2	142	1	2	3	7	26	10	2128
HES Other	15	48	16	20	2	20	14	54	44	64	38	1	9	18	13	88	464
Other	688	474	557	147	182	654	80	570	927	356	49	115	54	176	100	432	5561
HES Total	856	951	2708	479	733	4171	302	1205	1099	1324	571	238	552	992	463	1172	17815
Norway	1544	1425	3265	626	915	4825	382	1775	2025	1680	620	353	606	1168	563	1604	23376

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Blekinge Institute of Technology	0	0		1	0	5	31	36	3	10	1		9	21	1	6	125
Borås University College	0	1	7	4	13	6	5	11	0	22	1	8	1	13		29	122
Chalmers University of Technology	25	17	119	37	301	21	55	575	81	13	7	181	127	533	4	37	2134
Gävle University College	1	1	6	7	1	8	3	27	4	23	5	1	3	3	10	16	117
Jönköping University	0	0	4	29	1	36	6	38		42	3	7	9	3	2	19	198
Karlstad University	11	8	18	20	15	14	3	38	11	36	8	29	18	26	10	22	286
Karolinska Institutet	12	41	2122	6	62	2368	6	25	19	743	8	7	10	21	125	65	5642
Linköping University	28	31	293	39	112	418	71	240	31	207	43	111	74	344	65	153	2259
Linnaeus University	16	38	77	29	19	22	13	34	37	42	23	15	35	57	7	42	505
Luleå University of Technology	20	3	13	24	48	10	9	225	56	39	6	64	38	82	4	28	668
Lund University	194	359	1174	116	434	1135	58	388	264	298	125	123	106	589	79	216	5657
Malmö University College	1	4	24	1	18	107	4	6	2	27	13	5	2	13	4	27	258
Mid Sweden University	16	7	12	11	11	10	1	47	14	50	4	34	15	35	3	40	311
Mälardalen University College	2	1	5	9	2	8	13	26	4	31	4	0	6	3	5	24	145
Royal Institute of Technology (KTH)	49	24	226	39	469	64	82	737	140	22	56	275	205	863	4	63	3319
Stockholm School of Economics		2	3	117		9	1	5	0	5	4		4		3	28	180
Stockholm University	87	270	468	110	388	91	17	56	388	91	171	63	95	343	73	276	2987
Swedish University of Agricultural Sciences	982	367	327	16	64	29	7	54	162	21	6	23	17	12	2	47	2135
Södertörns University College	7	12	35	3	1	2	0		3	8	29			0	2	34	136
Umeå University	66	135	499	48	115	477	32	79	115	305	40	21	80	201	50	151	2413
University of Gothenburg	72	217	788	124	134	992	16	68	180	282	89	32	76	163	78	265	3576
Uppsala University	93	304	1228	82	418	736	57	258	247	207	121	151	172	669	97	214	5057
Örebro University	10	4	36	16	26	59	11	24	17	76	14	2	3	11	33	66	406
Karolinska University Hospital	2	4	371	0	7	934	0	6	1	78	1	1	0	2	15	5	1427
Linköping University Hospital	0	0	60		3	240	0	3	1	26	0	1		1	1	1	337
Sahlgrenska University Hospital	1	3	173	0	3	753	0	7	6	71	1	1	1	5	8	2	1034
Skåne University Hospital	3	2	243	0	6	929	3	8	8	98	0	1	1	8	8	3	1322
University Hospital of Umeå	0	1	43		2	221	1	5	0	22		0	0	0	2	1	299
Uppsala University Hospital	3	3	149	0	2	591	0	5	2	42	0	1	0	0	6	2	809
Örebro University Hospital	1	2	49	0	1	170	1	2	4	36	0			1	3	3	274
HES Other	7	23	31	15	4	59	24	60	6	111	12	19	7	28	22	53	479
Other	348	205	973	145	331	1389	54	658	385	457	79	256	45	356	50	189	5920
HES Total	1710	1885	8600	904	2680	10521	530	3093	1809	3083	797	1176	1113	4053	727	1940	44620
Sweden	2057	2090	9573	1049	3011	11911	584	3750	2194	3540	876	1432	1158	4408	777	2130	50540

*Data from Clarivate Analytics

Table A.11: Number of fractionalised publications (2011-2014)*

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Aalborg University	37	23	178	43	65	136	94	631	64	88	49	62	40	129	35	182	1857
Aarhus University	682	423	969	231	469	654	70	176	401	266	272	125	137	542	144	397	5959
Copenhagen Business School	2	0	2	229		4	11	11	1	8	44		2		10	138	462
Roskilde University	12	28	44	14	29	8	9	6	20	14	38	6	7	52	4	134	424
Technical University of Denmark	321	177	617	38	627	113	107	1198	327	67	4	382	80	948	8	64	5078
University of Copenhagen	896	512	2444	127	478	2064	80	105	437	592	319	62	188	595	101	467	9470
University of Southern Denmark	37	69	463	129	164	482	34	102	72	330	109	35	50	212	45	177	2511
Aalborg University Hospitals	3	1	67		1	257	2	10	3	46		1	0	2	3	3	399
Aarhus University Hospitals	9	7	357	0	6	1503	0	10	3	144	3	5	1	7	24	4	2082
Copenhagen University Hospitals	8	10	757	1	14	2668	2	11	10	308	1	2	1	13	37	13	3854
University of Southern Denmark Hospitals	0	1	156		3	567	0	2	2	46	0	1	0	1	5	1	785
HES Other	2	4	1	1	2	3	36	3	3	5	10	0	6	1		12	89
Other	225	85	953	61	171	1312	25	298	381	420	102	53	15	139	40	165	4445
HES Total	2011	1256	6056	814	1859	8457	445	2264	1343	1913	850	681	513	2503	414	1593	32970
Denmark	2236	1341	7009	874	2030	9769	470	2562	1724	2333	952	734	527	2642	454	1757	37415
Aalto University	42	17	126	189	293	66	171	799	74	10	34	272	128	731	33	97	3081
Hanken School of Economics	2		1	105		2	4	5		2	2		1		2	19	146
Lappeenranta University of Technology	20	4	11	52	47	0	15	250	28	3	1	54	8	73	2	14	583
Tampere University of Technology	4	18	74	27	99	19	73	343	24	8	3	102	31	227	2	15	1068
University of Eastern Finland	180	94	445	18	98	303	29	103	110	141	45	44	48	126	24	95	1902
University of Helsinki	546	558	1297	63	293	646	42	103	470	245	369	81	197	419	172	408	5911
University of Jyväskylä	30	151	142	49	177	81	38	74	38	130	88	42	117	291	119	178	1746
University of Lapland	3	9	0	7	0	0	0		15	5	11		0	0	1	36	88
University of Oulu	69	102	258	53	82	297	55	258	105	83	37	86	83	201	20	114	1906
University of Tampere	2	10	158	27	5	288	34	11	3	140	52	4	25	2	47	165	973
University of Turku	89	188	391	75	139	402	63	70	52	128	88	37	72	198	74	135	2198
University of Vaasa	1	1	2	58	0	1	4	22	2	1	3		10	2	1	10	119
Åbo Akademi University	24	42	126	17	186	29	27	167	32	22	39	102	18	28	25	57	943
Helsinki University Hospital	1	2	201	0	2	1009	0	5	0	46	0	1	0	2	13	2	1288
Kuopio University Hospital	1	1	87	2	1	216	0	6	1	34	0	0	0	2	3	2	358
Oulu University Hospital	0	1	55	0	0	275	0	2	1	27	1	0	0	2	7	3	375
Tampere University Hospital	1	1	92	0	2	297	0	2	0	26		1	0	1	9	1	434
Turku University Hospital	0	0	72	0	1	271	1	2	0	36	1	1	0	1	4	1	392
HES Other	15	19	49	23	12	63	34	34	10	40	16	13	11	103	6	26	472
Other	666	269	799	134	178	1221	75	582	671	609	48	200	20	308	75	221	6076
HES Total	1030	1218	3587	765	1437	4268	590	2256	967	1127	791	843	748	2410	566	1380	23983
Finland	1696	1488	4386	900	1615	5489	665	2838	1638	1736	838	1042	768	2718	641	1601	30059

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Agricultural University of Iceland	18	4	0						5	0	0					1	28
Reykjavik University	0	2	9	10	0	3	21	43	2	6	1	2	10	15	6	9	138
University of Akureyri	2	0	6	3	4	4	1	2	2	10	2			2	1	11	49
University of Iceland	43	61	112	18	42	151	9	47	137	76	61	14	14	113	30	69	995
Landspítali University Hospital	2	1	29	1	1	163	0	1	1	30	0	0	1		5	2	236
HES Other	4	8	2	0							1				0	2	17
Other	51	40	43	2	6	53	1	20	66	22	22	4	2	3	6	11	352
HES Total	70	76	159	31	46	320	31	93	147	122	64	16	24	130	42	92	1463
Iceland	121	116	201	33	52	373	32	112	212	144	86	20	26	133	48	103	1814
Nord University	28	25	32	10	0	4	2	4	5	36	6	0	2	0	2	33	187
Norwegian Business School	0	0	0	116		1	4	6	2	3	6		4		23	31	197
Norwegian School of Economics and Business Administration	6	1	1	90			1	12	2	1	12		8	3	5	25	166
Norwegian School of Sport Sciences	0	0	19	1	1	33	0	2	0	132	4			0	8	19	221
Norwegian University of Life Sciences	512	164	290	21	26	25	6	45	97	33	5	6	18	19	7	69	1342
Norwegian University of Science and Technology	117	155	338	78	280	437	117	1048	234	266	112	198	170	438	84	249	4321
Oslo and Akershus University College of Applied Sciences	3	3	16	15	2	35	5	6	4	90	18	0	11	21	15	128	372
University College of Southeast Norway	6	11	8	7	15	24	10	59	10	48	16	20	4	29	9	26	302
University of Agder	4	2	7	22	1	12	27	95	2	48	31	2	44	9	11	53	370
University of Bergen	83	196	443	37	83	559	89	118	353	227	120	10	121	126	120	203	2889
University of Oslo	85	247	782	77	299	857	57	132	385	374	292	72	163	415	203	485	4925
University of Stavanger	19	7	18	39	14	21	6	150	18	40	22	3	20	19	14	64	473
University of Tromsø	74	141	240	28	74	278	17	31	157	173	115	4	34	70	34	102	1572
St. Olavs Hospital	1	0	56	0	1	214	0	4	0	47	1	0		3	7	4	339
University Hospital North Norway	0	1	45		0	158	4	0	1	57	1		1	0	5	3	276
Bergen University Hospital	2	3	154	2	2	533	1	3	1	63	1		0	3	23	4	794
Oslo University Hospital	4	9	562	3	12	1430	2	16	2	181	1	4	3	8	47	18	2300
HES Other	25	56	19	32	2	34	11	41	59	129	83	4	15	22	19	135	686
Other	764	579	625	216	195	886	86	723	1074	600	92	143	66	197	167	629	7043
HES Total	968	1021	3030	576	811	4653	361	1773	1331	1947	845	323	619	1186	635	1652	21731
Norway	1732	1599	3655	792	1006	5539	447	2496	2405	2547	936	466	685	1383	802	2281	28774

Organisation	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Infor- mation Sciences	Engineering	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences	Total
Blekinge Institute of Technology		1	0	6		8	42	48	4	19		1	4	16	2	13	164
Borås University College	1	0	16	7	33	14	12	28	5	28	5	28	2	9	1	28	217
Chalmers University of Technology	23	40	199	54	365	36	85	861	99	29	8	218	93	618	6	61	2793
Gävle University College	1	1	6	4		10	2	31	9	46	3		4	3	18	19	156
Jönköping University	0	0	2	51	1	35	5	22	0	76	2	8	15	3	3	35	259
Karlstad University	14	18	19	37	20	19	2	44	9	49	11	22	22	26	11	59	382
Karolinska Institutet	14	43	2138	3	81	2880	8	26	27	910	12	18	16	24	191	76	6468
Linköping University	34	37	352	70	160	612	84	355	54	283	63	195	79	427	84	209	3098
Linnaeus University	19	48	71	35	21	24	7	52	33	50	38	14	31	46	9	55	554
Luleå University of Technology	33	3	18	36	64	9	15	309	93	49	4	96	37	89	8	35	896
Lund University	197	305	1230	175	444	1639	72	565	301	449	211	168	100	559	110	347	6871
Malmö University College	0	3	18	3	24	150	3	15	2	41	34	12	3	11	4	56	379
Mid Sweden University	15	9	17	18	17	22	6	69	10	92	4	50	12	35	8	61	446
Mälardalen University College	4	0	3	5	3	12	22	63	9	38	6	4	4	3	6	28	210
Royal Institute of Technology (KTH)	48	26	234	66	570	83	122	1170	145	41	47	377	173	941	6	122	4172
Stockholm School of Economics		1	2	112		6	0	4	0	2	4		2	0	2	21	156
Stockholm University	84	258	468	149	399	126	19	73	486	155	291	74	87	404	107	433	3612
Swedish University of Agricultural Sciences	1190	445	390	25	65	32	6	97	230	41	13	19	15	12	1	86	2667
Södertörns University College	3	4	9	3	1	3	0	3	5	8	48				1	55	143
Umeå University	95	122	554	67	111	669	35	89	124	423	80	42	80	151	73	226	2939
University of Gothenburg	70	202	901	161	141	1245	23	69	170	393	167	31	76	162	128	453	4392
Uppsala University	99	286	1359	132	437	1196	73	305	275	268	211	230	191	700	112	315	6190
Örebro University	11	3	58	23	14	98	14	23	26	78	13	2	4	5	55	100	528
Karolinska University Hospital	1	4	281		7	765	0	5	1	72	0	1	1	2	6	4	1152
Linköping University Hospital	0	1	22	0	2	120	0	1	1	21	0	0		0	2	1	171
Sahlgrenska University Hospital	1	3	121	0	1	579	0	6	5	81	1	2	0	1	4	2	807
Skåne University Hospital	1	0	126	0	1	542	0	3	4	64	0	1	0	2	3	2	750
University Hospital of Umeå		0	13		0	72		0	0	8	0	0		0	2	0	96
Uppsala University Hospital	1	1	66	0	2	302	0	3	3	33	0	1	0	1	5	1	418
Örebro University Hospital	1	3	54	0	0	178	1	1	2	26	0	0	0	0	1	2	269
HES Other	6	17	32	29	3	85	24	75	13	163	34	23	11	15	30	96	655
Other	348	197	962	161	289	1459	76	725	469	538	124	232	31	394	55	247	6306
HES Total	1964	1883	8778	1272	2990	11571	683	4415	2145	4035	1313	1638	1061	4263	1001	3000	52013
Sweden	2312	2080	9740	1433	3279	13030	759	5140	2614	4572	1437	1870	1093	4657	1056	3246	58319

*Data from Clarivate Analytics

Appendix 6: Relative Specialisation Index (RSI) in 2011-2014
(Size level reflected by darkness of colour)*

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	-0.4	-0.5	-0.3	0.2	-0.5	-0.4	0.5	0.6	-0.1	0.1	0.0	-0.1	-0.2	-0.2	0.0	0.5
Aarhus University	0.4	0.3	0.0	0.4	-0.1	-0.2	-0.2	-0.5	0.2	0.1	0.3	-0.3	-0.2	-0.1	0.1	0.3
Copenhagen Business School	-0.9	-1.0	-1.0	0.9		-0.9	0.1	-0.6	-0.9	-0.4	0.6		-0.8		0.1	0.8
Roskilde University	-0.3	0.3	-0.2	0.3	-0.2	-0.8	0.1	-0.7	0.0	-0.1	0.6	-0.5	-0.3	0.1	-0.4	0.8
Technical University of Denmark	0.1	0.0	-0.1	-0.4	0.1	-0.8	0.1	0.4	0.2	-0.5	-0.9	0.3	-0.3	0.3	-0.9	-0.5
University of Copenhagen	0.3	0.2	0.2	-0.1	-0.3	0.1	-0.4	-0.8	0.0	0.2	0.2	-0.7	-0.2	-0.3	-0.3	0.1
University of Southern Denmark	-0.6	-0.1	0.1	0.5	-0.2	0.0	-0.1	-0.4	-0.2	0.5	0.3	-0.5	-0.2	-0.1	0.0	0.3
Aalborg University Hospitals	-0.7	-0.8	0.0		-0.9	0.6	-0.5	-0.6	-0.7	0.5		-0.9	-0.9	-0.9	-0.4	-0.7
Aarhus University Hospitals	-0.8	-0.8	0.0	-1.0	-0.9	0.6	-1.0	-0.9	-0.9	0.3	-0.9	-0.9	-1.0	-0.9	-0.2	-0.9
Copenhagen University Hospitals	-0.9	-0.9	0.1	-1.0	-0.9	0.6	-1.0	-0.9	-0.9	0.3	-1.0	-1.0	-1.0	-0.9	-0.3	-0.8
University of Southern Denmark Hospitals	-1.0	-0.9	0.1		-0.9	0.6	-1.0	-1.0	-0.9	0.2	-1.0	-1.0	-1.0	-1.0	-0.5	-0.9
HES Other	-0.4	0.2	-0.9	-0.2	-0.7	-0.7	0.9	-0.5	-0.2	0.1	0.6	-0.8	0.4	-0.7		0.6
Other	0.0	-0.3	0.1	-0.1	-0.4	0.2	-0.5	-0.2	0.3	0.4	0.0	-0.5	-0.8	-0.5	-0.3	0.0
HES Total	0.1	0.0	-0.1	0.2	-0.3	-0.1	-0.2	-0.2	-0.1	0.0	0.0	-0.3	-0.4	-0.2	-0.3	0.1
Denmark	0.0	0.0	-0.1	0.1	-0.3	-0.1	-0.3	-0.2	-0.1	0.0	-0.1	-0.4	-0.4	-0.2	-0.3	0.1
Aalto University	-0.6	-0.7	-0.6	0.6	0.0	-0.8	0.5	0.5	-0.3	-0.8	-0.4	0.4	0.1	0.4	-0.3	-0.1
Hanken School of Economics	-0.6		-1.0	1.0		-0.8	0.2	-0.4		-0.6	-0.3		-0.6		-0.1	0.6
Lappeenranta University of Technology	-0.2	-0.7	-0.8	0.7	-0.1	-1.0	0.2	0.6	0.0	-0.8	-0.9	0.4	-0.4	0.1	-0.6	-0.2
Tampere University of Technology	-0.9	-0.4	-0.4	0.2	0.0	-0.8	0.6	0.5	-0.3	-0.7	-0.8	0.4	-0.1	0.3	-0.8	-0.4
University of Eastern Finland	0.3	0.2	0.2	-0.3	-0.3	-0.1	-0.1	-0.3	0.1	0.3	0.0	-0.3	-0.1	-0.2	-0.2	0.2
University of Helsinki	0.3	0.5	0.1	-0.2	-0.3	-0.2	-0.4	-0.7	0.3	0.0	0.4	-0.5	0.0	-0.2	0.2	0.3
University of Jyväskylä	-0.5	0.4	-0.3	0.3	0.0	-0.6	0.1	-0.4	-0.3	0.3	0.3	-0.3	0.4	0.2	0.6	0.5
University of Lapland	-0.2	0.5	-1.0	0.7	-1.0	-1.0	-0.9		0.6	0.2	0.7		-0.8	-1.0	-0.4	0.8
University of Oulu	-0.2	0.2	-0.1	0.3	-0.4	-0.1	0.2	0.2	0.1	0.0	-0.1	0.1	0.2	0.0	-0.3	0.2
University of Tampere	-0.9	-0.6	0.0	0.3	-0.9	0.2	0.3	-0.8	-0.9	0.6	0.4	-0.8	-0.1	-1.0	0.4	0.6
University of Turku	-0.1	0.4	0.0	0.3	-0.2	0.0	0.2	-0.5	-0.3	0.2	0.2	-0.4	0.0	-0.1	0.3	0.2
University of Vaasa	-0.6	-0.7	-0.8	0.9	-1.0	-0.9	0.3	0.3	-0.4	-0.6	0.0		0.4	-0.7	-0.3	0.4
Åbo Akademi University	-0.3	0.1	-0.1	0.0	0.3	-0.7	0.2	0.3	-0.1	-0.3	0.3	0.5	-0.3	-0.6	0.2	0.2
Helsinki University Hospital	-1.0	-0.9	0.0	-1.0	-1.0	0.6	-1.0	-0.9	-1.0	-0.1	-1.0	-1.0	-1.0	-1.0	-0.3	-0.9
Kuopio University Hospital	-0.9	-0.8	0.2	-0.6	-0.9	0.5	-0.9	-0.7	-0.9	0.4	-0.9	-1.0	-1.0	-0.9	-0.3	-0.7
Oulu University Hospital	-1.0	-0.9	0.0	-1.0	-1.0	0.6	-1.0	-0.9	-0.9	0.3	-0.8	-0.9	-1.0	-0.9	0.0	-0.6
Tampere University Hospital	-0.9	-0.8	0.1	-1.0	-0.9	0.6	-0.9	-0.9	-1.0	0.2		-0.8	-1.0	-0.9	0.0	-0.9
Turku University Hospital	-1.0	-1.0	0.1	-0.9	-1.0	0.6	-0.8	-0.9	-1.0	0.4	-0.8	-0.9	-1.0	-1.0	-0.3	-0.9
HES Other	-0.3	0.1	-0.2	0.5	-0.6	-0.1	0.6	-0.1	-0.4	0.4	0.2	-0.2	-0.2	0.3	-0.2	0.2
Other	0.3	0.1	-0.1	0.1	-0.5	0.1	-0.2	0.0	0.4	0.4	-0.5	-0.1	-0.8	-0.4	-0.2	0.0
HES Total	-0.1	0.2	-0.1	0.3	-0.2	-0.3	0.1	0.0	-0.1	0.0	0.1	-0.1	0.0	0.0	0.1	0.2
Finland	-0.2	0.1	-0.2	0.2	-0.3	-0.4	0.0	-0.1	-0.2	-0.1	0.0	-0.2	-0.1	-0.2	0.0	0.1

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland	0.8	0.6	-0.9						0.6	-0.9	-0.9					-0.3
Reykjavik University	-0.9	-0.5	-0.4	0.6	-1.0	-0.8	0.8	0.5	-0.5	0.0	-0.5	-0.5	0.4	0.0	0.4	0.3
University of Akureyri	-0.2	-0.7	-0.1	0.6	-0.1	-0.4	0.1	-0.3	0.0	0.7	0.1			-0.5	-0.1	0.7
University of Iceland	-0.1	0.3	-0.2	0.0	-0.4	-0.1	-0.3	-0.3	0.5	0.3	0.4	-0.5	-0.4	0.0	0.2	0.3
Landspítali University Hospital	-0.7	-0.9	-0.1	-0.7	-0.9	0.6	-1.0	-1.0	-0.8	0.5	-1.0	-1.0	-0.9		0.1	-0.6
HES Other	0.6	0.9	-0.1	0.0							0.1				0.2	0.4
Other	0.5	0.5	-0.1	-0.5	-0.7	-0.1	-0.6	-0.3	0.6	0.2	0.4	-0.6	-0.7	-0.8	0.0	-0.1
HES Total	-0.1	0.1	-0.3	0.1	-0.5	-0.2	0.1	-0.2	0.4	0.2	0.3	-0.6	-0.3	-0.1	0.1	0.2
Iceland	-0.2	0.0	-0.4	0.0	-0.6	-0.3	0.0	-0.3	0.3	0.1	0.2	-0.6	-0.4	-0.2	0.0	0.1
Nord University	0.5	0.6	0.0	0.5	-1.0	-0.8	-0.2	-0.7	-0.3	0.7	0.1	-1.0	-0.6	-1.0	-0.3	0.7
Norwegian Business School	-0.9	-1.0	-1.0	0.9		-1.0	0.1	-0.5	-0.6	-0.4	0.1		-0.3		0.7	0.6
Norwegian School of Economics and Business Administration	-0.2	-0.6	-0.9	0.9			-0.4	-0.2	-0.6	-0.8	0.5		0.2	-0.7	0.2	0.6
Norwegian School of Sport Sciences	-1.0	-0.9	-0.3	-0.6	-1.0	-0.1	-1.0	-0.8	-0.9	0.9	-0.1			-1.0	0.3	0.4
Norwegian University of Life Sciences	0.8	0.6	0.1	0.0	-0.7	-0.8	-0.6	-0.5	0.2	-0.2	-0.7	-0.8	-0.4	-0.8	-0.6	0.2
Norwegian University of Science and Technology	-0.3	0.0	-0.4	0.0	-0.2	-0.3	0.2	0.4	0.1	0.2	0.0	0.1	0.1	0.0	0.0	0.2
Oslo and Akershus University College of Applied Sciences	-0.8	-0.6	-0.6	0.4	-0.9	-0.3	-0.1	-0.7	-0.6	0.7	0.3	-1.0	-0.1	-0.3	0.4	0.8
University College of Southeast Norway	-0.5	0.0	-0.7	0.2	-0.3	-0.4	0.3	0.3	-0.2	0.6	0.4	0.2	-0.4	0.0	0.2	0.4
University of Agder	-0.7	-0.8	-0.8	0.6	-1.0	-0.7	0.6	0.5	-0.8	0.5	0.5	-0.8	0.6	-0.6	0.2	0.6
University of Bergen	-0.3	0.3	0.0	-0.1	-0.5	0.0	0.3	-0.4	0.5	0.3	0.3	-0.8	0.1	-0.4	0.4	0.3
University of Oslo	-0.5	0.2	0.0	0.0	-0.2	0.0	-0.2	-0.6	0.3	0.3	0.4	-0.5	0.0	-0.1	0.4	0.5
University of Stavanger	-0.1	-0.4	-0.6	0.7	-0.5	-0.6	-0.2	0.5	-0.1	0.4	0.3	-0.7	0.1	-0.5	0.2	0.6
University of Tromsø	-0.1	0.4	0.0	0.0	-0.3	0.0	-0.3	-0.7	0.4	0.5	0.5	-0.9	-0.2	-0.4	0.1	0.3
St. Olavs Hospital	-0.9	-1.0	0.0	-1.0	-0.9	0.6	-0.9	-0.8	-1.0	0.6	-0.9	-1.0		-0.9	0.1	-0.6
University Hospital North Norway	-1.0	-0.8	0.0		-1.0	0.5	-0.2	-1.0	-0.9	0.7	-0.9		-0.8	-1.0	-0.1	-0.5
Bergen University Hospital	-0.9	-0.8	0.1	-0.7	-1.0	0.6	-0.9	-0.9	-1.0	0.3	-0.9		-1.0	-0.9	0.2	-0.8
Oslo University Hospital	-0.9	-0.8	0.2	-0.9	-0.9	0.6	-0.9	-0.9	-1.0	0.3	-1.0	-0.9	-0.9	-0.9	0.0	-0.6
HES Other	-0.2	0.4	-0.7	0.5	-1.0	-0.6	-0.1	-0.2	0.3	0.6	0.7	-0.8	-0.2	-0.5	0.2	0.7
Other	0.3	0.4	-0.3	0.3	-0.6	-0.2	-0.2	0.0	0.5	0.4	-0.3	-0.3	-0.5	-0.6	0.1	0.4
HES Total	-0.1	0.1	-0.2	0.2	-0.4	-0.3	-0.1	-0.1	0.1	0.3	0.2	-0.5	-0.1	-0.3	0.1	0.3
Norway	-0.2	0.0	-0.4	0.1	-0.6	-0.4	-0.2	-0.2	0.0	0.1	0.0	-0.6	-0.2	-0.5	0.0	0.2

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geosci- ences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology		-0.8	-1.0	0.4		-0.6	0.9	0.5	-0.3	0.5		-0.8	-0.2	0.0	-0.2	0.4
Borås University College	-0.8	-1.0	-0.4	0.3	0.2	-0.5	0.5	0.2	-0.4	0.5	0.0	0.5	-0.6	-0.5	-0.6	0.6
Chalmers University of Technology	-0.7	-0.4	-0.4	0.1	0.2	-0.9	0.2	0.5	-0.1	-0.6	-0.8	0.3	0.0	0.4	-0.8	-0.3
Gävle University College	-0.7	-0.7	-0.6	0.2		-0.5	-0.2	0.4	0.1	0.8	-0.1		-0.1	-0.7	0.7	0.5
Jönköping University	-1.0	-1.0	-0.9	0.8	-0.9	-0.1	0.0	-0.1	-0.9	0.8	-0.5	-0.1	0.3	-0.8	-0.2	0.6
Karlstad University	-0.2	0.2	-0.5	0.7	-0.3	-0.6	-0.6	0.1	-0.3	0.5	0.1	0.2	0.3	-0.2	0.2	0.6
Karolinska Institutet	-0.9	-0.7	0.3	-0.9	-0.8	0.4	-0.9	-0.9	-0.8	0.6	-0.9	-0.9	-0.9	-0.9	0.2	-0.5
Linköping University	-0.7	-0.5	-0.2	0.2	-0.3	0.0	0.2	0.1	-0.4	0.4	-0.1	0.2	-0.1	0.1	0.2	0.3
Linnaeus University	-0.2	0.4	-0.1	0.6	-0.4	-0.6	-0.2	0.0	0.1	0.4	0.5	-0.2	0.3	-0.1	-0.1	0.5
Luleå University of Technology	-0.2	-0.8	-0.8	0.4	-0.1	-0.9	-0.1	0.6	0.4	0.1	-0.7	0.4	0.1	0.0	-0.4	0.0
Lund University	-0.3	0.1	0.0	0.2	-0.2	0.1	-0.3	-0.1	0.0	0.2	0.1	-0.2	-0.4	-0.1	-0.1	0.2
Malmö University College	-1.0	-0.7	-0.6	-0.3	-0.2	0.4	-0.3	-0.4	-0.8	0.5	0.6	-0.1	-0.6	-0.6	-0.3	0.6
Mid Sweden University	-0.2	-0.3	-0.6	0.4	-0.4	-0.6	-0.2	0.2	-0.3	0.7	-0.4	0.5	-0.1	-0.1	0.0	0.6
Mälardalen University College	-0.5	-0.9	-0.8	0.2	-0.7	-0.5	0.7	0.5	0.0	0.6	0.0	-0.4	-0.3	-0.8	0.2	0.6
Royal Institute of Technology (KTH)	-0.6	-0.7	-0.5	0.0	0.2	-0.8	0.2	0.5	-0.1	-0.6	-0.4	0.4	0.1	0.4	-0.8	-0.1
Stockholm School of Economics		-0.8	-0.9	1.0		-0.7	-0.8	-0.6	-0.9	-0.5	0.0		-0.4	-1.0	-0.1	0.6
Stockholm University	-0.4	0.3	-0.1	0.4	0.1	-0.7	-0.6	-0.6	0.5	0.0	0.5	-0.3	-0.1	0.0	0.2	0.5
Swedish University of Agricultural Sciences	0.8	0.7	-0.1	-0.3	-0.6	-0.9	-0.8	-0.4	0.3	-0.4	-0.7	-0.7	-0.7	-0.9	-1.0	-0.1
Södertörns University College	-0.5	-0.1	-0.4	0.1	-0.9	-0.8	-0.9	-0.7	-0.1	0.2	0.9				-0.3	0.8
Umeå University	-0.2	0.1	0.1	0.2	-0.4	0.1	-0.2	-0.5	0.0	0.6	0.1	-0.5	-0.1	-0.3	0.1	0.4
University of Gothenburg	-0.5	0.1	0.1	0.4	-0.5	0.2	-0.6	-0.7	-0.1	0.4	0.2	-0.7	-0.3	-0.5	0.2	0.5
Uppsala University	-0.5	0.1	0.1	0.1	-0.2	0.0	-0.2	-0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2
Örebro University	-0.4	-0.7	-0.2	0.5	-0.6	0.0	0.2	-0.4	0.0	0.6	0.0	-0.9	-0.6	-0.8	0.7	0.7
Karolinska University Hospital	-1.0	-0.8	0.2		-0.9	0.6	-1.0	-0.9	-1.0	0.2	-1.0	-1.0	-1.0	-1.0	-0.6	-0.8
Linköping University Hospital	-1.0	-0.8	-0.1	-0.9	-0.8	0.6	-1.0	-0.9	-0.8	0.5	-1.0	-0.9		-1.0	-0.2	-0.8
Sahlgrenska University Hospital	-1.0	-0.8	0.0	-1.0	-1.0	0.6	-1.0	-0.9	-0.8	0.4	-0.9	-0.9	-1.0	-1.0	-0.6	-0.9
Skåne University Hospital	-0.9	-1.0	0.0	-1.0	-1.0	0.6	-1.0	-0.9	-0.8	0.4	-1.0	-1.0	-1.0	-0.9	-0.7	-0.9
University Hospital of Umeå		-1.0	-0.1		-1.0	0.6		-0.9	-0.9	0.3	-1.0	-1.0		-1.0	0.2	-0.9
Uppsala University Hospital	-0.9	-0.9	0.0	-0.9	-0.9	0.6	-1.0	-0.9	-0.7	0.3	-0.9	-0.9	-1.0	-1.0	-0.2	-0.9
Örebro University Hospital	-0.9	-0.6	0.1	-0.9	-1.0	0.6	-0.6	-0.9	-0.7	0.4	-0.9	-1.0	-1.0	-1.0	-0.8	-0.6
HES Other	-0.7	-0.1	-0.5	0.5	-0.9	-0.2	0.3	0.1	-0.4	0.7	0.4	-0.1	-0.3	-0.6	0.4	0.6
Other	0.0	-0.1	0.0	0.2	-0.4	0.1	-0.2	0.1	0.3	0.4	-0.1	-0.1	-0.7	-0.3	-0.4	0.0
HES Total	-0.2	0.0	0.0	0.2	-0.3	0.0	-0.2	-0.1	0.0	0.3	0.0	-0.1	-0.2	-0.1	0.0	0.2
Sweden	-0.2	0.0	-0.1	0.1	-0.3	-0.1	-0.2	-0.1	-0.1	0.2	-0.1	-0.2	-0.3	-0.2	-0.1	0.1

*Data from Clarivate Analytics

The higher activity (compared to the world average) a university, university college or university hospital has, the greener the colour. The lower activity (compared to the world average), the more yellow the colour.

Appendix 7: Volume, share of highly cited papers and average citation rate for national and international co-publications (2011-2014)

Organisation	Volume*		Share of highly cited papers*		Average citation rate*	
	Publi-cations without in-ternational co-authors	Publi-cations with inter-national co-authors	Public-ations without in-ternational co-authors	Publi-cations with inter-national co-authors	Publi-cations without in-ternational co-authors	Publi-dcations with inter-national co-authors
Aalborg University	1173	683	11 %	15 %	1.14	1.58
Aarhus University	3667	2291	12 %	15 %	1.13	1.35
Copenhagen Business School	290	172	11 %	22 %	1.08	1.92
Roskilde University	319	105	11 %	14 %	1.00	1.23
Technical University of Denmark	3161	1917	15 %	17 %	1.38	1.53
University of Copenhagen	5819	3651	13 %	16 %	1.17	1.47
University of Southern Denmark	1533	978	9 %	14 %	1.01	1.31
Aalborg University Hospitals	289	110	8 %	14 %	0.83	1.27
Aarhus University Hospitals	1526	555	11 %	17 %	1.11	1.39
Copenhagen University Hospitals	2904	950	11 %	16 %	1.07	1.47
University of Southern Denmark Hospitals	595	190	8 %	17 %	0.90	1.46
HES Other	50	39	12 %	13 %	1.21	1.07
Other	2760	1684	11 %	16 %	1.01	1.44
HES Total	21327	11643	12 %	16 %	1.15	1.45
Denmark	24087	13328	12 %	16 %	1.13	1.45

Organisation	Volume*		Share of highly cited papers*		Average citation rate*	
	Publi-cations without in-ternational co-authors	Publi-cations with inter-national co-authors	Public-ations without in-ternational co-authors	Publi-cations with inter-national co-authors	Publi-cations without in-ternational co-authors	Publi-dcations with inter-national co-authors
Aalto University	1960	1121	10 %	14 %	1.05	1.34
Hanken School of Economics	95	51	17 %	21 %	1.67	1.66
Lappeenranta University of Technology	417	165	9 %	11 %	0.89	1.14
Tampere University of Technology	681	387	8 %	11 %	0.87	1.17
University of Eastern Finland	1218	684	8 %	11 %	0.93	1.11
University of Helsinki	3718	2193	10 %	14 %	0.99	1.30
University of Jyväskylä	1120	626	9 %	10 %	1.04	1.14
University of Lapland	69	20	3 %	12 %	0.63	1.30
University of Oulu	1241	665	8 %	11 %	0.89	1.10
University of Tampere	731	242	8 %	11 %	0.83	1.15
University of Turku	1353	845	9 %	12 %	0.86	1.14
University of Vaasa	76	43	7 %	17 %	0.79	1.33
Åbo Akademi University	569	374	8 %	9 %	0.88	0.99
Helsinki University Hospital	938	351	9 %	14 %	0.97	1.41
Kuopio University Hospital	259	98	9 %	18 %	0.94	1.44
Oulu University Hospital	295	81	8 %	15 %	0.90	1.46
Tampere University Hospital	314	120	8 %	14 %	0.91	1.30
Turku University Hospital	290	102	13 %	17 %	1.11	1.43
HES Other	289	184	8 %	12 %	0.89	1.24
Other	4112	1964	9 %	13 %	0.94	1.25
HES Total	15632	8351	9 %	13 %	0.95	1.23
Finland	19744	10315	9 %	13 %	0.95	1.23

Organisation	Volume*		Share of highly cited papers*		Average citation rate*	
	Publi-cations without in-ternational co-authors	Publi-cations with inter-national co-authors	Public-ations without in-ternational co-authors	Publi-cations with inter-national co-authors	Publi-cations without in-ternational co-authors	Publi-dcations with inter-national co-authors
Agricultural University of Iceland	15	12	0 %	19 %	0.29	1.36
Reykjavik University	58	80	3 %	7 %	0.46	0.83
University of Akureyri	40	9	6 %	20 %	0.73	1.42
University of Iceland	518	477	6 %	12 %	0.84	1.19
Landspítali University Hospital	137	99	7 %	11 %	0.71	1.24
HES Other	4	12	0 %	9 %	0.58	0.84
Other	157	195	5 %	14 %	0.65	1.57
HES Total	773	689	6 %	11 %	0.77	1.15
Iceland	930	884	6 %	12 %	0.75	1.24
Nord University	129	58	6 %	15 %	0.93	1.66
Norwegian Business School	131	66	7 %	12 %	0.71	1.28
Norwegian School of Economics and Business Administration	108	58	9 %	15 %	0.83	1.28
Norwegian School of Sport Sciences	148	73	19 %	15 %	1.55	1.54
Norwegian University of Life Sciences	780	562	9 %	13 %	1.03	1.28
Norwegian University of Science and Technology	2993	1328	9 %	13 %	1.00	1.29
Oslo and Akershus University College of Applied Sciences	302	70	6 %	10 %	0.71	0.99
University College of Southeast Norway	225	77	7 %	7 %	0.85	0.88
University of Agder	221	148	5 %	12 %	0.81	1.37
University of Bergen	1692	1196	8 %	12 %	0.87	1.20
University of Oslo	3152	1773	9 %	14 %	0.94	1.30
University of Stavanger	338	135	13 %	11 %	1.03	1.11
University of Tromsø	1007	565	8 %	10 %	0.92	1.06
St. Olavs Hospital	255	84	7 %	13 %	0.90	1.29
University Hospital North Norway	199	76	9 %	11 %	1.03	1.19
Bergen University Hospital	540	255	9 %	15 %	0.97	1.31
Oslo University Hospital	1641	659	8 %	16 %	0.93	1.45
HES Other	461	225	6 %	12 %	0.68	1.09
Other	4504	2539	10 %	14 %	1.00	1.31
HES Total	14322	7409	9 %	13 %	0.94	1.26
Norway	18826	9948	9 %	13 %	0.95	1.27

Organisation	Volume*		Share of highly cited papers*		Average citation rate*	
	Publi-cations without in-ternational co-authors	Publi-cations with inter-national co-authors	Public-ations without in-ternational co-authors	Publi-cations with inter-national co-authors	Publi-cations without in-ternational co-authors	Publi-dcations with inter-national co-authors
Blekinge Institute of Technology	110	54	12 %	21 %	0.92	1.55
Borås University College	156	62	6 %	8 %	0.75	0.88
Chalmers University of Technology	1827	966	11 %	14 %	1.06	1.23
Gävle University College	116	40	7 %	8 %	0.79	0.80
Jönköping University	184	75	6 %	12 %	0.77	1.18
Karlstad University	270	112	6 %	13 %	0.76	1.16
Karolinska Institutet	3725	2743	12 %	16 %	1.14	1.47
Linköping University	2151	947	9 %	14 %	0.99	1.39
Linnaeus University	390	163	6 %	11 %	0.99	1.12
Luleå University of Technology	617	279	5 %	8 %	0.73	0.98
Lund University	4292	2579	10 %	13 %	0.98	1.31
Malmö University College	277	103	9 %	11 %	0.93	1.05
Mid Sweden University	349	97	7 %	9 %	0.77	0.90
Mälardalen University College	160	50	8 %	14 %	0.86	1.27
Royal Institute of Technology (KTH)	2591	1581	10 %	13 %	0.98	1.24
Stockholm School of Economics	85	71	10 %	16 %	1.04	1.54
Stockholm University	2272	1341	11 %	14 %	1.10	1.42
Swedish University of Agricultural Sciences	1626	1041	11 %	14 %	1.07	1.27
Södertörns University College	118	25	8 %	7 %	0.79	0.87
Umeå University	1979	960	9 %	13 %	0.92	1.26
University of Gothenburg	2912	1480	9 %	15 %	0.94	1.43
Uppsala University	3891	2299	10 %	13 %	1.02	1.27
Örebro University	406	122	8 %	12 %	0.89	1.26
Karolinska University Hospital	737	414	11 %	16 %	1.04	1.45
Linköping University Hospital	133	38	8 %	14 %	0.90	1.44
Sahlgrenska University Hospital	580	228	10 %	15 %	0.96	1.51
Skåne University Hospital	510	240	9 %	16 %	0.91	1.46
University Hospital of Umeå	67	28	9 %	18 %	0.86	1.48
Uppsala University Hospital	289	128	11 %	16 %	1.00	1.61
Örebro University Hospital	200	69	8 %	18 %	0.89	1.92
HES Other	492	163	7 %	11 %	0.77	1.13
Other	4086	2220	9 %	13 %	0.96	1.26
HES Total	33514	18499	10 %	14 %	0.99	1.33
Sweden	37600	20718	10 %	14 %	0.99	1.33

*Data from Clarivate Analytics

Appendix 8: Field normalised citation rates of HE sector institutions across subject fields

Table A.12: Field normalised citation rates of HE sector institutions (1999-2002) across subject fields*

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	1.67		0.66	0.65		0.61	1.15	1.71						1.16		
Aarhus University	1.31	1.16	0.93	0.54	1.93	1.06		1.43	1.07	0.97	0.99		1.07	1.72		1.26
Copenhagen Business School				0.89												
Roskilde University																
Technical University of Denmark	1.83	1.40	1.07		1.47		1.18	1.63	1.08			1.47	1.47	1.53		
University of Copenhagen	1.32	1.18	0.82	0.93	1.22	1.08	1.46	1.49	1.14	1.20	0.91		1.63	1.19		1.06
University of Southern Denmark		1.37	1.38		1.63	1.32				0.99			1.43	1.38		
Aalborg University Hospitals						0.92										
Aarhus University Hospitals			0.77			0.98				1.11						
Copenhagen University Hospitals			0.77			1.13				1.46						
University of Southern Denmark Hospitals			0.66			1.10										
HES Other																
Other	1.35	1.03	0.99		1.69	1.17		1.40	0.95	1.12	1.29			1.55	0.55	1.12
HES Total	1.43	1.21	0.89	0.76	1.49	1.07	1.09	1.59	1.18	1.15	0.91	1.30	1.38	1.47	0.65	1.13
Denmark	1.42	1.19	0.91	0.76	1.53	1.09	1.15	1.55	1.12	1.15	0.96	1.26	1.34	1.48	0.62	1.13
Aalto University			0.68	0.99	1.09		2.19	1.18				1.36	1.32	1.07		
Hanken School of Economics																
Lappeenranta University of Technology								0.73								
Tampere University of Technology					0.77			0.72				0.86		0.89		
University of Eastern Finland	1.19	0.94	0.79		0.73	1.35		0.77	1.00	1.45				0.63		
University of Helsinki	1.33	1.09	1.00		1.22	1.32		1.35	1.11	1.04	0.53	2.13	1.10	1.29	0.80	0.86
University of Jyväskylä		1.03	0.60		0.83				0.95	1.12			1.11	0.89	0.43	
University of Lapland																
University of Oulu	0.67	0.98	0.83		0.59	0.96		1.21	0.58	1.22			0.46	0.69		
University of Tampere			0.87			1.00				0.78						1.04
University of Turku	1.28	1.29	0.77		0.75	0.99		0.95	1.08	1.08				0.47	0.89	0.69
University of Vaasa																
Åbo Akademi University			0.82		0.76			0.84				1.08				
Helsinki University Hospital			0.94			1.10				1.03						
Kuopio University Hospital			0.81			1.01										
Oulu University Hospital						0.95										
Tampere University Hospital			0.83			0.95										
Turku University Hospital			0.87			0.97										
HES Other														1.71		
Other	1.06	0.76	0.86	0.78	0.92	1.16	1.15	1.14	0.85	1.15		1.00		0.74	0.63	0.63
HES Total	1.21	1.11	0.87	0.51	0.94	1.08	1.07	1.01	0.99	1.08	0.79	1.21	1.01	0.99	0.72	0.79
Finland	1.14	1.04	0.87	0.58	0.94	1.09	1.08	1.05	0.93	1.10	0.76	1.13	1.01	0.96	0.71	0.76

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland																
Reykjavik University																
University of Akureyri																
University of Iceland			0.60			0.93			1.55					0.63		
Landspítali University Hospital						1.14										
HES Other																
Other																
HES Total			0.73			1.07			1.53					0.63		
Iceland	1.14	0.91	1.03			1.10			1.29	1.09				0.66		
Nord University																
Norwegian Business School																
Norwegian School of Economics and Business Administration				0.50												
Norwegian School of Sport Sciences																
Norwegian University of Life Sciences	1.25	0.87	0.70						0.95							
Norwegian University of Science and Technology	0.91	1.08	0.76		0.65	1.01	0.78	1.35	0.61	0.93		1.12	1.95	0.92		0.90
Oslo and Akershus University College of Applied Sciences																
University College of Southeast Norway																
University of Agder																
University of Bergen	1.17	0.96	0.85		0.82	0.87		1.01	1.34	0.96			1.82	0.74	0.66	0.96
University of Oslo	0.95	1.21	0.93		1.11	0.91		1.35	1.12	0.95	0.84		1.34	1.05	0.68	1.21
University of Stavanger																
University of Tromsø	1.34	0.91	0.61		1.39	0.72			1.07						0.73	
St. Olavs Hospital			0.63			0.94										
University Hospital North Norway						0.69										
Bergen University Hospital			0.68			1.09										
Oslo University Hospital			0.88			0.99				1.21						
HES Other																
Other	1.35	1.04	0.69	0.52	0.91	0.92	0.91	1.17	0.92	1.06		1.36	1.01	0.82	0.67	0.91
HES Total	1.17	1.05	0.82	0.61	0.95	0.94	0.93	1.20	1.09	1.00	0.81	1.15	1.51	0.97	0.68	0.97
Norway	1.25	1.04	0.80	0.58	0.94	0.94	0.93	1.18	1.01	1.02	0.79	1.24	1.43	0.94	0.68	0.95

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology																
Borås University College																
Chalmers University of Technology			0.65		1.26		1.08	1.46	0.70			1.30	1.09	1.05		
Gävle University College																
Jönköping University																
Karlstad University																
Karolinska Institutet			1.09		2.15	1.19				1.07					1.56	
Linköping University			0.73		1.58	0.81	0.63	1.23		0.95		1.72	1.33	1.25		
Linnaeus University																
Luleå University of Technology					2.92			0.91	0.74			1.32		0.91		
Lund University	1.17	1.26	0.84	0.81	1.56	1.02	0.88	1.34	1.09	0.96	0.82	1.17	1.44	1.23	0.48	0.86
Malmö University College						0.90										
Mid Sweden University																
Mälardalen University College																
Royal Institute of Technology (KTH)			0.85		1.33		1.22	1.38	0.65			1.45	2.77	0.96		
Stockholm School of Economics				0.96												
Stockholm University	1.49	1.46	0.89	1.64	1.51	0.74		1.70	1.43	0.82	0.61	1.84	1.26	0.99	0.64	1.06
Swedish University of Agricultural Sciences	1.25	1.38	0.59		1.12			1.11	1.01							
Södertörns University College																
Umeå University	1.98	1.82	0.94		1.15	1.03			1.70	0.93			0.89	1.07		0.68
University of Gothenburg	0.93	1.28	0.85	0.73	1.20	1.12		1.31	1.02	1.13	0.03	1.03	1.11	1.21	0.71	0.86
Uppsala University	1.07	1.50	0.86	0.83	1.68	0.98	1.81	1.65	0.93	1.02	1.30	1.50	1.96	0.97	0.97	1.24
Örebro University																
Karolinska University Hospital			0.81			1.14				1.11						
Linköping University Hospital			0.58			0.96										
Sahlgrenska University Hospital			0.78			1.07				1.16						
Skåne University Hospital			0.87			0.91				0.92						
University Hospital of Umeå			0.70			0.97										
Uppsala University Hospital			0.65			1.00				0.78						
Örebro University Hospital						1.23										
HES Other										0.92						
Other	1.20	1.24	1.00	0.84	1.45	1.17	1.67	1.16	1.01	0.97	0.38	1.52		1.01	0.66	0.88
HES Total	1.23	1.42	0.88	0.86	1.48	1.05	1.02	1.34	1.09	1.01	0.67	1.42	1.53	1.06	0.90	0.95
Sweden	1.22	1.41	0.89	0.86	1.48	1.06	1.09	1.31	1.08	1.00	0.63	1.45	1.53	1.06	0.87	0.95

*Data from Clarivate Analytics

Table A.13: Field normalised citation rates of HE sector institutions (2003-2006) across subject fields*

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	1.42		0.64	0.81		0.73	0.90	1.33				0.57	1.01	1.35		1.58
Aarhus University	1.35	1.38	0.90		2.30	1.23	0.92	1.55	1.41	1.03	0.53		1.58	1.50	0.60	0.80
Copenhagen Business School				1.42												1.11
Roskilde University			0.90													1.15
Technical University of Denmark	1.62	1.45	1.19		1.66	0.94	1.86	1.64	1.13	0.71		1.93	1.50	1.60		
University of Copenhagen	1.31	1.13	0.96	0.92	1.11	1.24	1.38	1.69	1.42	1.42	0.96		1.44	1.26	1.14	0.95
University of Southern Denmark		1.33	1.79		1.20	1.00				1.05			1.50	1.25		
Aalborg University Hospitals						0.86										
Aarhus University Hospitals			0.79			1.00				1.18						
Copenhagen University Hospitals			0.98			1.26				1.37						
University of Southern Denmark Hospitals			0.82			0.98										
HES Other																
Other	1.44	1.14	1.08	0.73	1.29	1.13		1.57	1.02	1.08	1.70			2.13		1.10
HES Total	1.39	1.24	1.03	0.98	1.56	1.15	1.16	1.52	1.33	1.24	0.79	1.61	1.45	1.47	0.80	1.07
Denmark	1.40	1.23	1.04	0.95	1.52	1.15	1.12	1.53	1.25	1.21	0.92	1.59	1.42	1.55	0.77	1.07
Aalto University			0.71	0.83	1.17		0.93	0.87				1.28	1.19	1.25		
Hanken School of Economics																
Lappeenranta University of Technology								1.04						0.43		
Tampere University of Technology					0.80			0.90				1.01		0.69		
University of Eastern Finland	1.23	0.92	0.78		0.60	1.17		1.13	1.10	1.10				0.72		
University of Helsinki	1.38	1.28	0.96	0.65	1.23	1.22	0.91	1.37	1.07	1.10	0.77	1.57	1.33	1.19	0.70	0.89
University of Jyväskylä	1.10	1.06	0.61		0.89	0.80				1.00			1.18	0.98	0.93	0.84
University of Lapland																
University of Oulu	0.88	0.96	0.80		0.67	0.93		1.15	0.78	0.79		0.79		0.61		
University of Tampere			0.77			0.96				0.92						1.07
University of Turku	1.25	1.28	0.78		0.95	0.98	0.51	0.94	0.91	0.83	0.61		0.80	0.65	0.94	0.79
University of Vaasa																
Åbo Akademi University			0.76		1.14			1.03				2.49				
Helsinki University Hospital			0.96			1.11				0.89						
Kuopio University Hospital			0.85			1.01										
Oulu University Hospital						0.91										
Tampere University Hospital			0.75			0.84										
Turku University Hospital			0.84			0.92										
HES Other														1.42		
Other	1.04	0.98	0.87	0.52	0.87	1.07	1.24	1.09	0.88	1.01		0.83		0.86	0.81	0.75
HES Total	1.27	1.16	0.86	0.64	1.01	1.04	0.90	0.98	1.01	0.97	1.09	1.28	1.10	1.00	0.80	0.90
Finland	1.17	1.12	0.86	0.61	0.99	1.04	0.95	1.01	0.95	0.99	1.06	1.15	1.11	0.99	0.80	0.87

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland																
Reykjavik University																
University of Akureyri																
University of Iceland			0.65			0.86			1.04	0.95				0.85		
Landspítali University Hospital			1.31			1.15										
HES Other																
Other	1.11	0.95	1.97			1.35			1.23							
HES Total	1.71	0.86	0.84			1.03			1.08	0.89				0.85		
Iceland	1.41	0.90	1.10			1.10			1.13	0.90				0.84		
Nord University																
Norwegian Business School				0.94												
Norwegian School of Economics and Business Administration				0.81												
Norwegian School of Sport Sciences											1.91					
Norwegian University of Life Sciences	1.34	0.97	0.77						0.98							
Norwegian University of Science and Technology	1.00	1.01	1.06	0.71	0.83	0.96	0.74	1.32	0.80	1.07		1.51	1.47	1.05	0.62	0.77
Oslo and Akershus University College of Applied Sciences										0.88						0.58
University College of Southeast Norway																
University of Agder																
University of Bergen	1.15	1.08	0.85		1.03	0.95	1.19	0.92	1.29	1.00	0.42		1.32	0.90	0.70	1.00
University of Oslo	0.93	1.25	1.07	0.86	0.99	0.99		1.50	1.15	0.92	0.79		1.41	1.13	0.64	1.15
University of Stavanger								1.08								
University of Tromsø	1.18	1.05	0.86		1.20	0.94			1.06	0.78				1.01	0.94	
St. Olavs Hospital			0.73			1.09										
University Hospital North Norway						0.95										
Bergen University Hospital			0.65			0.98										
Oslo University Hospital			1.08			1.07				1.09						
HES Other																
Other	1.32	1.17	0.82	0.69	1.02	1.00	1.46	1.28	1.10	1.14		1.14	1.44	0.94	0.53	1.19
HES Total	1.21	1.07	0.95	0.83	0.93	1.01	0.89	1.20	1.10	1.04	0.74	1.40	1.30	1.06	0.68	0.98
Norway	1.26	1.10	0.93	0.79	0.95	1.01	1.05	1.23	1.10	1.07	0.71	1.30	1.32	1.04	0.65	1.05

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology																
Borås University College																
Chalmers University of Technology			0.86		1.09		0.76	1.20	0.91			1.07	1.10	1.04		
Gävle University College																
Jönköping University																
Karlstad University																
Karolinska Institutet			1.13		1.09	1.18				1.17					1.02	
Linköping University			0.69		1.16	0.82	0.74	1.22	0.71	0.93		1.53	1.18	1.02		0.75
Linnaeus University			0.93											0.67		
Luleå University of Technology					0.80			0.79	0.83			0.84		0.81		
Lund University	1.23	1.32	0.90	0.92	1.31	0.89	0.90	1.37	1.01	0.89	0.84	1.65	2.31	1.26	0.49	0.93
Malmö University College						0.85										
Mid Sweden University																
Mälardalen University College																
Royal Institute of Technology (KTH)	1.50		0.92		1.15		0.76	1.19	0.72			1.17	1.20	0.96		0.77
Stockholm School of Economics				0.99												
Stockholm University	1.37	1.34	1.19	1.23	1.94	0.84		2.01	1.69	0.86	0.42	1.54	1.33	1.04	0.59	1.07
Swedish University of Agricultural Sciences	1.28	1.53	0.81		1.08			0.85	1.12							
Södertörns University College																
Umeå University	1.68	1.28	1.04		1.21	1.03		1.15	1.68	1.09			1.17	0.81	0.74	0.93
University of Gothenburg	1.19	1.24	0.94	0.81	1.00	1.13		1.06	0.94	0.90	0.65	1.14	1.12	1.10	0.64	0.96
Uppsala University	1.11	1.40	0.98	0.61	1.46	0.95	1.13	1.08	0.79	1.03	0.54	1.35	1.21	1.06	0.90	1.24
Örebro University																
Karolinska University Hospital			0.95			1.17					1.16					
Linköping University Hospital			0.59			0.98										
Sahlgrenska University Hospital			0.84			1.15					1.05					
Skåne University Hospital			0.91			0.95					0.94					
University Hospital of Umeå			0.64			1.04										
Uppsala University Hospital			0.81			0.95										
Örebro University Hospital						1.03										
HES Other											1.02					
Other	1.40	1.10	1.08	0.75	1.11	1.11	1.10	1.04	1.13	0.92	0.28	1.01	0.98	0.79	0.65	1.22
HES Total	1.26	1.34	0.97	0.83	1.30	1.05	0.77	1.15	1.11	1.01	0.77	1.24	1.28	1.04	0.73	0.97
Sweden	1.28	1.32	0.98	0.82	1.27	1.06	0.81	1.13	1.12	1.00	0.72	1.19	1.27	1.02	0.72	1.00

*Data from Clarivate Analytics

Table A.14: Field normalised citation rates of HE sector institutions (2007-2010) across subject fields*

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	1.19		0.69	0.88	0.67	0.85	0.75	1.55	0.90	0.96		0.86	0.92	1.17		1.11
Aarhus University	1.27	1.37	1.05	0.84	1.89	1.27	0.80	1.35	1.28	1.01	1.63	1.96	1.03	1.46	1.27	1.11
Copenhagen Business School				1.10												1.08
Roskilde University														2.03		1.09
Technical University of Denmark	1.59	1.60	1.22		1.80	1.13	1.09	1.64	1.28	0.96		2.62	1.30	1.65		
University of Copenhagen	1.48	1.24	1.19	0.72	0.89	1.25	1.08	1.42	1.31	1.18	1.10	1.59	1.04	1.50	0.75	0.89
University of Southern Denmark		1.28	1.22	0.63	1.01	1.22		1.00		1.07	1.31			1.65		1.16
Aalborg University Hospitals			0.64			0.90										
Aarhus University Hospitals			0.92			1.16				1.50						
Copenhagen University Hospitals			1.01			1.36				1.35						
University of Southern Denmark Hospitals			0.87			1.09										
HES Other																
Other	1.42	1.18	1.12	1.00	1.66	1.19		1.38	0.96	1.13	1.38	1.16		1.18		1.06
HES Total	1.42	1.32	1.10	0.91	1.44	1.24	1.00	1.56	1.32	1.18	1.32	2.09	1.10	1.55	1.06	1.06
Denmark	1.42	1.31	1.10	0.92	1.47	1.24	1.00	1.53	1.23	1.17	1.33	2.00	1.08	1.53	1.01	1.06
Aalto University			0.96	1.07	1.16	0.90	0.95	1.01	1.09			1.22	1.02	1.06		1.21
Hanken School of Economics				1.02												
Lappeenranta University of Technology								0.81						0.58		
Tampere University of Technology			0.87		0.83		1.18	1.01				0.87		0.79		
University of Eastern Finland	1.03	0.89	0.98		0.84	1.14		1.26	1.22	1.13		0.88	1.57	0.65		0.54
University of Helsinki	1.28	1.21	1.14	0.51	1.22	1.16	1.38	1.01	1.05	1.02	1.22	1.44	1.94	1.09	0.90	0.83
University of Jyväskylä		1.00	0.61		1.04	0.69		1.03		0.96	1.55		1.14	1.37	0.74	0.87
University of Lapland																
University of Oulu	1.09	1.22	0.86		0.58	0.97		0.95	0.70	1.21		0.92	1.36	0.65		0.85
University of Tampere			0.85			1.08	0.69			1.28	1.08					0.76
University of Turku	1.36	1.18	0.84	0.83	0.75	1.03	0.36	0.71	0.90	1.09	0.50		0.66	1.01	0.94	0.98
University of Vaasa																
Åbo Akademi University			0.92		1.04			1.21				1.18				0.82
Helsinki University Hospital			1.11			1.04				1.02						
Kuopio University Hospital			0.92			1.07										
Oulu University Hospital			0.83			0.88										
Tampere University Hospital			0.81			0.97										
Turku University Hospital			0.94			1.06										
HES Other						1.70	0.54							1.19		
Other	1.20	1.05	0.96	0.76	0.95	1.11	1.16	0.92	0.84	1.21	1.55	0.71		0.79	1.02	0.85
HES Total	1.19	1.13	0.99	0.82	1.00	1.05	1.00	1.00	1.00	1.06	1.17	1.07	1.25	1.01	0.90	0.88
Finland	1.19	1.11	0.98	0.81	1.00	1.06	1.02	0.98	0.93	1.12	1.21	0.99	1.23	0.98	0.92	0.87

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland																
Reykjavik University																
University of Akureyri																
University of Iceland			1.12			0.97			1.11	0.95				1.09		0.68
Landspítali University Hospital						0.87										
HES Other																
Other	0.85		3.17			2.08			0.99							
HES Total	0.97	0.90	1.33			0.91		1.13	1.11	0.98	0.71		0.75	1.05	0.62	0.65
Iceland	0.91	0.88	1.78		0.79	1.11		1.11	1.07	1.11	0.60		0.80	1.02	0.63	0.75
Nord University																
Norwegian Business School				0.77												
Norwegian School of Economics and Business Administration				0.72												
Norwegian School of Sport Sciences										1.49						
Norwegian University of Life Sciences	1.30	1.12	0.93						1.18							1.27
Norwegian University of Science and Technology	1.12	1.09	1.09	0.92	0.98	1.01	1.05	1.15	0.87	1.11	1.38	1.15	1.60	1.20	0.83	0.98
Oslo and Akershus University College of Applied Sciences										0.99						0.93
University College of Southeast Norway																
University of Agder																
University of Bergen	1.14	0.99	0.98		0.95	1.03	1.01	1.14	1.24	1.03	1.08		1.04	0.86	1.14	0.94
University of Oslo	1.26	1.13	0.94	0.92	0.96	1.08	0.95	1.08	1.23	1.14	0.99	1.05	1.17	1.04	0.78	1.09
University of Stavanger								0.79								0.92
University of Tromsø	1.61	1.22	0.92		0.94	0.96			1.00	1.01	0.71			0.90	0.56	0.97
St. Olavs Hospital			0.84			1.08										
University Hospital North Norway			1.01			1.12				1.45						
Bergen University Hospital			0.80			1.32				0.99						
Oslo University Hospital			0.95			1.05				1.22						
HES Other		0.85						1.05	1.30	0.83						0.67
Other	1.42	1.09	0.84	0.81	1.05	1.11	1.66	1.01	1.10	1.09	1.44	1.19	1.11	0.95	0.81	1.29
HES Total	1.28	1.09	0.95	0.84	0.95	1.07	0.92	1.07	1.14	1.10	1.01	1.06	1.18	1.07	0.85	0.97
Norway	1.34	1.09	0.93	0.84	0.97	1.08	1.07	1.05	1.12	1.10	1.04	1.10	1.18	1.05	0.84	1.06

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology																
Borås University College																
Chalmers University of Technology			0.87		1.17		0.58	1.18	1.05			1.05	0.96	1.08		
Gävle University College																
Jönköping University										0.86						
Karlstad University																
Karolinska Institutet		1.71	1.23		1.81	1.20				1.10					1.38	1.17
Linköping University			0.82		1.53	1.03	0.86	1.21		0.81	1.22	1.47	0.83	1.32	0.88	0.97
Linnaeus University			0.68							0.77				0.55		0.71
Luleå University of Technology					0.89			0.92	0.84			1.20		0.49		
Lund University	1.19	1.30	0.99	0.89	1.24	0.99	1.59	1.30	1.22	0.99	0.86	1.54	1.48	1.15	0.81	1.19
Malmö University College						1.00										
Mid Sweden University								1.17		0.81						
Mälardalen University College																
Royal Institute of Technology (KTH)	1.26		1.04		1.38	0.77	0.79	1.11	0.66		1.54	1.03	0.91	1.12		1.12
Stockholm School of Economics				1.35												
Stockholm University	1.27	1.34	1.18	1.21	1.53	1.11		1.38	1.37	1.00	1.03	1.39	0.95	1.32	0.80	1.36
Swedish University of Agricultural Sciences	1.33	1.41	0.77		0.92			0.96	1.16							0.83
Södertörns University College																
Umeå University	1.61	1.34	0.96	0.63	0.95	1.06		0.94	1.15	0.95	0.83		0.54	1.07	0.93	0.95
University of Gothenburg	1.20	1.36	0.90	0.88	0.93	1.23		1.39	1.26	1.21	0.86		0.94	0.87	0.75	1.07
Uppsala University	1.14	1.38	1.00	0.87	1.27	1.09	1.07	1.11	0.93	1.13	1.03	1.05	0.81	1.03	0.96	1.18
Örebro University						0.81				1.18						1.08
Karolinska University Hospital			1.03			1.19				1.27						
Linköping University Hospital			0.77			0.98										
Sahlgrenska University Hospital			0.96			1.17				1.24						
Skåne University Hospital			0.97			1.00				1.05						
University Hospital of Umeå			0.84			0.98										
Uppsala University Hospital			0.82			1.15				1.00						
Örebro University Hospital			0.96			1.19										
HES Other						0.94		0.81		0.93						0.77
Other	1.27	0.93	1.05	1.00	1.09	1.15	1.07	0.99	1.11	1.10	0.52	0.99	0.79	1.07	1.01	1.01
HES Total	1.30	1.33	1.02	0.97	1.27	1.11	0.96	1.12	1.14	1.03	1.00	1.14	0.90	1.09	0.93	1.08
Sweden	1.30	1.29	1.02	0.98	1.25	1.12	0.97	1.10	1.14	1.04	0.96	1.11	0.89	1.09	0.93	1.08

*Data from Clarivate Analytics

Appendix 9: HE sector institutions’ percentage of highly cited publications across subject field among the top 10 per cent in world production

Table A.15: HE sector institutions’ percentage of highly cited publications across subject field among the top 10 per cent in world production (1999-2002) (10 per cent equals the world average)*

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	20 %		3 %	5 %		4 %	9 %	17 %						10 %		
Aarhus University	14 %	12 %	9 %	4 %	22 %	12 %		10 %	10 %	9 %	10 %		8 %	19 %		20 %
Copenhagen Business School				6 %												
Roskilde University																
Technical University of Denmark	20 %	15 %	10 %		17 %		12 %	17 %	11 %			18 %	13 %	17 %		
University of Copenhagen	14 %	11 %	7 %	11 %	12 %	11 %	15 %	16 %	12 %	13 %	11 %		20 %	13 %		9 %
University of Southern Denmark		17 %	15 %		18 %	15 %				10 %			15 %	15 %		
Aalborg University Hospitals						7 %										
Aarhus University Hospitals			7 %			10 %				8 %						
Copenhagen University Hospitals			6 %			11 %				15 %						
University of Southern Denmark Hospitals			5 %			11 %										
HES Other																
Other	15 %	10 %	9 %		19 %	13 %		14 %	10 %	10 %	12 %			17 %	5 %	12 %
HES Total	15 %	12 %	8 %	6 %	16 %	11 %	10 %	16 %	12 %	12 %	10 %	15 %	15 %	16 %	8 %	12 %
Denmark	15 %	12 %	8 %	7 %	17 %	11 %	10 %	15 %	12 %	11 %	10 %	14 %	14 %	16 %	7 %	12 %
Aalto University			4 %	10 %	10 %		17 %	11 %				14 %	16 %	11 %		
Hanken School of Economics																
Lappeenranta University of Technology								4 %								
Tampere University of Technology					7 %			7 %				6 %		9 %		
University of Eastern Finland	9 %	6 %	6 %		4 %	12 %		8 %	9 %	15 %				5 %		
University of Helsinki	14 %	12 %	9 %		13 %	15 %		13 %	12 %	10 %	6 %	29 %	13 %	12 %	9 %	6 %
University of Jyväskylä		9 %	3 %		5 %				8 %	11 %			10 %	8 %	3 %	
University of Lapland																
University of Oulu	4 %	12 %	8 %		2 %	9 %		11 %	4 %	15 %			3 %	5 %		
University of Tampere			8 %			10 %				6 %						11 %
University of Turku	13 %	14 %	6 %		6 %	9 %		11 %	14 %	9 %				3 %	10 %	4 %
University of Vaasa																
Åbo Akademi University			7 %		3 %			7 %				11 %				
Helsinki University Hospital			10 %			10 %				9 %						
Kuopio University Hospital			6 %			9 %										
Oulu University Hospital						8 %										
Tampere University Hospital			8 %			9 %										
Turku University Hospital			7 %			9 %										
HES Other														18 %		
Other	11 %	6 %	7 %	9 %	8 %	11 %	11 %	12 %	7 %	12 %		10 %		7 %	5 %	4 %
HES Total	11 %	12 %	8 %	5 %	8 %	10 %	9 %	10 %	9 %	10 %	9 %	13 %	10 %	9 %	7 %	7 %
Finland	11 %	10 %	8 %	6 %	8 %	11 %	10 %	10 %	8 %	11 %	9 %	12 %	10 %	9 %	7 %	6 %

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland																
Reykjavik University																
University of Akureyri																
University of Iceland			4 %			8 %			16 %					5 %		
Landspítali University Hospital						13 %										
HES Other																
Other																
HES Total			5 %			12 %			15 %					5 %		
Iceland	13 %	8 %	8 %			12 %			13 %	8 %				6 %		
Nord University																
Norwegian Business School																
Norwegian School of Economics and Business Administration				1 %												
Norwegian School of Sport Sciences																
Norwegian University of Life Sciences	14 %	8 %	5 %						10 %							
Norwegian University of Science and Technology	7 %	10 %	7 %		5 %	10 %	7 %	16 %	5 %	8 %		11 %	17 %	9 %		9 %
Oslo and Akershus University College of Applied Sciences																
University College of Southeast Norway																
University of Agder																
University of Bergen	13 %	10 %	7 %		7 %	7 %		9 %	16 %	7 %			13 %	8 %	5 %	10 %
University of Oslo	11 %	13 %	8 %		11 %	8 %		12 %	12 %	8 %	10 %		16 %	11 %	4 %	11 %
University of Stavanger																
University of Tromsø	17 %	10 %	4 %		19 %	4 %			10 %						5 %	
St. Olavs Hospital			5 %			8 %										
University Hospital North Norway						6 %										
Bergen University Hospital			5 %			10 %										
Oslo University Hospital			8 %			9 %				18 %						
HES Other																
Other	16 %	10 %	6 %	2 %	6 %	7 %	6 %	11 %	9 %	9 %		17 %	13 %	8 %	5 %	8 %
HES Total	13 %	11 %	7 %	5 %	9 %	8 %	8 %	13 %	12 %	9 %	9 %	12 %	14 %	10 %	5 %	9 %
Norway	14 %	10 %	7 %	4 %	9 %	8 %	7 %	12 %	10 %	9 %	9 %	14 %	14 %	10 %	5 %	9 %

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology																
Borås University College																
Chalmers University of Technology			4 %		15 %		11 %	16 %	6 %			13 %	11 %	11 %		
Gävle University College																
Jönköping University																
Karlstad University																
Karolinska Institutet			11 %		15 %	13 %				11 %					17 %	
Linköping University			7 %		17 %	6 %	3 %	12 %		9 %		20 %	13 %	14 %		
Linnaeus University																
Luleå University of Technology					31 %			9 %	7 %			15 %		9 %		
Lund University	12 %	13 %	7 %	6 %	16 %	9 %	5 %	14 %	13 %	8 %	10 %	13 %	14 %	13 %	2 %	9 %
Malmö University College						10 %										
Mid Sweden University																
Mälardalen University College																
Royal Institute of Technology (KTH)			6 %		15 %		6 %	16 %	2 %			16 %	21 %	10 %		
Stockholm School of Economics				10 %												
Stockholm University	12 %	14 %	8 %	15 %	16 %	7 %		19 %	14 %	9 %	6 %	14 %	14 %	10 %	4 %	9 %
Swedish University of Agricultural Sciences	15 %	15 %	5 %		12 %			12 %	8 %							
Södertörns University College																
Umeå University	24 %	19 %	9 %		12 %	11 %			22 %	8 %			6 %	11 %		6 %
University of Gothenburg	8 %	14 %	7 %	5 %	12 %	11 %		13 %	10 %	12 %	1 %	12 %	11 %	13 %	6 %	9 %
Uppsala University	11 %	16 %	7 %	7 %	20 %	9 %	10 %	18 %	8 %	10 %	11 %	17 %	14 %	10 %	8 %	12 %
Örebro University																
Karolinska University Hospital			6 %			11 %				11 %						
Linköping University Hospital			3 %			8 %										
Sahlgrenska University Hospital			6 %			10 %				11 %						
Skåne University Hospital			8 %			8 %				8 %						
University Hospital of Umeå			5 %			10 %										
Uppsala University Hospital			4 %			9 %				5 %						
Örebro University Hospital						13 %										
HES Other										9 %						
Other	13 %	11 %	10 %	7 %	15 %	12 %	13 %	11 %	10 %	9 %	4 %	17 %		11 %	6 %	10 %
HES Total	14 %	15 %	8 %	7 %	16 %	10 %	7 %	14 %	10 %	9 %	7 %	16 %	14 %	11 %	7 %	9 %
Sweden	14 %	15 %	8 %	7 %	16 %	10 %	8 %	14 %	10 %	9 %	7 %	16 %	14 %	11 %	7 %	9 %

*Data from Clarivate Analytics

Table A.16: HE sector institutions’ percentage of highly cited publications across subject field among the top 10 per cent in world production (2003-2006) (10 per cent equals the world average)*

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	16 %		5 %	5 %		4 %	7 %	13 %				3 %	10 %	13 %		14 %
Aarhus University	15 %	15 %	9 %		28 %	13 %	10 %	18 %	15 %	8 %	6 %		19 %	15 %	4 %	6 %
Copenhagen Business School				19 %												14 %
Roskilde University			8 %													12 %
Technical University of Denmark	19 %	17 %	13 %		18 %	11 %	14 %	18 %	10 %	7 %		21 %	16 %	20 %		
University of Copenhagen	14 %	11 %	9 %	10 %	12 %	15 %	13 %	18 %	16 %	15 %	10 %		16 %	14 %	10 %	10 %
University of Southern Denmark		15 %	18 %		12 %	10 %				10 %			18 %	12 %		
Aalborg University Hospitals						7 %										
Aarhus University Hospitals			7 %			10 %				10 %						
Copenhagen University Hospitals			10 %			14 %				17 %						
University of Southern Denmark Hospitals			8 %			10 %										
HES Other																
Other	14 %	13 %	11 %	7 %	12 %	12 %		17 %	10 %	11 %	15 %			26 %		10 %
HES Total	15 %	13 %	10 %	10 %	17 %	12 %	10 %	16 %	14 %	13 %	8 %	17 %	16 %	16 %	6 %	10 %
Denmark	15 %	13 %	10 %	10 %	17 %	12 %	10 %	16 %	13 %	12 %	9 %	16 %	16 %	18 %	6 %	10 %
Aalto University			6 %	6 %	11 %		10 %	9 %				14 %	13 %	15 %		
Hanken School of Economics																
Lappeenranta University of Technology								13 %						3 %		
Tampere University of Technology					6 %			9 %				14 %		5 %		
University of Eastern Finland	13 %	5 %	6 %		3 %	12 %		10 %	12 %	11 %				5 %		
University of Helsinki	13 %	14 %	9 %	8 %	13 %	13 %	6 %	14 %	11 %	10 %	7 %	21 %	11 %	13 %	5 %	10 %
University of Jyväskylä	12 %	10 %	3 %		6 %	3 %				9 %			9 %	9 %	8 %	8 %
University of Lapland																
University of Oulu	6 %	8 %	8 %		2 %	8 %		13 %	7 %	10 %		9 %		3 %		
University of Tampere			7 %			8 %				6 %						12 %
University of Turku	11 %	11 %	7 %		9 %	9 %	4 %	9 %	8 %	8 %	5 %		8 %	6 %	10 %	7 %
University of Vaasa																
Åbo Akademi University			5 %		12 %			11 %				26 %				
Helsinki University Hospital			10 %			11 %				6 %						
Kuopio University Hospital			7 %			10 %										
Oulu University Hospital						8 %										
Tampere University Hospital			6 %			6 %										
Turku University Hospital			9 %			11 %										
HES Other														17 %		
Other	10 %	9 %	8 %	3 %	9 %	10 %	12 %	11 %	9 %	9 %		8 %		8 %	8 %	7 %
HES Total	12 %	11 %	8 %	5 %	9 %	10 %	8 %	10 %	10 %	8 %	9 %	14 %	10 %	11 %	7 %	9 %
Finland	11 %	11 %	8 %	4 %	9 %	10 %	9 %	10 %	9 %	9 %	9 %	12 %	10 %	10 %	7 %	9 %

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine		Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland																	
Reykjavik University																	
University of Akureyri																	
University of Iceland			5 %			9 %				8 %	7 %				10 %		
Landspítali University Hospital			14 %			13 %											
HES Other																	
Other	10 %	6 %	15 %			18 %				12 %							
HES Total	15 %	7 %	8 %			11 %				9 %	6 %				10 %		
Iceland	12 %	7 %	9 %			12 %				10 %	6 %				11 %		
Nord University																	
Norwegian Business School				10 %													
Norwegian School of Economics and Business Administration				6 %													
Norwegian School of Sport Sciences												26 %					
Norwegian University of Life Sciences	14 %	9 %	6 %							11 %							
Norwegian University of Science and Technology	8 %	9 %	9 %	4 %	9 %	9 %		7 %	15 %	7 %	12 %		14 %	15 %	11 %	3 %	8 %
Oslo and Akershus University College of Applied Sciences											3 %						4 %
University College of Southeast Norway																	
University of Agder																	
University of Bergen	13 %	11 %	7 %		12 %	9 %		11 %	7 %	14 %	9 %	6 %		17 %	9 %	7 %	9 %
University of Oslo	10 %	12 %	9 %	5 %	9 %	10 %			15 %	10 %	8 %	9 %		15 %	13 %	3 %	13 %
University of Stavanger									14 %								
University of Tromsø	9 %	11 %	7 %		13 %	6 %				11 %	7 %				9 %	10 %	
St. Olavs Hospital			6 %			10 %											
University Hospital North Norway						6 %											
Bergen University Hospital			4 %			10 %											
Oslo University Hospital			12 %			9 %					12 %						
HES Other																	
Other	14 %	13 %	7 %	4 %	10 %	10 %		18 %	13 %	11 %	10 %		12 %	11 %	10 %	3 %	14 %
HES Total	12 %	10 %	9 %	7 %	9 %	9 %		8 %	13 %	11 %	10 %	8 %	14 %	14 %	12 %	5 %	10 %
Norway	13 %	11 %	8 %	7 %	9 %	9 %		11 %	13 %	11 %	10 %	8 %	13 %	14 %	11 %	5 %	11 %

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology																
Borås University College																
Chalmers University of Technology			8 %		12 %		9 %	13 %	9 %			12 %	12 %	10 %		
Gävle University College																
Jönköping University																
Karlstad University																
Karolinska Institutet			11 %		9 %	12 %				12 %					11 %	
Linköping University			5 %		13 %	6 %	6 %	11 %	4 %	10 %		18 %	13 %	11 %		4 %
Linnaeus University			9 %											10 %		
Luleå University of Technology					5 %			6 %	7 %			8 %		9 %		
Lund University	11 %	14 %	8 %	9 %	13 %	8 %	8 %	13 %	11 %	8 %	8 %	18 %	23 %	14 %	1 %	8 %
Malmö University College						11 %										
Mid Sweden University																
Mälardalen University College																
Royal Institute of Technology (KTH)	18 %		8 %		12 %		8 %	12 %	8 %			12 %	15 %	10 %		8 %
Stockholm School of Economics				10 %												
Stockholm University	12 %	14 %	12 %	18 %	23 %	6 %		20 %	17 %	6 %	5 %	21 %	16 %	9 %	4 %	8 %
Swedish University of Agricultural Sciences	13 %	18 %	8 %		10 %			6 %	11 %							
Södertörns University College																
Umeå University	20 %	15 %	11 %		10 %	11 %		11 %	23 %	10 %			11 %	8 %	5 %	8 %
University of Gothenburg	11 %	13 %	9 %	6 %	10 %	12 %		10 %	8 %	6 %	6 %	11 %	11 %	12 %	4 %	9 %
Uppsala University	10 %	15 %	9 %	3 %	16 %	8 %	10 %	10 %	9 %	11 %	6 %	14 %	12 %	11 %	10 %	12 %
Örebro University																
Karolinska University Hospital			9 %			11 %				11 %						
Linköping University Hospital			4 %			8 %										
Sahlgrenska University Hospital			9 %			11 %				8 %						
Skåne University Hospital			8 %			8 %				9 %						
University Hospital of Umeå			6 %			11 %										
Uppsala University Hospital			8 %			9 %										
Örebro University Hospital						10 %										
HES Other										10 %						
Other	14 %	11 %	11 %	8 %	10 %	11 %	11 %	10 %	11 %	9 %	4 %	10 %	8 %	7 %	3 %	13 %
HES Total	13 %	15 %	9 %	8 %	14 %	10 %	7 %	11 %	12 %	9 %	8 %	13 %	13 %	11 %	7 %	9 %
Sweden	13 %	14 %	9 %	8 %	13 %	10 %	7 %	11 %	12 %	9 %	8 %	13 %	13 %	11 %	6 %	9 %

*Data from Clarivate Analytics

Table A.17: HE sector institutions’ percentage of highly cited publications across subject field among the top 10 per cent in world production (2007-2010) (10 per cent equals the world average)*

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Aalborg University	13 %		5 %	7 %	3 %	6 %	6 %	16 %	10 %	7 %		7 %	11 %	13 %		13 %
Aarhus University	13 %	15 %	11 %	8 %	23 %	14 %	6 %	17 %	13 %	10 %	15 %	24 %	9 %	18 %	18 %	11 %
Copenhagen Business School				9 %												11 %
Roskilde University														30 %		9 %
Technical University of Denmark	18 %	19 %	14 %		19 %	12 %	12 %	16 %	14 %	10 %		19 %	14 %	18 %		
University of Copenhagen	16 %	14 %	13 %	5 %	8 %	14 %	11 %	15 %	13 %	13 %	11 %	19 %	9 %	17 %	7 %	8 %
University of Southern Denmark		10 %	13 %	3 %	10 %	13 %		7 %		10 %	13 %			17 %		12 %
Aalborg University Hospitals			5 %			7 %										
Aarhus University Hospitals			9 %			12 %				19 %						
Copenhagen University Hospitals			9 %			15 %				17 %						
University of Southern Denmark Hospitals			9 %			11 %										
HES Other																
Other	15 %	12 %	11 %	12 %	14 %	13 %		14 %	10 %	11 %	14 %	10 %		11 %		11 %
HES Total	15 %	15 %	12 %	8 %	16 %	14 %	9 %	16 %	14 %	13 %	13 %	18 %	11 %	18 %	13 %	11 %
Denmark	15 %	15 %	12 %	8 %	15 %	13 %	9 %	16 %	13 %	13 %	13 %	17 %	10 %	17 %	12 %	11 %
Aalto University			10 %	11 %	11 %	7 %	8 %	10 %	11 %			12 %	11 %	11 %		13 %
Hanken School of Economics				14 %												
Lappeenranta University of Technology								5 %						3 %		
Tampere University of Technology			11 %		8 %		13 %	10 %				11 %		7 %		
University of Eastern Finland	10 %	7 %	11 %		8 %	11 %		10 %	11 %	11 %		7 %	15 %	4 %		4 %
University of Helsinki	14 %	12 %	10 %	3 %	12 %	12 %	8 %	9 %	11 %	8 %	11 %	15 %	15 %	9 %	8 %	9 %
University of Jyväskylä		10 %	3 %		9 %	7 %		9 %		9 %	13 %		13 %	18 %	4 %	7 %
University of Lapland																
University of Oulu	13 %	12 %	7 %		5 %	8 %		9 %	6 %	9 %		9 %	10 %	6 %		6 %
University of Tampere			7 %			10 %	5 %			13 %	12 %					5 %
University of Turku	17 %	10 %	8 %	10 %	6 %	10 %	3 %	7 %	8 %	9 %	5 %		7 %	10 %	6 %	10 %
University of Vaasa																
Åbo Akademi University			7 %		8 %			12 %				13 %				6 %
Helsinki University Hospital			11 %			10 %				11 %						
Kuopio University Hospital			9 %			9 %										
Oulu University Hospital			8 %			8 %										
Tampere University Hospital			6 %			8 %										
Turku University Hospital			9 %			10 %										
HES Other						18 %	5 %							13 %		
Other	12 %	10 %	9 %	5 %	9 %	11 %	12 %	9 %	7 %	12 %	12 %	7 %		8 %	11 %	7 %
HES Total	13 %	11 %	9 %	8 %	9 %	10 %	9 %	10 %	10 %	9 %	11 %	11 %	11 %	10 %	7 %	8 %
Finland	12 %	11 %	9 %	8 %	9 %	10 %	9 %	9 %	9 %	10 %	12 %	10 %	11 %	10 %	8 %	8 %

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Agricultural University of Iceland																
Reykjavik University																
University of Akureyri																
University of Iceland			9 %			10 %			9 %	7 %				11 %		4 %
Landspítali University Hospital						10 %										
HES Other																
Other	7 %		35 %			14 %			7 %							
HES Total	10 %	7 %	12 %			10 %		10 %	9 %	9 %	9 %		5 %	10 %	3 %	4 %
Iceland	8 %	7 %	17 %		7 %	10 %		11 %	8 %	10 %	7 %		7 %	10 %	3 %	5 %
Nord University																
Norwegian Business School				5 %												
Norwegian School of Economics and Business Administration				6 %												
Norwegian School of Sport Sciences											19 %					
Norwegian University of Life Sciences	14 %	9 %	8 %						13 %							12 %
Norwegian University of Science and Technology	9 %	12 %	11 %	7 %	11 %	9 %	9 %	12 %	8 %	12 %	16 %	12 %	18 %	13 %	8 %	10 %
Oslo and Akershus University College of Applied Sciences											8 %					6 %
University College of Southeast Norway																
University of Agder																
University of Bergen	11 %	10 %	9 %		6 %	11 %	10 %	10 %	13 %	10 %	13 %		10 %	6 %	13 %	9 %
University of Oslo	12 %	12 %	9 %	11 %	10 %	11 %	9 %	11 %	13 %	12 %	10 %	11 %	11 %	11 %	5 %	10 %
University of Stavanger								6 %								6 %
University of Tromsø	20 %	12 %	8 %		11 %	9 %			9 %	11 %	6 %			6 %	4 %	8 %
St. Olavs Hospital			9 %			11 %										
University Hospital North Norway			8 %			12 %				18 %						
Bergen University Hospital			7 %			13 %				9 %						
Oslo University Hospital			8 %			10 %				11 %						
HES Other		7 %						11 %	12 %	7 %						4 %
Other	17 %	11 %	7 %	7 %	12 %	11 %	16 %	9 %	11 %	12 %	12 %	12 %	14 %	8 %	6 %	14 %
HES Total	14 %	11 %	9 %	8 %	10 %	10 %	8 %	11 %	12 %	11 %	11 %	11 %	12 %	11 %	7 %	9 %
Norway	15 %	11 %	8 %	8 %	10 %	10 %	10 %	10 %	12 %	12 %	11 %	11 %	12 %	10 %	7 %	10 %

Country, university	Agri- culture, Fisheries & Forestry	Biology	Biomedicine & Molecular Biosciences	Business Studies & Economics	Chemistry	Clinical Medicine	Computer & Information Sciences	Engineer- ing	Geo- sciences	Health Sciences	Human- ities	Materials Science	Mathe- matics & Statistics	Physics	Psychology	Social Sciences
Blekinge Institute of Technology																
Borås University College																
Chalmers University of Technology			10 %		13 %		5 %	13 %	13 %			10 %	8 %	11 %		
Gävle University College																
Jönköping University										4 %						
Karlstad University																
Karolinska Institutet		18 %	13 %		10 %	13 %				11 %					16 %	12 %
Linköping University			7 %		19 %	9 %	8 %	13 %		6 %	14 %	17 %	9 %	16 %	7 %	7 %
Linnaeus University			7 %							4 %				4 %		7 %
Luleå University of Technology					6 %			9 %	7 %			13 %		4 %		
Lund University	11 %	15 %	10 %	10 %	14 %	9 %	16 %	14 %	13 %	10 %	9 %	15 %	13 %	12 %	6 %	14 %
Malmö University College						8 %										
Mid Sweden University								11 %		7 %						
Mälardalen University College																
Royal Institute of Technology (KTH)	14 %		12 %		16 %	6 %	7 %	11 %	5 %		15 %	11 %	8 %	11 %		13 %
Stockholm School of Economics				13 %												
Stockholm University	11 %	15 %	11 %	14 %	18 %	10 %		17 %	14 %	7 %	11 %	15 %	9 %	13 %	7 %	12 %
Swedish University of Agricultural Sciences	14 %	14 %	6 %		4 %			8 %	11 %							5 %
Södertörns University College																
Umeå University	20 %	15 %	10 %	6 %	6 %	10 %		9 %	12 %	10 %	8 %		4 %	11 %	6 %	9 %
University of Gothenburg	12 %	13 %	8 %	7 %	9 %	13 %		15 %	12 %	13 %	11 %		7 %	8 %	7 %	10 %
Uppsala University	11 %	15 %	10 %	7 %	13 %	10 %	13 %	11 %	9 %	13 %	10 %	10 %	9 %	10 %	7 %	14 %
Örebro University						5 %				13 %						11 %
Karolinska University Hospital			10 %			11 %				16 %						
Linköping University Hospital			9 %			7 %										
Sahlgrenska University Hospital			8 %			12 %				14 %						
Skåne University Hospital			8 %			9 %				11 %						
University Hospital of Umeå			7 %			11 %										
Uppsala University Hospital			6 %			11 %				9 %						
Örebro University Hospital			6 %			10 %										
HES Other						9 %		9 %		8 %						9 %
Other	13 %	9 %	11 %	10 %	11 %	12 %	10 %	9 %	11 %	11 %	5 %	10 %	9 %	10 %	9 %	10 %
HES Total	13 %	14 %	10 %	9 %	13 %	11 %	9 %	12 %	12 %	10 %	10 %	11 %	8 %	11 %	8 %	11 %
Sweden	13 %	14 %	10 %	9 %	13 %	11 %	9 %	11 %	11 %	10 %	10 %	11 %	8 %	11 %	8 %	11 %

*Data from Clarivate Analytics