Uppsala University Annual Bibliometric Monitoring 2020

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Abstract

Uppsala University Annual Bibliometric Monitoring produces statistics on publication volume, publishing level, citation impact, collaboration (in terms of co-publishing) and open access. The aggregation level is primarily department, which means that it is primarily the departments of Uppsala University that are the units of analysis in the monitoring. Two main data sources are used: the local publication database of Uppsala University, DiVA, and the in-house version of the Web of Science database available at the Centre for Science and Technology Studies at Leiden University, the Netherlands. The considered publication period is 2011-2019. The results are presented in graphs or in tables, and in the next to last section, the results are briefly summarized. Regarding the domain Humanities and Social Sciences, the indicator proportion of publication fractions at level 2 (in the Norwegian model), the departments *Economics* and *Peace and Conflict Studies* have the highest values for the last three considered publication years. The highest values on the citation indicators, with respect to the domain Medicine and Pharmacy and the whole publication period, are observed for the three departments *Medical Biochemistry and Microbiology*, *Immunology, Genetics and Pathology* and *Pharmacy*. For the domain Science and Technology, the three biology departments, *Cell and Molecular Biology*, *Ecology and Genetics* and *Organismal Biology*, all have high values on the citation indicators with respect to the whole publication period.

1 Introduction

Uppsala University (UU) *Annual Bibliometric Monitoring* (ABM) produces statistics on publication volume, publishing level, citation impact, collaboration (in terms of co-publishing) and open access (OA). The aggregation level is primarily department, which means that it is primarily the departments of UU that are the units of analysis in ABM. However, the first subsection of the results section below reports outcomes for UU as a whole.

Values of several bibliometric indicators are obtained for the departments included in ABM. Indicator values are obtained by publication year. However, 3-year moving averages are generally applied.

In "Quality and Renewal 2017" ("Kvalitet och förnyelse 2017") (Malmberg et al., 2017), the peer assessments were complemented with a bibliometric report. One conclusion of the exercise was that an annual bibliometric report was desirable. The ABMs are a response to this conclusion and present extensive bibliometric statistics with regard to the UU departments.

UU has six development goals to renew education and research.[1] For goal 2, "Develop research excellence", the citation impact indicator *proportion of frequently cited publications (top 10%)*, an indicator described in Section 2.2, is particularly relevant among the indicators included in ABM. The two collaboration indicators of ABM (Section 2.3)–*proportion of international collaborative publications* and *proportion of publications with industry*–are both relevant for goals 3 and 6, "Strengthen transdisciplinary and challenge-driven research" and "Develop collaboration", respectively.

[1] https://uu.se/en/about-uu/mission-goals-strategies/mission-goals-strategies/

The remainder of this report is structured as follows. Section 2 treats the data and methods of ABM. The results of ABM are reported in Section 3, whereas the results are briefly summarized in Section 4. Concluding remarks are given in Section 5.

2 Data and methods

Two main data sources are used in ABM: the local publication database of UU, DiVA, and the in-house version of the Web of Science (WoS) database available at the Centre for Science and Technology Studies (CWTS) at Leiden University, the Netherlands. The latter database is accessed via CWTS Monitor, a tool for bibliometric analysis of WoS publications and provided by CWTS. We used version 2020/2 in ABM 2020. DiVA data, or more precisely DiVA data as it appear in GLIS (*Generellt Lednings Informations System*), are used for the analysis according to the Norwegian model, and for obtaining the publication volume tables of the results section, whereas CWTS Monitor is used for the analysis of citation impact and collaboration. For the OA analysis, we use the same DiVA/GLIS data used for the Norwegian model analysis, combined with OA data from Unpaywall, DOAJ, OpenAPC and Sherpa Romeo.

In the Norwegian model, as well as in the citation analyses in ABM, author fractionalization is used. An author of a publication is assigned $1/n$ of the publication, where n is the number of authors of the publication. The fraction of the publication assigned to a given UU department is the sum of the author fractions with regard to the authors affiliated to the department. Note, though, that if an author is affiliated to m ($m \geq 2$) UU departments in a publication, the author contributes with $1/(n \times m)$ author fraction to all m departments (the author fraction an UU department has of a publication is more formally defined in Appendix 1).

In the citation analyses and in the collaboration analyses of ABM, only the WoS publication types "Article" and "Review" are taken into account. Further, in these two types of analyses, only core publications are used. Core publications are publications in international scientific journals in fields that are suitable for citation analysis.[2] In the citation analyses, author self-citations are excluded. A citation is counted as an author self-citation if the citing and the cited publication have at least one common author name.

For OA, we use full counts at the department level: each affiliated department is assigned the publication. OA is measured by defining the open access status for each publication and counting the number of publications affiliated to each department.

We use the following condition for department inclusion in the Norwegian model, the collaboration and the OA analyses:

(a) The researchers of the department have not their main affiliation to another unit.

Information on (a) was obtained from the offices for the three scientific domains of UU. These three domains are Humanities and Social Sciences (HumSam), Medicine and Pharmacy (MedFarm), and Science and Technology (TekNat).

With regard to the citation analyses of ABM, the following two inclusion conditions are applied:

(a) the researchers of the department have not their main affiliation to another unit, and
(b) the department has at least 40 (core) publications (of the types "Article" and "Review") in the period 2011-2018.

For each table below that reports citation analysis results, the expression "null" in a cell indicates that condition (a), but not condition (b), is satisfied by the department corresponding to the row of the cell.

[2] For more on core journals, see the CWTS Leiden Ranking page https://www.leidenranking.com/information/indicators.

2.1 The Norwegian model

The Norwegian model considers publishing volume and publishing level. For level, the model does not use citations. Instead, the model takes into account the extent to which publications from a unit of analysis are published in publishing channels with large prestige. The channels that are considered in the model are journals, publishers and series. A large number of channels have been assessed in Norway by subject experts and assigned to one of three levels: level 0 (non-scientific channel), level 1 (scientific channel), and level 2 (scientific channel with extra-large prestige).

The Norwegian model comprises three publication types: article in journal or series, article in anthology and monograph. Conference papers are taken into account. If the host publication of a conference paper belongs to a series, the paper is classified as article in journal or series, otherwise the paper is classified as article in anthology. The weight of a publication is determined by its type and by the level of its channel. How publications are weighted is reported in Table 1.

Table 1. The weights of the Norwegian model as a function of publication type and publishing level.

Publication type	Level 1	Level 2
Article in journal or series	1	3
Article in anthology	0,7	1
Monograph	5	8

The publishing channels at level 2 in a given research field should publish a certain proportion (20%) of the publications of the field. By this rule, comparisons across fields are fairer, compared to if a certain number of channels, constant across fields, had been stipulated for level 2. The reason for this is that the access to level 2 channels becomes more equal across fields. Note that the proportion publications at level 2 for a given unit of analysis can be seen as a quality indicator (Schneider, 2009).

Some publications are excluded in analyses according to the Norwegian model, for instance:

- Letter to the editor
- Working reports
- Publications where the author has editorship
- Popular scientific publications

Each unit of analysis is assigned a publication score, a weighted expression for publishing volume and publishing level. The scores are obtained by multiplying author fractions by weights. For example, the publication score for a department, for a given publication year, with respect to articles published in level 2 journals is equal to the sum of the department author fractions over the articles (published in the year) multiplied by 3, the weight for a an article published in a level 2 journal (Table 1).

In ABM, each considered UU department is assigned a publication score for each considered publication year. In the application of the Norwegian model, the publication period is 2012-2019.

2.2 Field normalized citation impact

An important principle in evaluative bibliometrics is to compare like with like. It is a fact that citation volumes are not equal across research fields. For instance, the volumes are considerably larger in biomedicine than in pure mathematics. This is due to different citation practices in the two fields. If publications from fields as these two should be compared with regard to citation impact, some form of normalization of raw citations scores should be performed. In ABM, all used citation impact indicators are *field normalized*.

The publication period used for the citation analyses is 2011-2018. The end publication year in the version of CWTS Monitor used is 2018. Further, a later end year than 2018 would not be proper due to an inappropriately short citation window.

ABM makes use of two kinds of field normalized citation indicators: publication-level indicators and journal-level indicators. In the next section, we treat the former ones, whereas the latter ones are treated in the section after the next section.

Publication-level indicators

Two publication-level indicators are used, namely *mean normalized number of citations per publication* (MNCS) and *proportion of frequently cited publications (top 10%)* (PP(top 10%)). These two indicators, which complements each other, are used, for instance, in the CWTS Leiden Ranking 2020.[3] For both MNCS and PP(top 10%), and for the two journal-level indicators described below, a subject classification of publications is used for normalization purposes. The classification is generated by application of an advanced clustering methodology, in which a publication-publication relatedness measure based on direct citations between publications is utilized (Waltman & van Eck, 2012). The classification, which contains about 4,000 classes, is such that each publication belongs to exactly one class.[4]

Regarding MNCS, and for each publication from a given department, the citation score of the publication is divided by the mean citation score across the publications, published in the same year as the publication, in the class to which the publication belongs. The resulting value is a (field) normalized citation score (NCS) for the publication. The MNCS for the department is then obtained by dividing the weighted sum of NCS values over the publications from the department–where the weight of a publication consists of the author fraction the department has of the publication–by the sum of the department author fractions over the publications. If the department has a MNCS of, say, 1.2, the department performs 20% above world average (= 1).

For PP(top 10%), and publication *i* from the department, the same class in the classification is used as in the calculation of the NCS for *i*. The citation score distribution for the class, with respect to publications published the same year as *i*, is obtained, and the extent to which *i* belongs to the 10% most frequently cited publications is determined. The result for *i* is a value in the interval [0, 1], say $(\text{top } 10\%)_i$.[5] PP(top 10%) for the department is then obtained by dividing the weighted sum of (top 10%) values over the publications from the department–where the weight of a publication consists of the author fraction the department has of the publication–by the sum of the department author fractions over the publications (cf. the calculation of MNCS). If the department has a PP(top 10%) value of, say, 8, the department performs 20% below the world average (= 10).

Journal-level indicators

The two publication-level citation indicators are complemented by two corresponding journal-level citation indicators, namely *mean normalized journal impact score per publication* (MNJS) and *mean journal proportion of top 10% publications* (MJPP(top 10%)).

For MNJS, each journal is first assigned an impact score, NJS, for each of the considered publication years. NJS, for given year, is equal to the mean across the NCSs of the publications in the journal published that year. Thus, NJS is a field normalized variant of the well-known Journal Impact Factor, values of which is available in Journal Citation Reports (provided by Clarivate Analytics). The latter indicator is not field normalized, however. Now, for a department and each publication from the department, the department author fraction of the publication is multiplied by the NJS of the journal of

[3] http://www.leidenranking.com/

[4] The traditional approach to field normalization typically uses the journal subject categories in WoS. However, one problem with the traditional approach is that the subfields of a certain field, where the fields are defined at a given level of granularity, might differ substantially from each other in terms of citation volume (e.g., van Eck et al., 2013). Moreover, it is clearly more reasonable to group the publications themselves into subject classes than to group the publications into such classes based on subject class membership of their journals.

[5] The approach to assign fractions of publications to the (for instance) 10% most frequently cited publications is described and discussed by Waltman and Schreiber (2013). The approach has the property to produce exactly 10% top 10% publications. In Appendix 1, we show how the extent to which publication *i* belongs to the 10% most frequently cited publications is calculated.

the publication with respect to the publication year of the publication. These operations yield a weighted sum over the publications from the department, and this sum is divided by the sum of the department author fractions over the publications. The result of the division is the MNJS for the department. Like MNCS, the world average for its journal-level counterpart, MNJS, is equal to 1.

The MJPP(top 10%) indicator is calculated as follows. For each combination of a journal, a class, and a publication year, the proportion of the publications in that journal, class, and year that belong (to a degree in the interval [0, 1]) to the 10% most frequently cited publications in that class and year is determined. This yields a PP(top 10%) value for each combination of a journal, a class, and a year. This value is assigned to all publications in that journal, class, and year. In this way, each publication obtains a JPP(top 10%) value. The MJPP(top 10%) value of a department is obtained dividing the weighted sum of JPP(top 10%) values over the publications from the department–where the weight of a publication consists of the author fraction the department has of the publication–by the sum of the department author fractions over the publications.

2.3 Collaboration

ABM uses two collaboration indicators: *proportion of international collaborative publications* (PP(int collab)) and *proportion of publications with industry* (PP(industry)). PP(int collab) for a department is the proportion of its publications that have been co-authored with two or more countries, whereas PP(industry) for a department is the proportion of its publications that have been co-authored with one or more industrial organizations. All private sector for profit business enterprises, covering all manufacturing and services sectors, are regarded as industrial organizations.

Here, and normally, full counts (and not fractional counts) are used for collaboration analysis. This means, taken international collaboration as an example, that if an UU department publication has at least one foreign address, relative to Sweden, the department is assigned one international collaborative publication, regardless of the author fraction the department has of the publication. If fractional counts are used, collaboration might be underestimated. However, publications with many organizations, like some of the publications in certain subfields of physics, do not indicate, to any larger extent, collaboration between the involved organizations. Such publications are included in the analysis.

For the collaboration part of ABM, the publication period is 2011-2018.

2.4 Open access

Explained in a simple way, OA is the concept of publications distributed online, free of cost or other access barriers to the reader. In the research policy bill “Forskning, frihet, framtid” (Prop. 2020/21:60), the Government’s national direction towards open science states that scientific publications, which are the result of research financed with public funds, should be published using immediate OA, with effect from year 2021. It is a shared responsibility for all actors in the research system that the direction towards immediate OA is followed and achieved. Large national and international funders, such as the Swedish Research Council and Horizon 2020 (European Commission), also mandate OA publishing. This makes it relevant to measure the trend of OA publishing at UU.

How far the shift to OA publishing has come and the possibility and simplicity to achieve OA differs greatly between fields and publication patterns (Piwowar et al., 2018). It should be kept in mind that the results for OA presented in ABM are not field normalized, so direct comparisons between different fields or departments should be avoided.

There are different ways for a researcher to achieve OA and different ways to define a source of a publication as being OA. In ABM, we use the following definitions with respect to OA types of publications:

Gold OA: Articles published in an OA journal, in which all articles are accessible directly and freely on the journal or publisher website; books and book chapters accessible directly and freely on the publisher website. Gold OA may or may not involve publication fees (APC).

Hybrid OA: Articles published in a subscription journal but that are immediately free to read under an open license, in exchange for publication fees (APC).

Green OA: Accepted author manuscript versions or versions of record of articles published in a journal, but self-archived in open institutional or subject specific repositories, usually after an embargo period; self-archived books and book chapters. Green OA publications that also satisfies the definition for Gold or Hybrid OA are only assigned to these latter types and are thereby not counted as Green OA in ABM.

Bronze OA: Publications free to read on the journal or publisher website, but lack a clearly identifiable license or other open access-information. Bronze OA is not included in ABM.

In ABM, we use DiVA, DOAJ, OpenAPC and Unpaywall as primary sources to determine if a publication is OA, and, if this is the case, to determine the OA type of the publication. A publication *P* is considered to be OA in ABM if at least one of the following five conditions is satisfied:

1) *P* is classified as ”gold”, “hybrid” or ”green” OA in Unpaywall (preprints excluded from “green”).
2) *P* is classified as ”gold” or “hybrid” in OpenAPC.
3) The full text of *P* is published OA in DiVA.
4) *P* is included in a journal classified as OA journal in DiVA.
5) *P* is included in a journal classified as OA in DOAJ.

Some publications are reclassified as “hybrid” from “green” if data in both DiVA and Sherpa Romeo supports the reclassification.

For the OA part of ABM, the publication period is 2012-2019. The publication types taken into account are the same that are used in the Norwegian model analysis, i.e. article in journal or series, article in anthology and monograph.

3 Results

In this section, we report the results of ABM. We first give, as a background, some results for UU as a whole. We then report the results for the UU departments, grouped by scientific domain.

Each of the sections 3.2-3.4, which corresponds to scientific domains, initially puts forward tables, which correspond to faculties and which report publication volumes (absolute and relative) and WoS coverage by department and publication type. Regarding WoS coverage, the validity of bibliometric indicators are in general higher if the coverage is high compared to low. Within a given section corresponding to a scientific domain, like Section 3.2, the other results are grouped based on what is analyzed: publishing volume and publishing level (the Norwegian model), field normalized citation impact, collaboration, and OA. Within a group of the indicated kind, the results are grouped by faculty.

3.1 UU as a whole

In Figure 1, an overview of the subject profile of UU is given.[6] In the map of the figure, all WoS subject categories in which UU has at least one publication of the types “Article” or “Review” and published in the period 2009-2018 are represented (239 categories). The size of a node indicates the publication output of UU in the corresponding category, whereas the color of a node indicates citation impact, measured by the indicator MNCS. Note that the MNCS is determined only by the locally relevant scientific neighborhoods of the publications, i.e. by the classes of the publications (cf. Section 2.2), instead of the subject categories at large. The color coding is as follows:

- Blue: The MNCS, determined as indicated above, of the UU publications selected based on the subject category is far below world average

[6] The subject profile overview was inspired by the CWTS web page at the following address: https://www.vosviewer.com/university-profile-maps.

- Green: The MNCS, determined as indicated above, of the UU publications selected based on the subject category is around world average.
- Red: The MNCS, determined as indicated above, of the UU publications selected based on the subject category is far above world average.

Observe that the number of publications in some subject categories is very low. In such cases, the color of the category should be interpreted with caution.

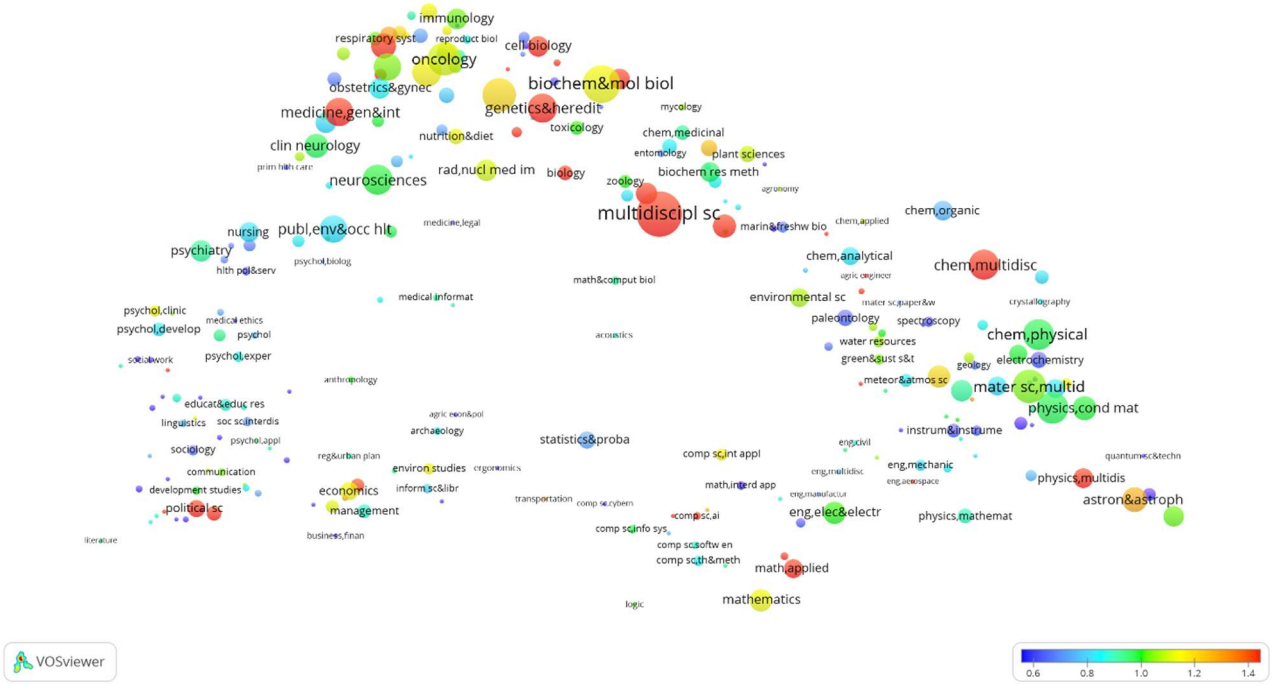

Figure 1. Subject profile map for UU. Publication period: 2009-2018.

In Figure 2, UUs proportion (in %) of the total number of publication fractions (P) for UU in combination with 10 benchmarking universities (see Table 2) is shown by publication year. The figure also shows UUs proportion of the total number of publication fractions belonging to the top 10% most frequently cited (P(top 10%)) for the same combination, where class (and thereby subject) and publication year of the publications are taken into account. The figure can be interpreted as the research production of UU over time, relative to a comparable set of universities.

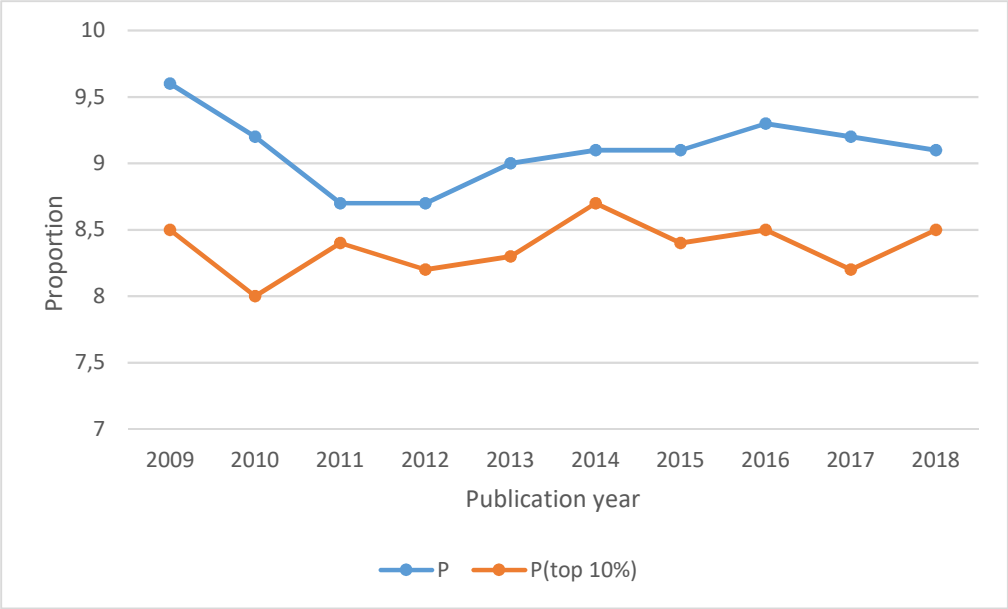

Figure 2. UUs proportion of publication fractions and of publication fractions belonging to the top 10% most frequently cited, by publication year and with regard to UU in combination with 10 benchmarking universities. Publication period: 2009-2018.

In Table 2, the 10 benchmarking universities are listed, together with a brief motivation for their inclusion.

Table 2. The 10 benchmarking universities.

Benchmark university	**Brief motivation for inclusion**
Durham University	European reference, belonging to the Matariki[7] network
Eberhard Karls University Tübingen	European reference, belonging to the Matariki and Guild[8] networks
Ghent University	European reference, belonging to U4Society[9] and Guild
Lund University	Swedish reference, belonging to the SLUG[10] network
Stockholm University	Swedish reference, belonging to the SLUG network
University of Copenhagen	Nordic reference
University of Gothenburg	Swedish reference, belonging to the SLUG network
University of Groningen	European reference, belonging to U4Society and Guild
University of Helsinki	Nordic reference
University of Oslo	Nordic reference

In Figure 3, UUs proportion of OA publications, and UUs proportion by OA type, relative to the total publication output are shown (the proportions are given as percentages). For UU as a whole, the proportion of OA publications is increasing during the considered publication period (the uppermost curve). Note that, for a given publication period, the proportion Total OA is equal to the sum of the proportions across the three OA types.

[7] The Matariki network is an international group of seven universities.
[8] The Guild is a network of 21 European universities.
[9] U4Society is a collaboration between five European universities.
[10] SLUG is a Swedish network of the Stockholm, Lund, Uppsala and Gothenburg universities.

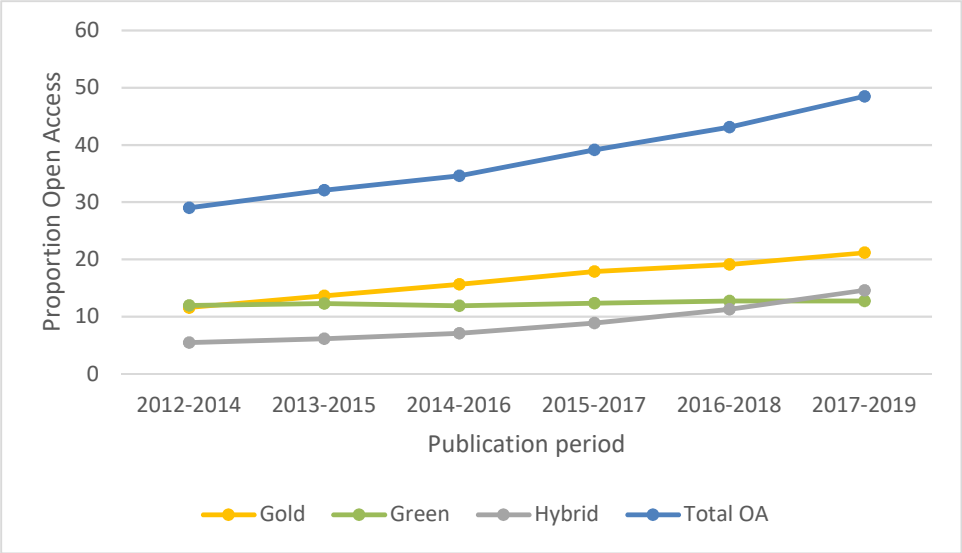

Figure 3. UUs proportion of OA publications, and UUs proportion by OA type, relative to the total publication output. Publication period: 2012-2019. 3-year moving average.

3.2 HumSam

The number of HumSam units of analysis included in ABM is 31: 28 departments and three faculties. For the latter, *Faculty of Law* and *Faculty of Theology* consists of only one large department each, responsible for all publications, and nearly all the publications of the *Faculty of Education* belong to the *Department of Education*.

Tables 3-6 report publication volume in terms of both fractional counts and full counts (within parentheses) by department (by faculty for Table 4) and publication type, and WoS coverage. WoS coverage concerns the number of WoS publications of the four types represented in the tables relative to all publications of these types for the department.

Table 3. Faculty of Arts. Publication volume by publication type, and WoS coverage (in %). Publication period: 2011-2019.

Department	**Publication type**					
	Article	**Article in anthology**	**Monograph**	**Conference paper**	**Total**	**WoS coverage**
ALM	95,9 (131)	57,3 (72)	7,3 (9)	18,9 (30)	179,4 (242)	27,0
Archeology and Ancient History	223,6 (332)	232,3 (257)	17,9 (23)	30,1 (38)	503,9 (650)	18,3
Art History	80,5 (101)	91,7 (98)	9,8 (11)	21,7 (35)	203,7 (245)	16,1
Cultural Anthropology and Ethnology	129,2 (150)	129,0 (146)	28,7 (37)	4,3 (5)	291,3 (338)	9,0
Game Design	13,2 (21)	0,25 (1)	50,0 (50)	14,8 (25)	78,3 (97)	7,5
Gender Research	132,9 (182)	117,9 (147)	10,9 (15)	13,6 (18)	275,3 (362)	17,4
History	183,6 (204)	268,3 (291)	32,7 (38)	25,6 (27)	510,2 (560)	15,6
History of Sciences and Ideas	157,8 (174)	137,7 (152)	10,8 (15)	1,25 (2)	307,6 (343)	13,2
Literature	169,7 (185)	271,2 (292)	67,3 (71)	7,1 (9)	515,3 (557)	2,8
Musicology	123,5 (129)	66,0 (68)	10,0 (10)	1,0 (1)	200,5 (208)	11,3
Philosophy	171,1 (183)	143,3 (154)	12,8 (15)	10,5 (11)	337,8 (363)	21,9

Table 4. Faculty of Education, Faculty of Law and Faculty of Theology. Publication volume by publication type, and WoS coverage (in %). Publication period: 2011-2019.

Faculty	Publication type					
	Article	Article in anthology	Monograph	Conference paper	Total	WoS coverage
Faculty of Education	340,5 (487)	317,5 (404)	47,8 (69)	56,8 (77)	762,7 (1037)	16,6
Faculty of Law	545,4 (606)	544,5 (573)	115,4 (136)	10,1 (12)	1215,3 (1327)	4,0
Faculty of Theology	335,4 (378)	426,4 (456)	75,3 (88)	15,4 (18)	852,4 (940)	11,7

Table 5. Faculty of Languages. Publication volume by publication type, and WoS coverage (in %). Publication period: 2011-2019.

Department	Publication type					
	Article	Article in anthology	Monograph	Conference paper	Total	WoS coverage
English	119,4 (129)	99,1 (108)	16,2 (17)	5,5 (6)	240,2 (260)	23,7
Linguistics and Philology	320,2 (379)	282,7 (315)	60,1 (71)	129,2 (192)	792,2 (957)	9,3
Modern Languages	238,5 (260)	224,4 (239)	19,0 (25)	34,7 (39)	516,5 (563)	8,1
Scandinavian Languages	390,1 (424)	179,9 (197)	21,7 (28)	57,8 (65)	649,5 (714)	3,0

Table 6. Faculty of Social Sciences. Publication volume by publication type, and WoS coverage (in %). Publication period: 2011-2019.

Department	Publication type					
	Article	Article in anthology	Monograph	Conference paper	Total	WoS coverage
Business Studies	302,1 (429)	260,1 (339)	51,6 (74)	131,1 (172)	745,0 (1014)	20,7
Economic History	131,5 (171)	222,5 (253)	32,5 (40)	30,3 (37)	416,9 (501)	14,0
Economics	160,9 (287)	10,0 (14)	4,6 (7)	0,0 (0)	175,6 (308)	75,6
Food Studies, Nutrition and Dietetics	72,7 (152)	59,1 (67)	1,8 (3)	3,3 (7)	136,9 (229)	36,1
Government	336,9 (469)	239,0 (283)	32,8 (40)	30,5 (34)	639,2 (826)	31,8
Housing and Urban Research	171,4 (290)	152,2 (197)	18,7 (26)	52,7 (64)	395,0 (577)	20,4
Informatics and Media	121,4 (177)	112,7 (141)	14,9 (18)	99,2 (145)	348,3 (481)	19,9
Peace and Conflict Studies	254,2 (314)	173,3 (201)	25,1 (32)	16,5 (20)	469,1 (567)	36,5
Psychology	348,5 (701)	31,3 (39)	6,0 (8)	16,0 (23)	401,8 (771)	75,1
Russian and Eurasian Studies	249,7 (290)	151,2 (165)	21,9 (25)	11,8 (13)	434,7 (493)	17,6
Social and Economic Geography	146,4 (206)	57,7 (70)	6,7 (9)	9,0 (11)	219,7 (296)	50,4
Sociology	236,5 (332)	158,8 (206)	25,1 (37)	37,2 (49)	457,5 (624)	26,8
Statistics	67,2 (142)	1,0 (1)	1,0 (2)	2,5 (9)	71,6 (154)	89,1

3.2.1 Publishing volume and publishing level–The Norwegian model

Faculty of Arts

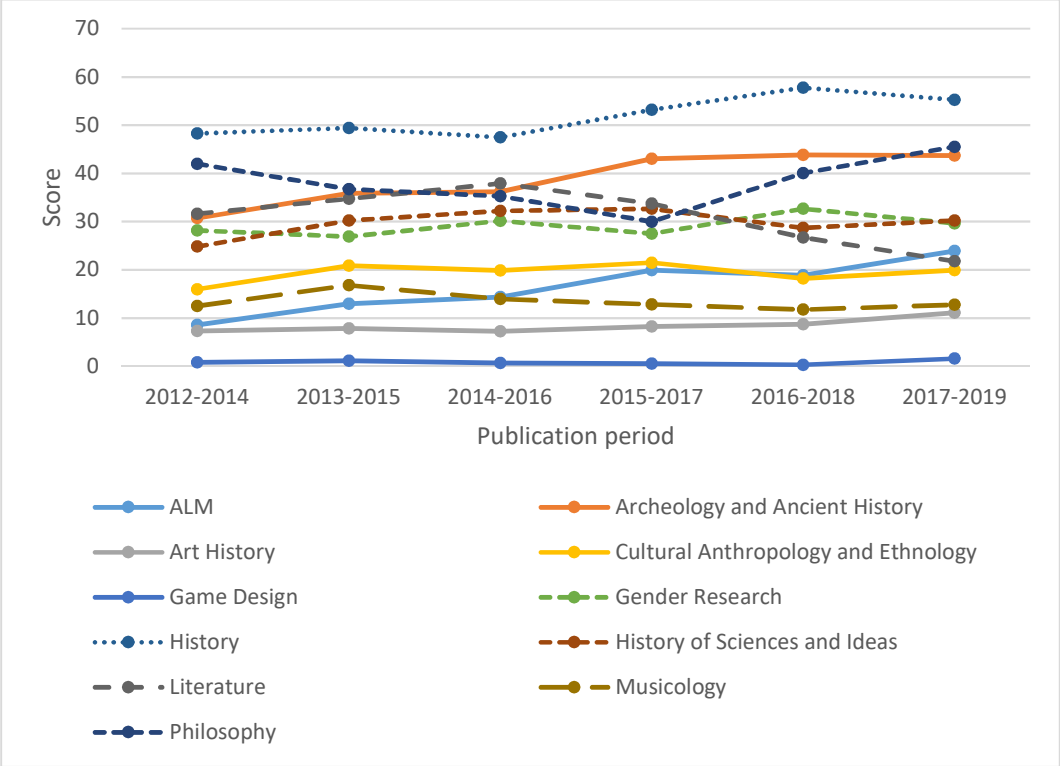

Figure 4. Faculty of Arts. Norwegian score by publication period. 3-year moving average.

Table 7. Faculty of Arts. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	**2012-2014**	**2013-2015**	**2014-2016**	**2015-2017**	**2016-2018**	**2017-2019**
ALM	26,8 (19,9)	42,9 (24,7)	32,7 (29,3)	38,0 (32,1)	33,2 (32,4)	48,0 (40,2)
Archeology and Ancient History	32,3 (73,6)	30,6 (94,9)	34,4 (91,6)	38,6 (97,3)	48,0 (89,2)	45,8 (86,1)
Art History	7,8 (21,9)	6,7 (23,4)	7,4 (21,3)	3,2 (24,2)	11,9 (21,7)	17,2 (26,1)
Cultural Anthropology and Ethnology	33,0 (31,8)	36,9 (39,3)	37,0 (41,0)	38,1 (45,1)	28,2 (46,1)	20,1 (48,7)
Game Design	0,0 (3,0)	0,0 (4,0)	0,0 (2,1)	0,0 (1,8)	0,0 (1,1)	7,3 (4,6)
Gender Research	30,4 (60,9)	22,5 (59,5)	19,6 (65,0)	27,3 (58,9)	27,9 (71,9)	32,4 (60,3)
History	19,0 (105,0)	23,3 (104,6)	31,6 (94,9)	36,7 (96,6)	41,5 (99,2)	37,5 (90,6)
History of Sciences and Ideas	28,2 (59,7)	30,7 (66,7)	30,1 (73,1)	28,5 (66,1)	21,3 (69,5)	31,2 (64,0)
Literature	11,5 (95,8)	12,8 (94,0)	10,2 (83,0)	5,9 (67,3)	11,0 (54,5)	13,0 (46,2)
Musicology	19,4 (31,0)	18,8 (37,2)	15,5 (32,2)	23,2 (30,2)	31,7 (30,0)	27,9 (34,0)
Philosophy	39,7 (91,8)	36,5 (77,7)	46,1 (77,7)	49,4 (59,3)	49,3 (72,0)	47,2 (80,5)

Faculty of Education, Faculty of Law and Faculty of Theology

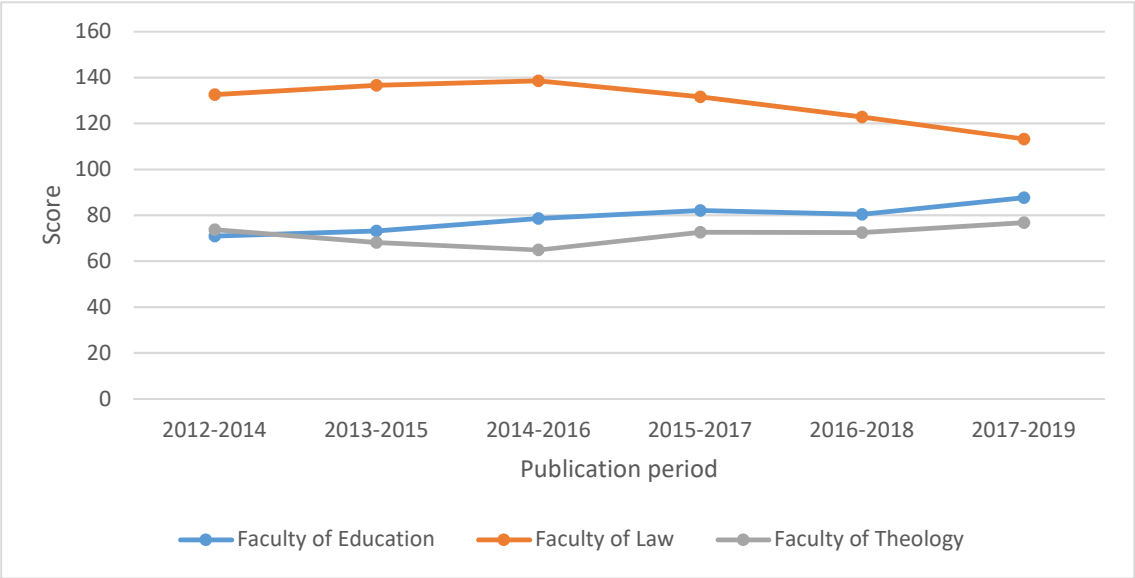

Figure 5. Faculty of Education, Faculty of Law and Faculty of Theology. Norwegian score by publication period. 3-year moving average.

Table 8. Faculty of Education, Faculty of Law and Faculty of Theology. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	**2012-2014**	**2013-2015**	**2014-2016**	**2015-2017**	**2016-2018**	**2017-2019**
Faculty of Education	11,2 (144,6)	15,6 (149,3)	18,5 (170,0)	25,7 (164,5)	26,9 (149,7)	29,5 (159,1)
Faculty of Law	13,3 (280,6)	19,7 (288,8)	25,0 (303,9)	24,4 (277,0)	21,7 (267,2)	18,4 (236,9)
Faculty of Theology	34,1 (157,8)	36,1 (151,1)	34,0 (141,2)	31,1 (158,4)	37,8 (151,7)	35,4 (159,2)

Faculty of Languages

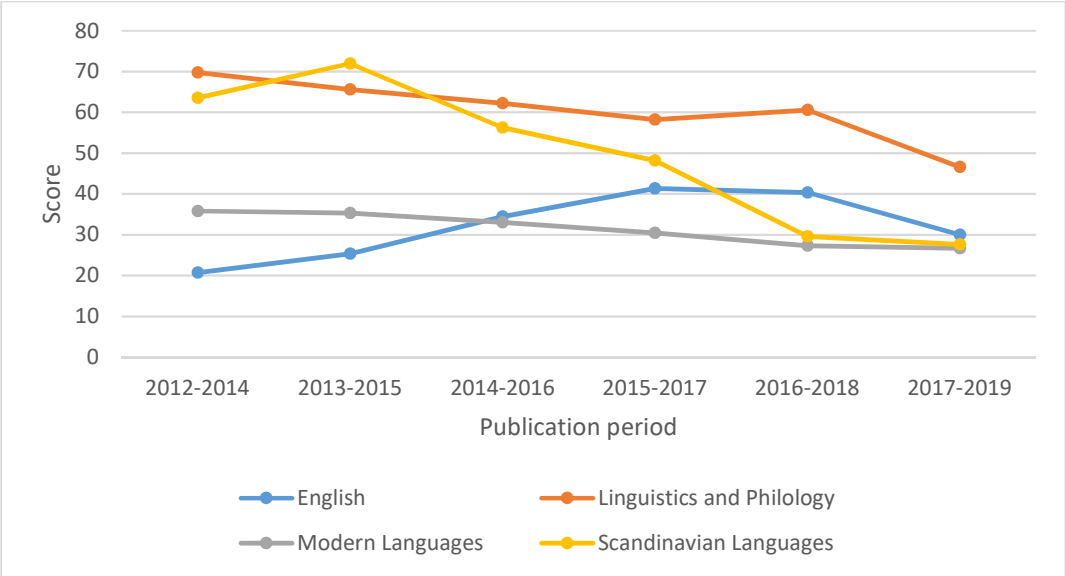

Figure 6. Faculty of Languages. Norwegian score by publication period. 3-year moving average.

Table 9. Faculty of Languages. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019
English	25,6 (53,8)	33,2 (59,5)	40,3 (59,0)	42,3 (66,3)	40,2 (64,3)	44,7 (56,7)
Linguistics and Philology	51,9 (133,0)	51,2 (128,9)	54,5 (113,7)	48,7 (106,2)	54,7 (111,0)	46,7 (107,0)
Modern Languages	15,8 (100,3)	16,2 (97,8)	15,1 (93,0)	18,1 (81,8)	13,0 (84,8)	18,2 (71,3)
Scandinavian Languages	30,9 (119,9)	28,9 (134,9)	25,1 (109,6)	18,0 (107,2)	12,6 (73,8)	12,0 (70,4)

Faculty of Social Sciences

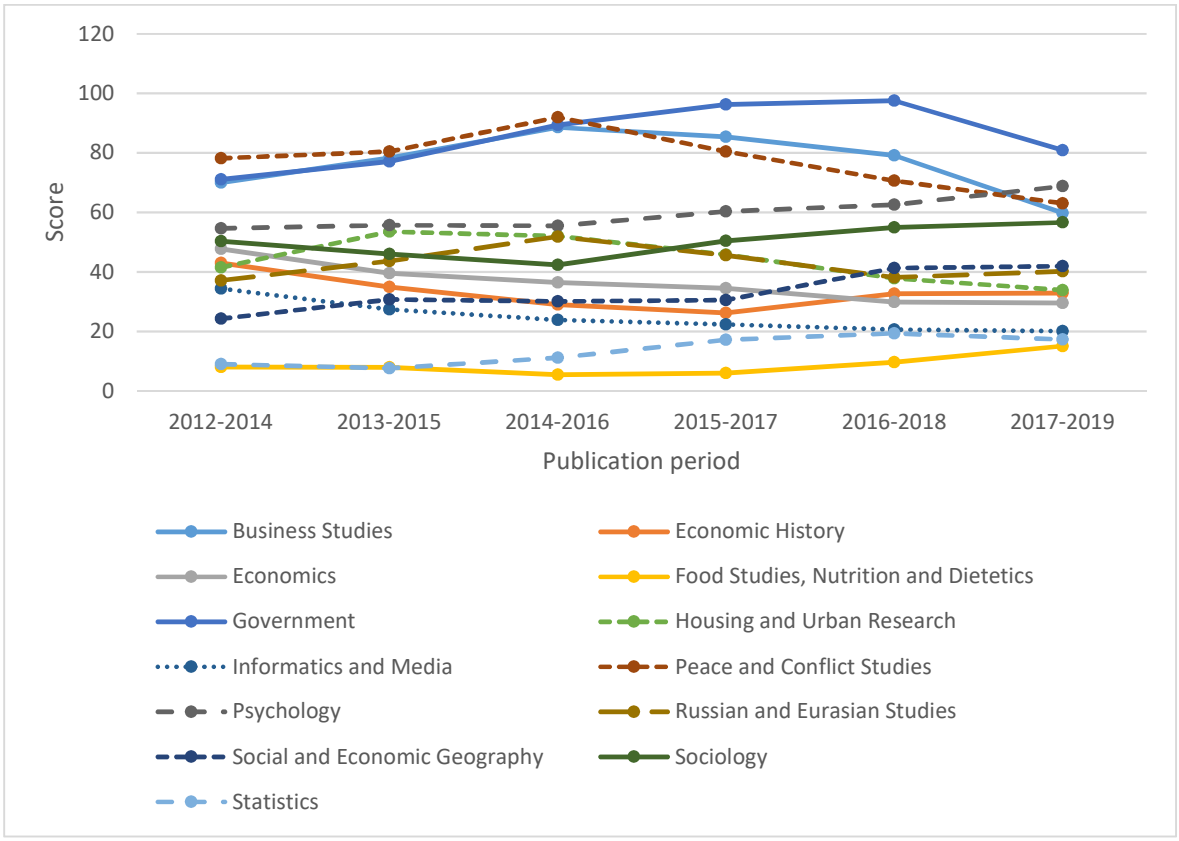

Figure 7. Faculty of Social Sciences. Norwegian score by publication period. 3-year moving average.

Table 10. Faculty of Social Sciences. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019
Business Studies	33,6 (134,7)	31,2 (145,2)	33,7 (168,9)	37,7 (163,3)	38,6 (158,2)	36,7 (118,6)
Economic History	20,6 (92,1)	26,3 (81,6)	30,7 (66,7)	31,3 (61,7)	37,6 (62,3)	43,2 (52,2)
Economics	38,3 (74,2)	44,3 (57,4)	45,7 (54,2)	50,3 (49,6)	50,6 (44,5)	57,6 (41,3)
Food Studies, Nutrition and Dietetics	8,0 (25,0)	10,1 (24,7)	14,0 (16,1)	12,9 (16,1)	7,9 (26,4)	11,4 (42,5)
Government	45,1 (148,9)	43,7 (154,0)	39,4 (169,8)	43,6 (171,1)	43,7 (182,3)	43,3 (153,9)
Housing and Urban Research	37,4 (81,2)	33,4 (106,4)	31,0 (101,5)	30,6 (93,9)	32,3 (75,3)	38,0 (65,6)
Informatics and Media	37,0 (70,9)	33,8 (60,4)	34,3 (51,0)	21,8 (50,3)	31,2 (51,0)	29,3 (59,2)
Peace and Conflict Studies	46,6 (144,5)	51,3 (125,6)	56,9 (141,8)	53,2 (134,2)	56,1 (130,7)	52,6 (111,6)
Psychology	21,8 (114,7)	21,4 (116,3)	25,0 (117,6)	26,2 (127,0)	29,1 (125,5)	32,4 (122,9)
Russian and Eurasian Studies	21,8 (69,0)	32,9 (85,1)	31,4 (109,7)	33,6 (100,6)	28,4 (78,8)	36,2 (66,1)
Social and Economic Geography	38,4 (46,6)	41,6 (58,1)	47,8 (58,0)	44,2 (59,9)	45,5 (68,9)	38,1 (72,0)
Sociology	26,4 (100,9)	27,2 (106,1)	23,5 (103,2)	26,2 (111,9)	31,7 (118,1)	40,8 (122,3)
Statistics	28,5 (17,2)	18,7 (15,6)	19,8 (21,0)	30,4 (29,6)	34,9 (32,6)	31,6 (31,8)

3.2.2 Field normalized citation impact

In each graph in this section, the label of the vertical axis that corresponds to the world average for the citation indicator of the graph is in green color.

Faculty of Arts

Table 11. Faculty of Arts. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPPtop10% for the whole publication period 2011-2018.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPPtop10%
ALM	30,7 (47)	1,01	8,9	0,98	10,4
Archeology and Ancient History	33,4 (87)	1,19	10,5	0,92	9,2
Art History	3,3 (10)	null	null	null	null
Cultural Anthropology and Ethnology	7,8 (11)	null	null	null	null
Game Design	0,1 (2)	null	null	null	null
Gender Research	17,8 (34)	null	null	null	null
History	15,4 (21)	null	null	null	null
History of Sciences and Ideas	4,4 (7)	null	null	null	null
Literature	0,0 (0)	null	null	null	null
Musicology	0,7 (2)	null	null	null	null
Philosophy	23,8 (25)	null	null	null	null

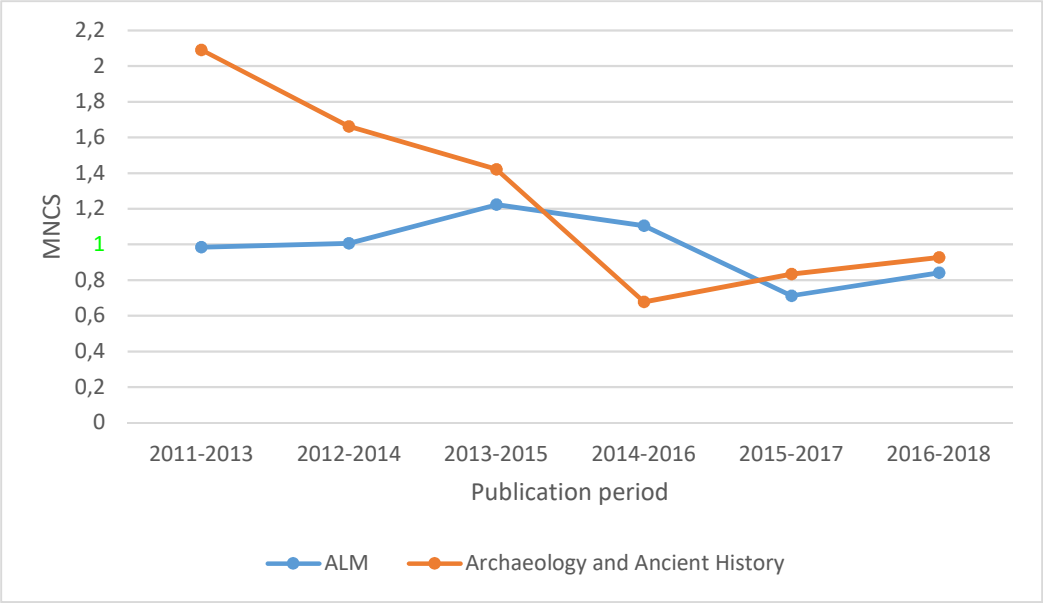

Figure 8. Faculty of Arts. MNCS by publication period. 3-year moving average.

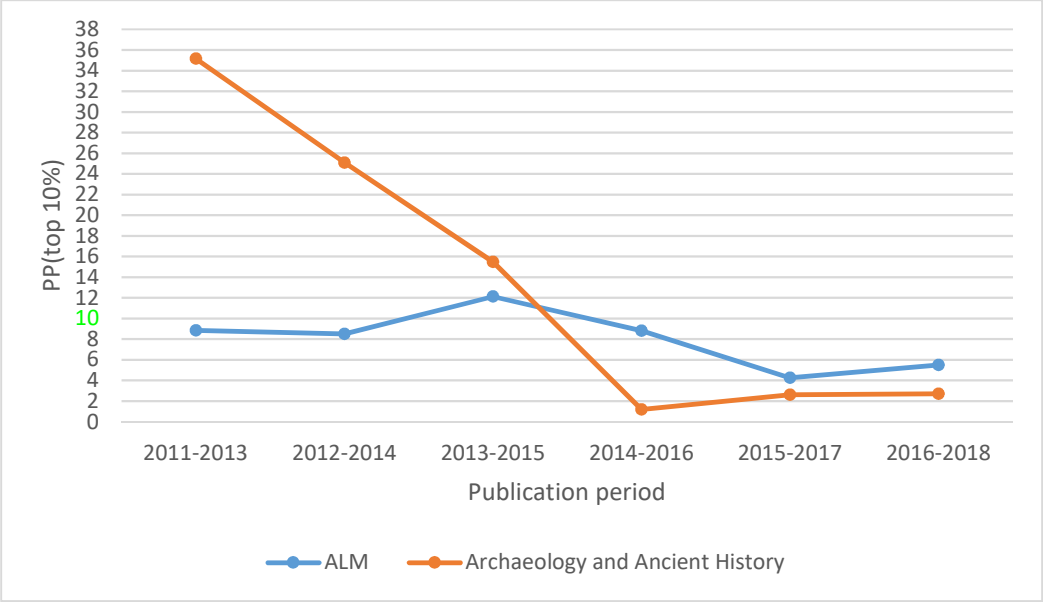

Figure 9. Faculty of Arts. PP(top 10%) by publication period. 3-year moving average.

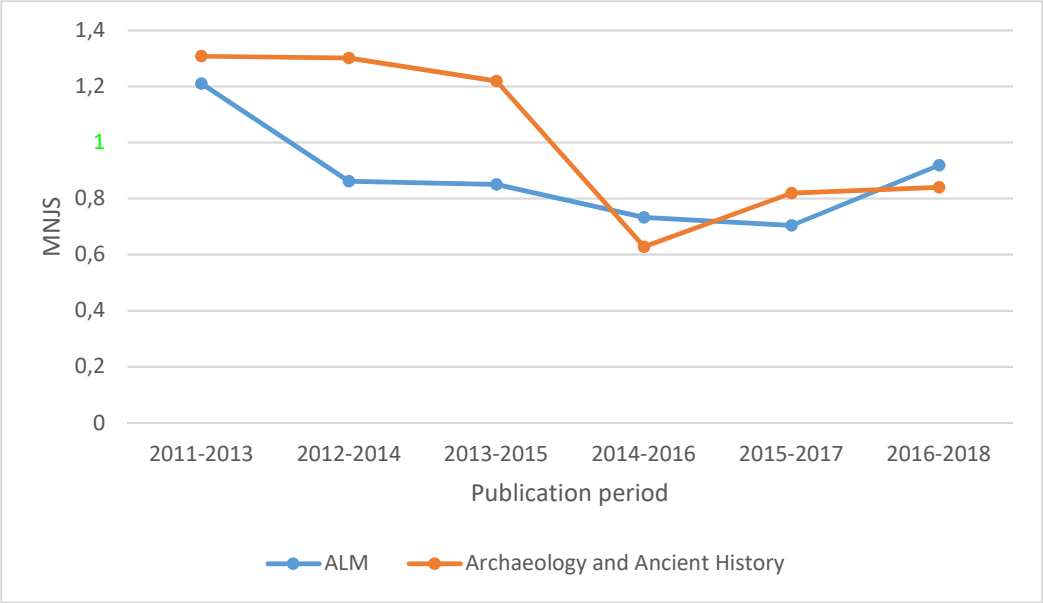

Figure 10. Faculty of Arts. MNJS by publication period. 3-year moving average.

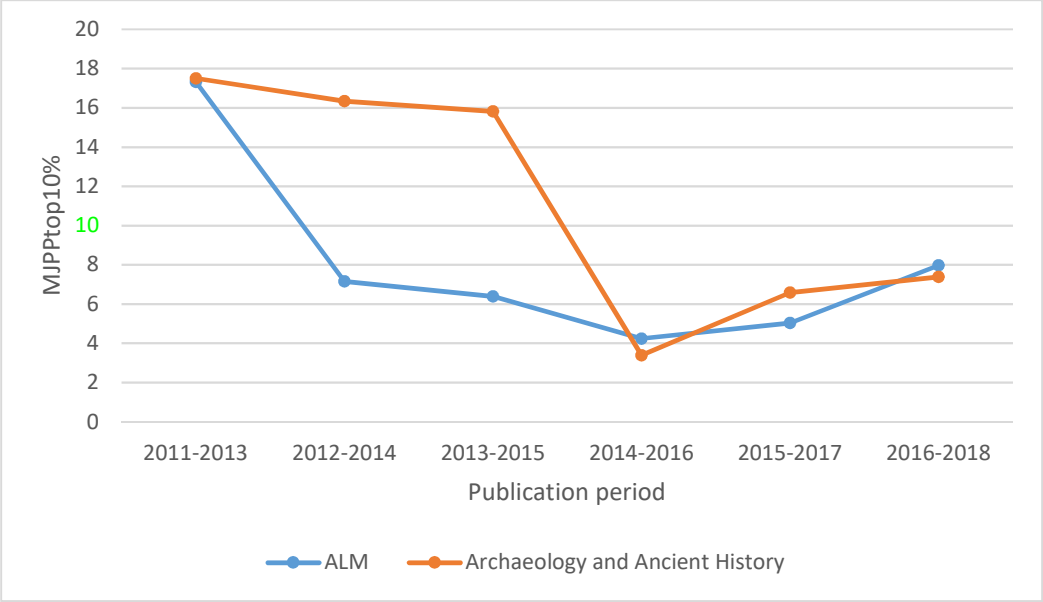

Figure 11. Faculty of Arts. MJPPtop10% by publication period. 3-year moving average.

Faculty of Education, Faculty of Law and Faculty of Theology

Table 12. Faculty of Education, Faculty of Law and Faculty of Theology. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPPtop10% by department and for the whole publication period 2011-2018.

Department	**Indicator**				
	P	**MNCS**	**PP(top 10%)**	**MNJS**	**MJPPtop10%**
Faculty of Education	66,0 (119)	0,74	7,0	0,85	8,2
Faculty of Law	20,5 (32)	null	null	null	null
Faculty of Theology	12,9 (25)	null	null	null	null

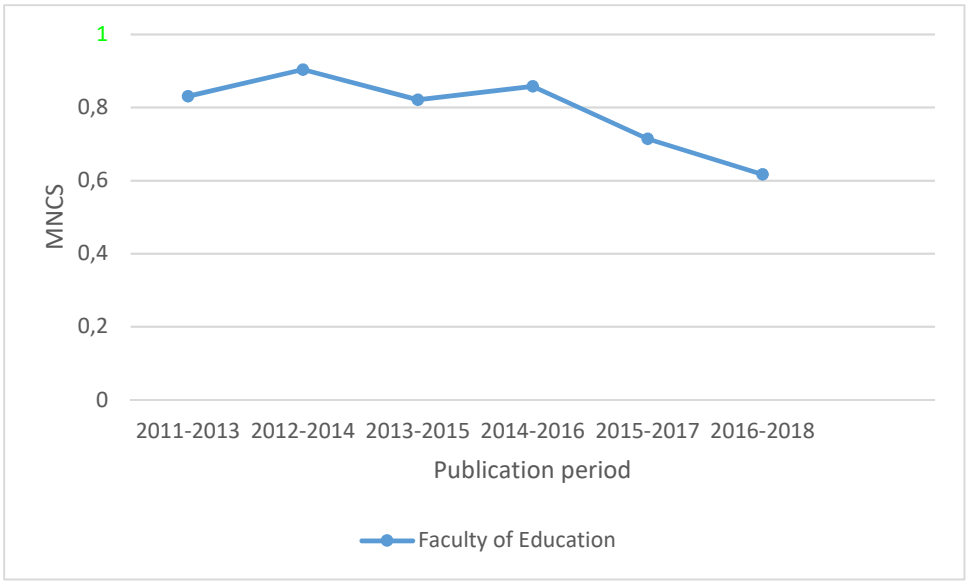

Figure 12. Faculty of Education. MNCS by publication period. 3-year moving average.

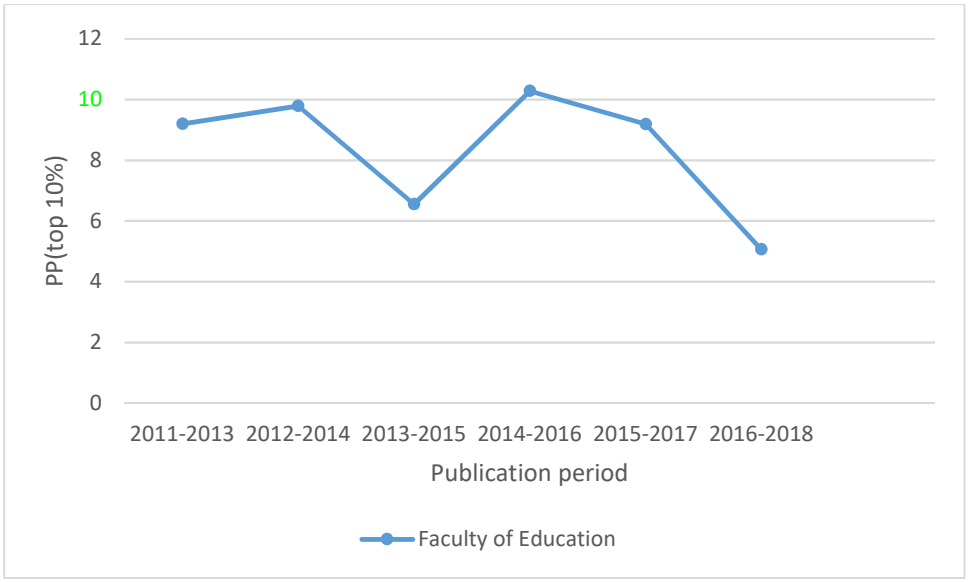

Figure 13. Faculty of Education. PP(top 10%) by publication period. 3-year moving average.

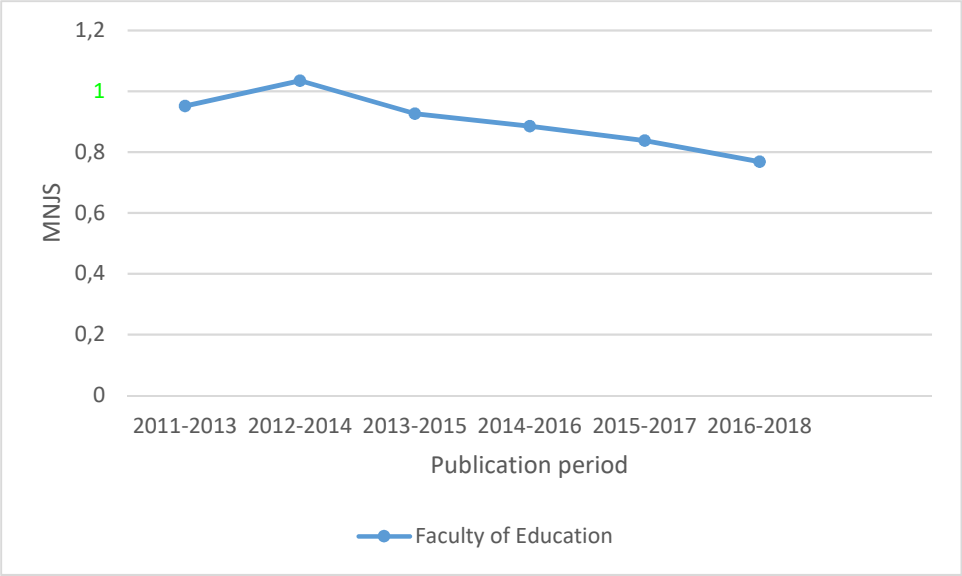

Figure 14. Faculty of Education. MNJS by publication period. 3-year moving average.

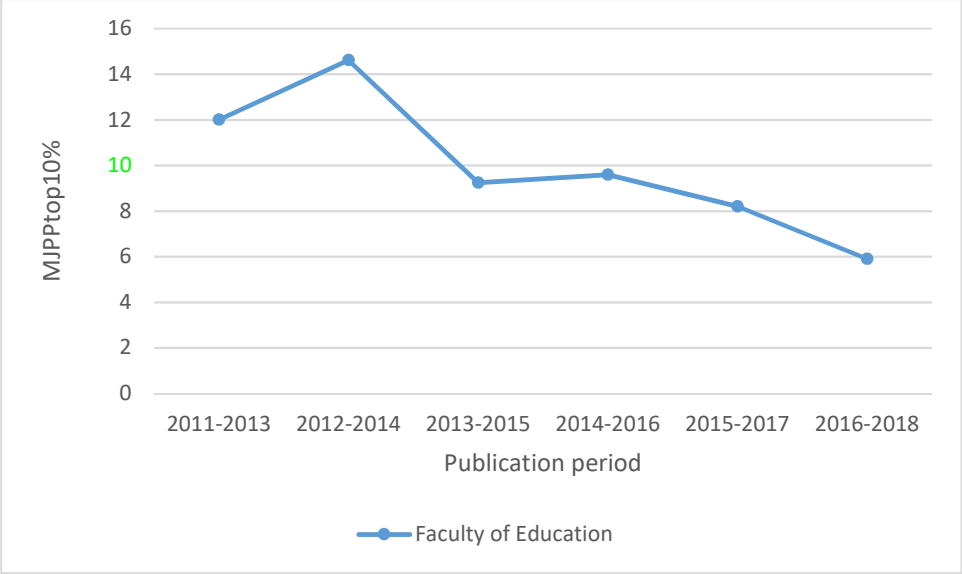

Figure 15. Faculty of Education. MJPPtop10% by publication period. 3-year moving average.

Faculty of Languages

Each of the four departments of the faculty has less than 40 publications for the publication period 2011-2018. This yields that the four departments are excluded from the citation analysis of ABM.

Table 13. Faculty of Languages. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPPtop10% for the whole publication period 2011-2018.

Department	**Indicator**				
	P	**MNCS**	**PP(top 10%)**	**MNJS**	**MJPPtop10%**
English	10,0 (11)	null	null	null	null
Linguistics and Philology	17,5 (33)	null	null	null	null
Modern Languages	5,3 (8)	null	null	null	null
Scandinavian Languages	6,9 (14)	null	null	null	null

Faculty of Social Sciences

Table 14. Faculty of Social Sciences. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPPtop10% by department and for the whole publication period 2011-2018.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPPtop10%
Business Studies	92,1 (167)	0,97	10,1	1,01	10,1
Economic History	21,0 (33)	null	null	null	null
Economics	86,7 (188)	1,12	14,4	1,22	13,5
Food Studies, Nutrition and Dietetics	35,7 (93)	0,61	2,3	0,76	6,4
Government	125,8 (207)	0,83	5,8	0,95	8,6
Housing and Urban Research	61,0 (128)	1,65	15,3	1,49	14,9
Informatics and Media	27,4 (48)	0,86	6,0	0,76	7,4
Peace and Conflict Studies	109,7 (157)	1,99	19,7	1,26	13,0
Psychology	235,2 (503)	1,13	9,9	1,13	10,3
Russian and Eurasian Studies	17,3 (32)	null	null	null	null
Social and Economic Geography	79,8 (126)	1,09	12,7	1,16	12,9
Sociology	64,1 (103)	0,65	2,1	0,76	5,1
Statistics	40,3 (93)	0,47	2,8	0,62	4,6

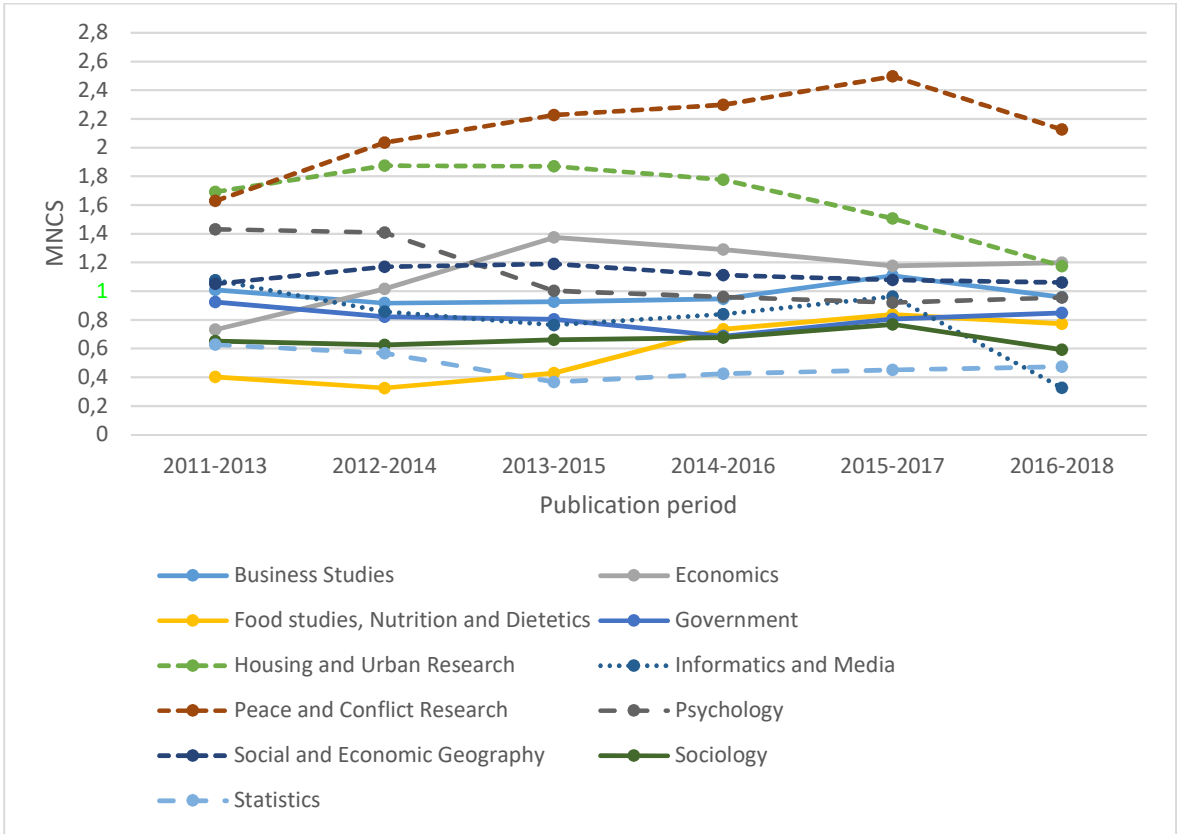

Figure 16. Faculty of Social Sciences. MNCS by publication period. 3-year moving average.

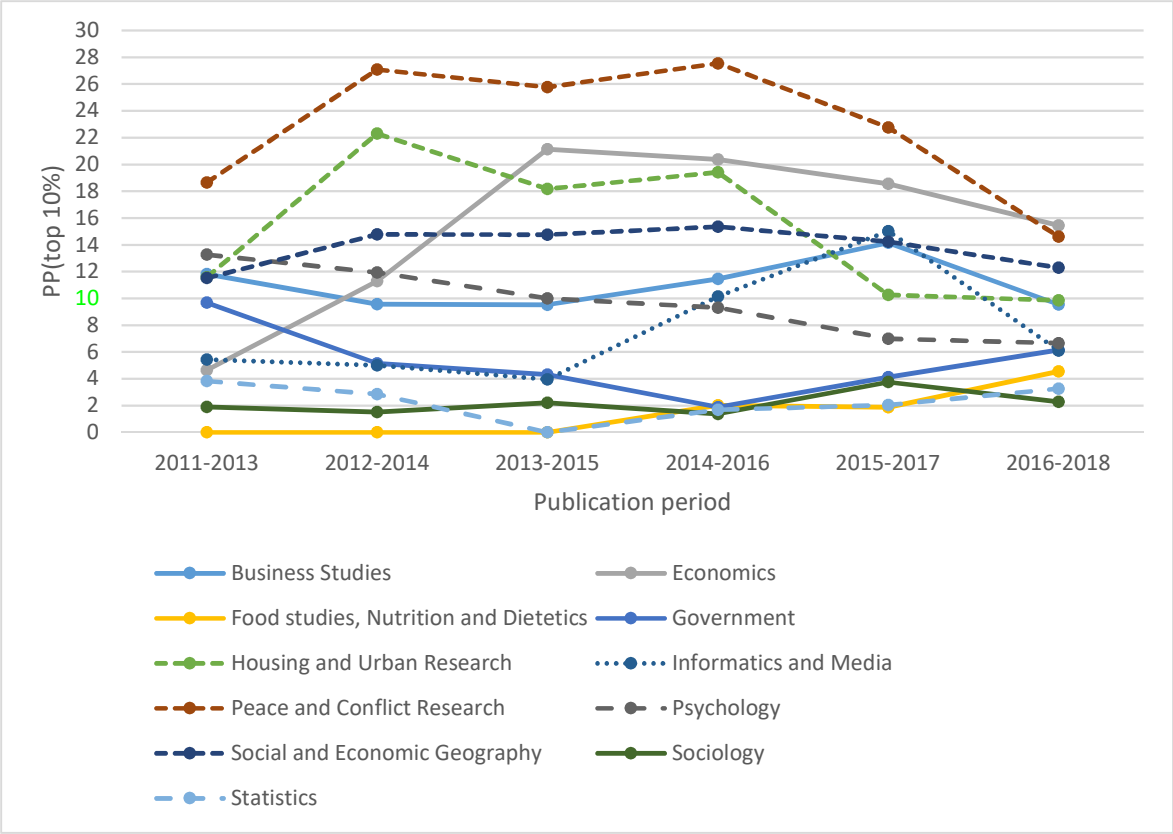

Figure 17. Faculty of Social Sciences. PP(top 10%) by publication period. 3-year moving average.

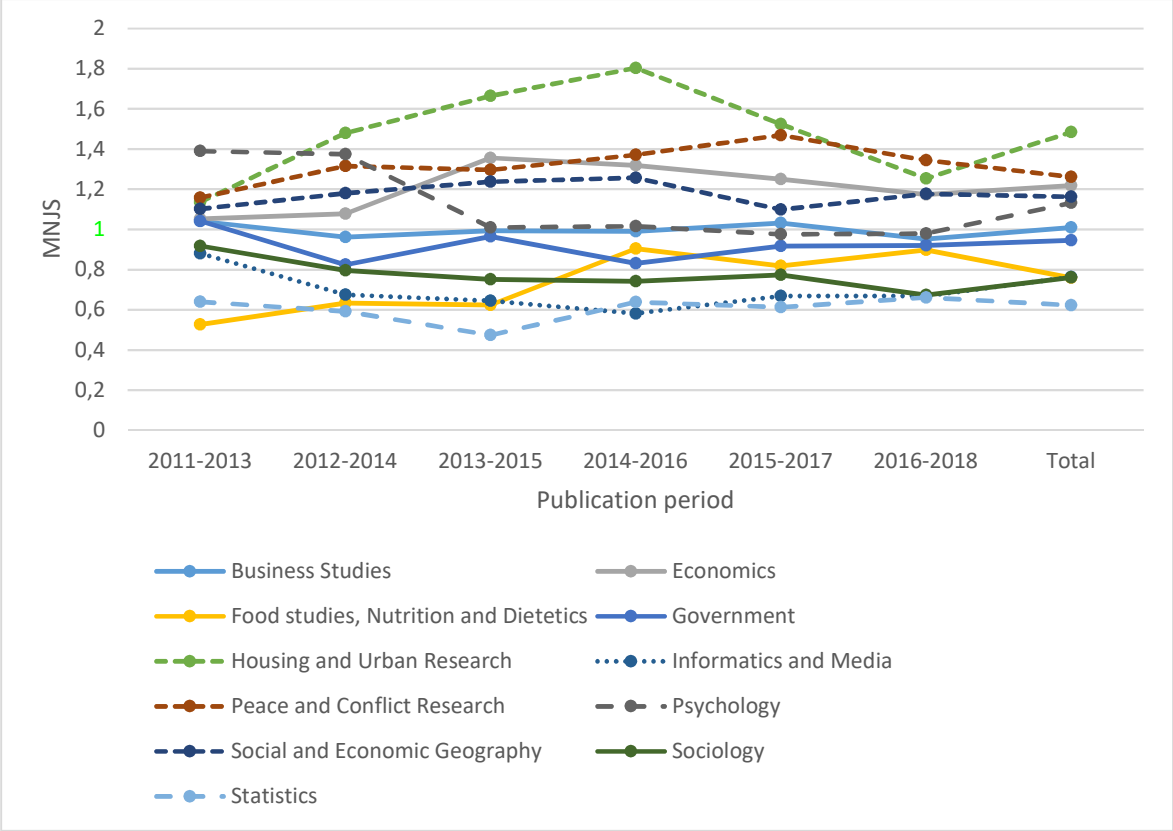

Figure 18. Faculty of Social Sciences. MNJS by publication period. 3-year moving average.

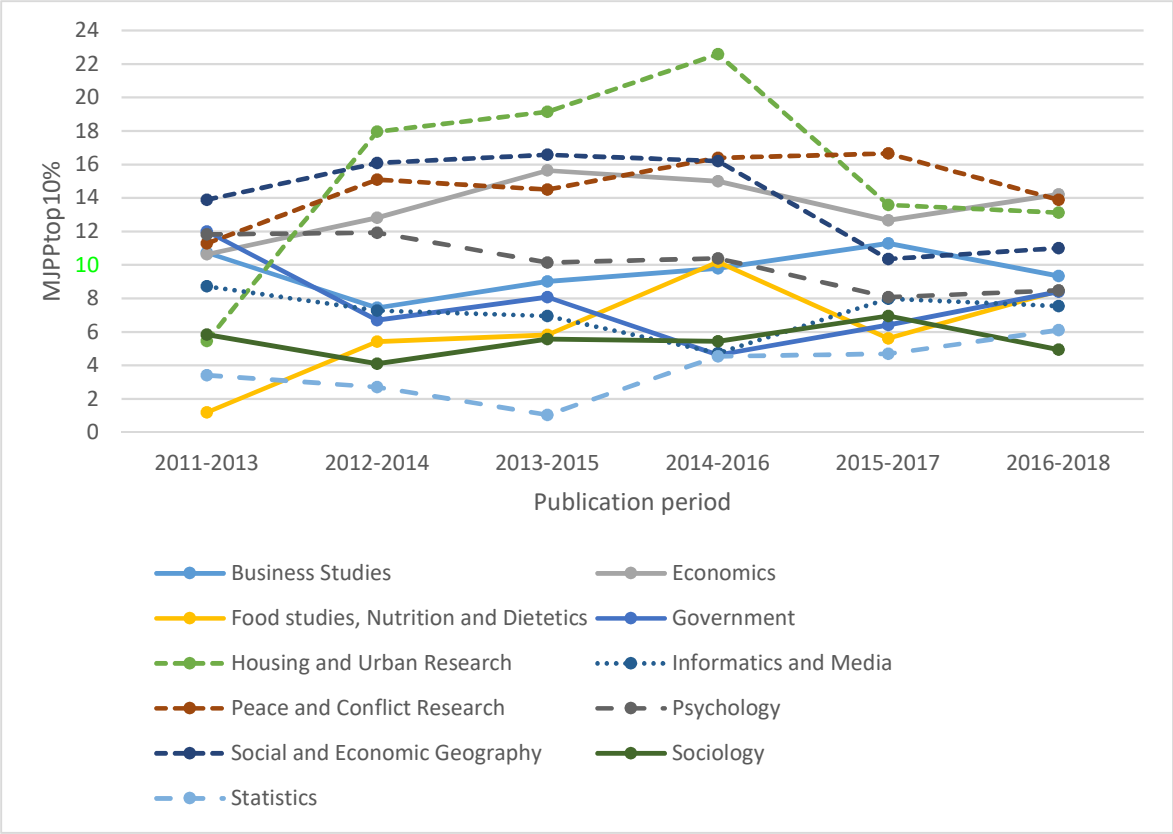

Figure 19. Faculty of Social Sciences. MJPPtop10% by publication period. 3-year moving average.

3.2.3 Collaboration

For all tables in this section, PP(int collab) and PP(industry) are given as percentages.

Faculty of Arts

Table 15. Faculty of Arts. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2011-2018.

Department	**Indicator**		
	P	**PP(int collab)**	**PP(industry)**
ALM	47	38,3	0,0
Archeology and Ancient History	87	72,4	3,5
Art History	10	90,0	0,0
Cultural Anthropology and Ethnology	11	9,1	0,0
Game Design	2	100,0	50,0
Gender Research	34	23,5	2,9
History	21	23,8	0,0
History of Sciences and Ideas	7	14,3	0,0
Literature	0	-	-
Musicology	2	100	0,0
Philosophy	25	8,0	0,0

In Table 16, which gives values of PP(int collab) and PP(industry) by publication period, "-" in a table cell indicates that indicator values for the corresponding department and period cannot be obtained, since the department has no WoS publications (of the type "Article" or "Review") in the period.

Table 16. Faculty of Arts. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
ALM	38,5 (0,0)	44,4 (0,0)	53,9 (0,0)	37,5 (0,0)	40,0 (0,0)	32,0 (0,0)
Archeology and Ancient History	52,9 (5,9)	61,1 (5,6)	73,7 (0,0)	79,3 (0,0)	76,2 (0,0)	76,4 (3,6)
Art History	-	100,0 (0,0)	100,0 (0,0)	100,0 (0,0)	88,9 (0,0)	80,0 (0,0)
Cultural Anthropology and Ethnology	0,0 (0,0)	0,0 (0,0)	20,0 (0,0)	14,3 (0,0)	14,3 (0,0)	0,0 (0,0)
Game Design	-	-	-	100,0 (100,0)	100,0 (100,0)	100,0 (50,0)
Gender Research	0,0 (0,0)	28,6 (0,0)	25,0 (0,0)	38,5 (7,7)	18,8 (6,3)	25,0 (5,0)
History	0,0 (0,0)	20,0 (0,0)	20,0 (0,0)	25,0 (0,0)	12,5 (0,0)	33,3 (0,0)
History of Sciences and Ideas	-	0,0 (0,0)	0,0 (0,0)	0,0 (0,0)	20,0 (0,0)	16,7 (0,0)
Literature	-	-	-	-	-	-
Musicology	100,0 (0,0)	-	100 (0,0)	100 (0,0)	100 (0,0)	-
Philosophy	9,1 (0,0)	10,0 (0,0)	0,0 (0,0)	0,0 (0,0)	16,7 (0,0)	8,3 (0,0)

Faculty of Education, Faculty of Law and Faculty of Theology

Table 17. Faculty of Education, Faculty of Law and Faculty of Theology. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2011-2018.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Faculty of Education	119	29,4	0,0
Faculty of Law	32	25,0	0,0
Faculty of Theology	25	40,0	0,0

Table 18. Faculty of Education, Faculty of Law and Faculty of Theology. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Faculty of Education	8,0 (0,0)	14,8 (0,0)	18,2 (0,0)	30,6 (0,0)	27,1 (0,0)	38,6 (0,0)
Faculty of Law	20,0 (0,0)	37,5 (0,0)	30,0 (0,0)	28,6 (0,0)	16,7 (0,0)	22,2 (0,0)
Faculty of Theology	25,0 (0,0)	28,6 (0,0)	33,3 (0,0)	40,0 (0,0)	41,7 (0,0)	54,6 (0,0)

Faculty of Languages

Table 19. Faculty of Languages. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2011-2018.

Department	Indicator		
	P	PP(int collab)	PP(industry)
English	11	18,2	0,0
Linguistics and Philology	33	60,6	6,1
Modern Languages	8	0,0	0,0
Scandinavian Languages	14	14,3	0,0

Table 20. Faculty of Languages. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
English	0,0 (0,0)	50,0 (0,0)	50,0 (0,0)	25,0 (0,0)	0,0 (0,0)	12,5 (0,0)
Linguistics and Philology	42,9 (7,1)	50,0 (14,3)	50,0 (12,5)	66,7 (11,1)	69,2 (0,0)	76,9 (0,0)
Modern Languages	0,0 (0,0)	0,0 (0,0)	0,0 (0,0)	0,0 (0,0)	0,0 (0,0)	-
Scandinavian Languages	50,0 (0,0)	50,0 (0,0)	33,3 (0,0)	11,1 (0,0)	0,0 (0,0)	0,0 (0,0)

Faculty of Social Sciences

Table 21. Faculty of Social Sciences. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2011-2018.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Business Studies	167	55,1	1,2
Economic History	33	39,4	0,0
Economics	188	44,1	1,6
Food Studies, Nutrition and Dietetics	93	54,8	2,1
Government	207	35,7	1,9
Housing and Urban Research	128	51,6	1,6
Informatics and Media	48	43,7	4,2
Peace and Conflict Studies	157	39,5	0,0
Psychology	503	41,6	2,6
Russian and Eurasian Studies	32	50,0	0,0
Social and Economic Geography	126	33,3	0,8
Sociology	103	21,4	0,0
Statistics	93	39,8	1,1

Table 22. Faculty of Social Sciences. PP(int collab) and PP(industry) (within parentheses) publication period. 3-year moving average.

Department	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Business Studies	44,7 (1,8)	50,9 (0,0)	55,6 (0,0)	62,3 (0,0)	62,7 (0,0)	60,6 (1,4)
Economic History	40,0 (0,0)	42,9 (0,0)	42,9 (0,0)	42,9 (0,0)	30,0 (0,0)	35,7 (0,0)
Economics	39,4 (4,2)	43,6 (3,9)	46,2 (0,0)	47,0 (0,0)	40,3 (0,0)	46,0 (0,0)
Food Studies, Nutrition and Dietetics	27,3 (0,0)	21,1 (0,0)	39,1 (0,0)	53,8 (0,0)	65,8 (5,3)	69,6 (3,6)
Government	25,5 (0,0)	31,0 (1,7)	29,8 (1,5)	35,3 (2,4)	35,5 (1,1)	41,4 (2,7)
Housing and Urban Research	47,4 (5,3)	41,2 (3,9)	43,9 (1,8)	50,0 (0,0)	52,9 (0,0)	62,5 (0,0)
Informatics and Media	23,8 (0,0)	26,9 (7,7)	41,7 (8,3)	63,1 (10,5)	83,3 (0,0)	63,6 (0,0)
Peace and Conflict Studies	38,5 (0,0)	36,1 (0,0)	41,1 (0,0)	39,0 (0,0)	39,6 (0,0)	41,2 (0,0)
Psychology	39,0 (2,3)	42,7 (2,9)	41,7 (2,8)	48,1 (3,7)	43,2 (2,9)	40,5 (1,9)
Russian and Eurasian Studies	55,5 (0,0)	33,3 (0,0)	25,0 (0,0)	30,8 (0,0)	45,5 (0,0)	76,9 (0,0)
Social and Economic Geography	24,3 (0,0)	20,0 (0,0)	28,3 (0,0)	35,0 (0,0)	34,9 (0,0)	39,7 (1,7)
Sociology	14,8 (0,0)	18,9 (0,0)	19,5 (0,0)	17,1 (0,0)	26,6 (0,0)	25,5 (0,0)
Statistics	40,0 (0,0)	34,6 (0,0)	25,0 (0,0)	44,1 (0,0)	40,4 (0,0)	42,1 (1,8)

3.2.4 Open access

For all figures in this section, proportion OA publications is given as a percentage. Total OA is defined as publications belonging to any type of OA (gold, hybrid or green).

Faculty of Arts

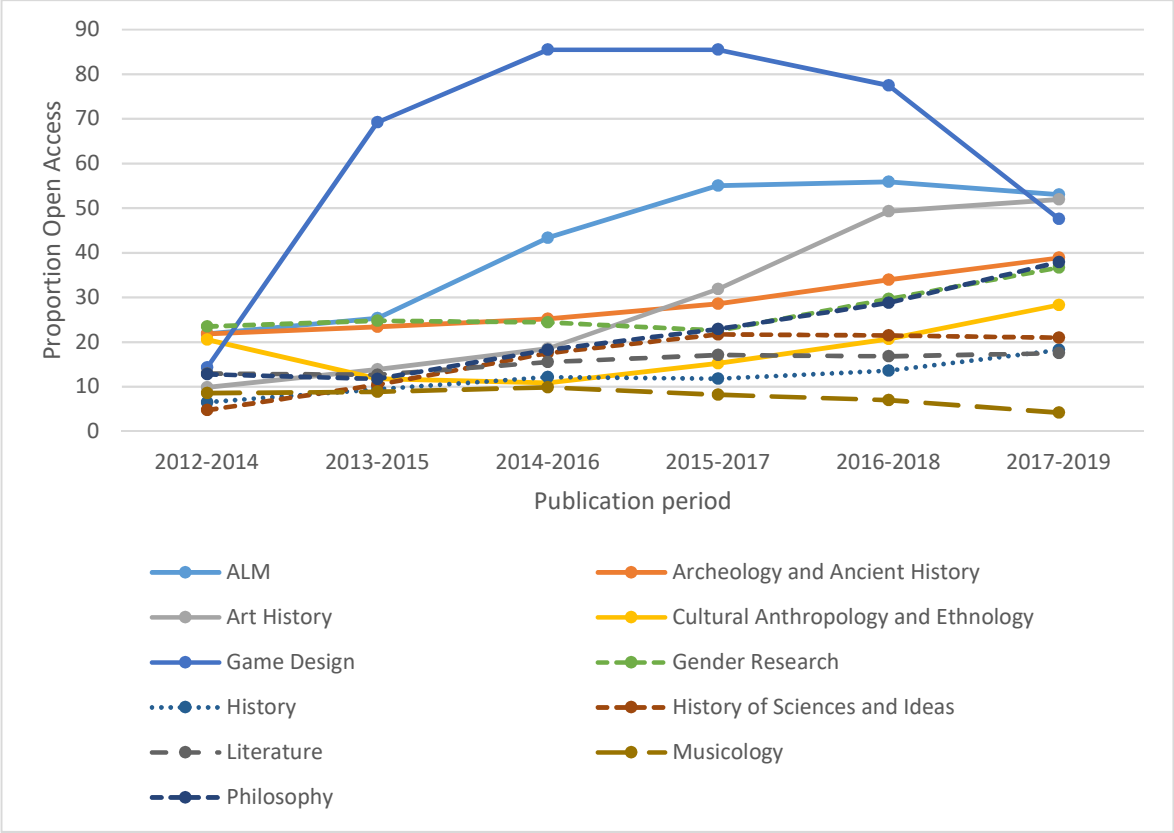

Figure 20. Faculty of Arts. Total OA by publication period. 3-year moving average.

Faculty of Education, Faculty of Law and Faculty of Theology

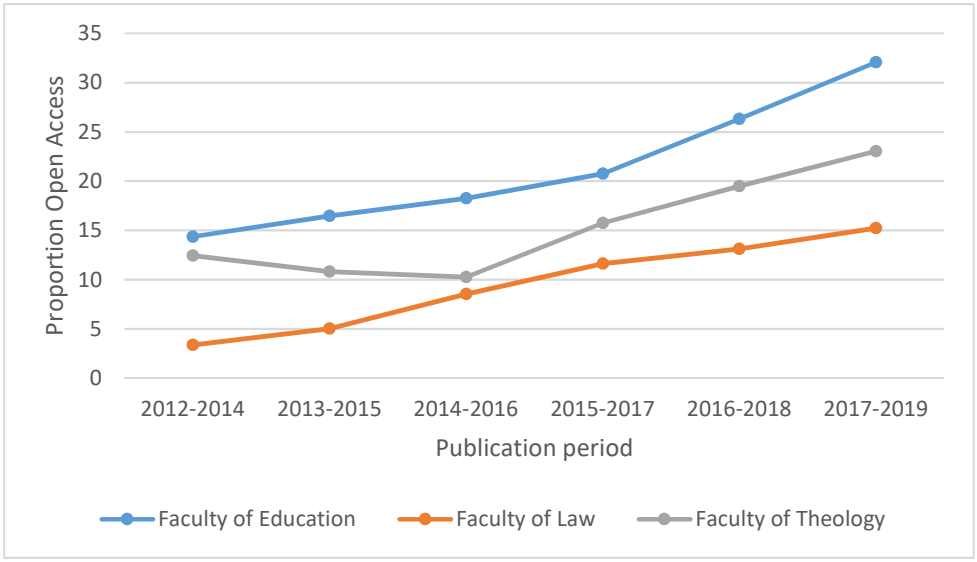

Figure 21. Faculty of Education, Faculty of Law and Faculty of Theology. Total OA by publication period. 3-year moving average.

Faculty of Languages

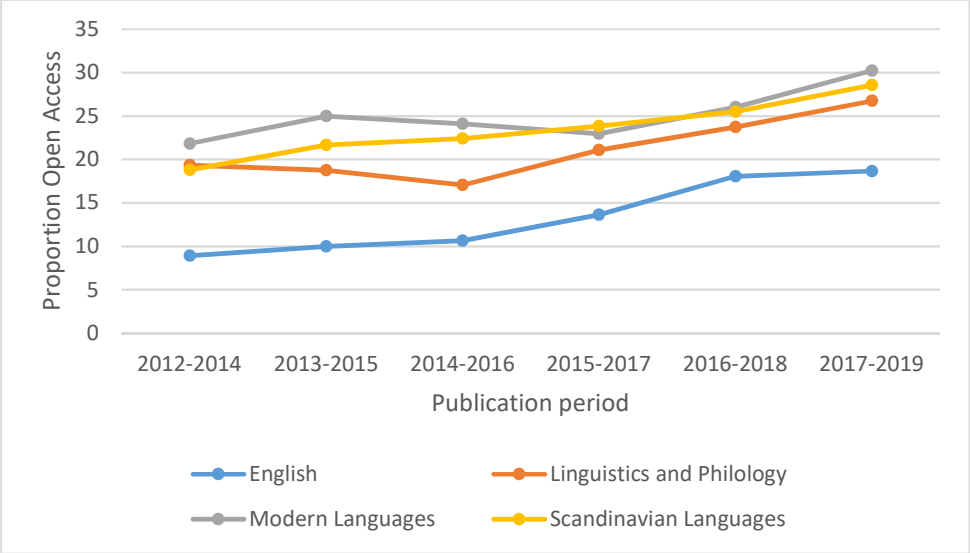

Figure 22. Faculty of Languages. Total OA Access by publication period. 3-year moving average.

Faculty of Social Sciences

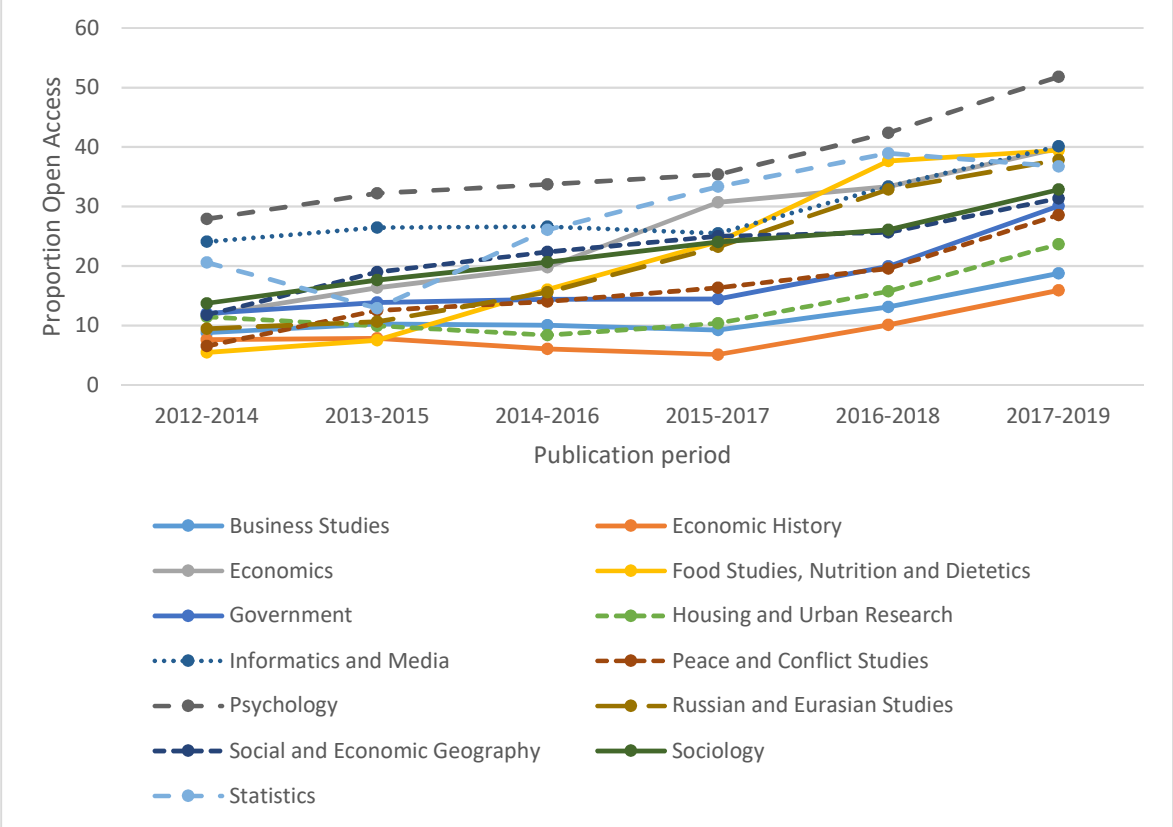

Figure 23. Faculty of Social Sciences. Total OA by publication period. 3-year moving average.

3.3 MedFarm

The number of MedFarm departments included in ABM is 11. Tables 23-24 report publication volume in terms of both fractional counts and full counts (within parentheses) by department and publication type, and WoS coverage. WoS coverage concerns the number of WoS publications of the four types represented in the tables relative to all publications of these types for the department.

Table 23. Faculty of Medicine. Publication volume by publication type, and WoS coverage (in %). Publication period: 2011-2019.

Department	Publication type					
	Article	Article in anthology	Monograph	Conference paper	Total	WoS coverage
Immunology, Genetics and Pathology	879,3 (2887)	22,8 (35)	0,0 (0)	7,7 (23)	909,8 (2945)	92,2
Medical Biochemistry and Microbiology	456,3 (1259)	10,5 (21)	0,3 (1)	1,5 (4)	468,6 (1285)	93,1
Medical Cell Biology	260,7 (541)	4,3 (7)	0,0 (0)	2,5 (3)	267,5 (551)	94,2
Medical Sciences	1424,9 (5204)	26,7 (35)	2,0 (2)	6,5 (15)	1460,2 (5256)	87,9
Neuroscience	972,6 (2170)	29,3 (41)	5,6 (9)	11,4 (31)	1018,9 (2251)	87,8
Public Health and Caring Sciences	843,4 (2328)	76,2 (109)	13,3 (16)	10,0 (25)	943,0 (2478)	74,9
Surgical Sciences	1413,6 (3916)	67,1 (95)	3,1 (4)	16,6 (37)	1500,3 (4052)	80,7
Women's and Children's Health	892,6 (2297)	45,0 (57)	5,3 (7)	2,4 (8)	945,3 (2369)	85,5

Table 24. Faculty of Pharmacy. Publication volume by publication type, and WoS coverage (in %). Publication period: 2011-2019.

Department	Publication type					
	Article	Article in anthology	Monograph	Conference paper	Total	WoS coverage
Medicinal Chemistry	301,9 (744)	13,4 (16)	0,0 (0)	0,0 (0)	315,2 (760)	90,5
Pharmaceutical Biosciences	442,4 (1013)	21,0 (23)	0,9 (1)	6,1 (13)	469,5 (1049)	88,6
Pharmacy	223,8 (462)	5,2 (7)	0,0 (0)	0,0 (0)	229,0 (469)	91,8

3.3.1 Publishing volume and publishing level–The Norwegian model

Faculty of Medicine

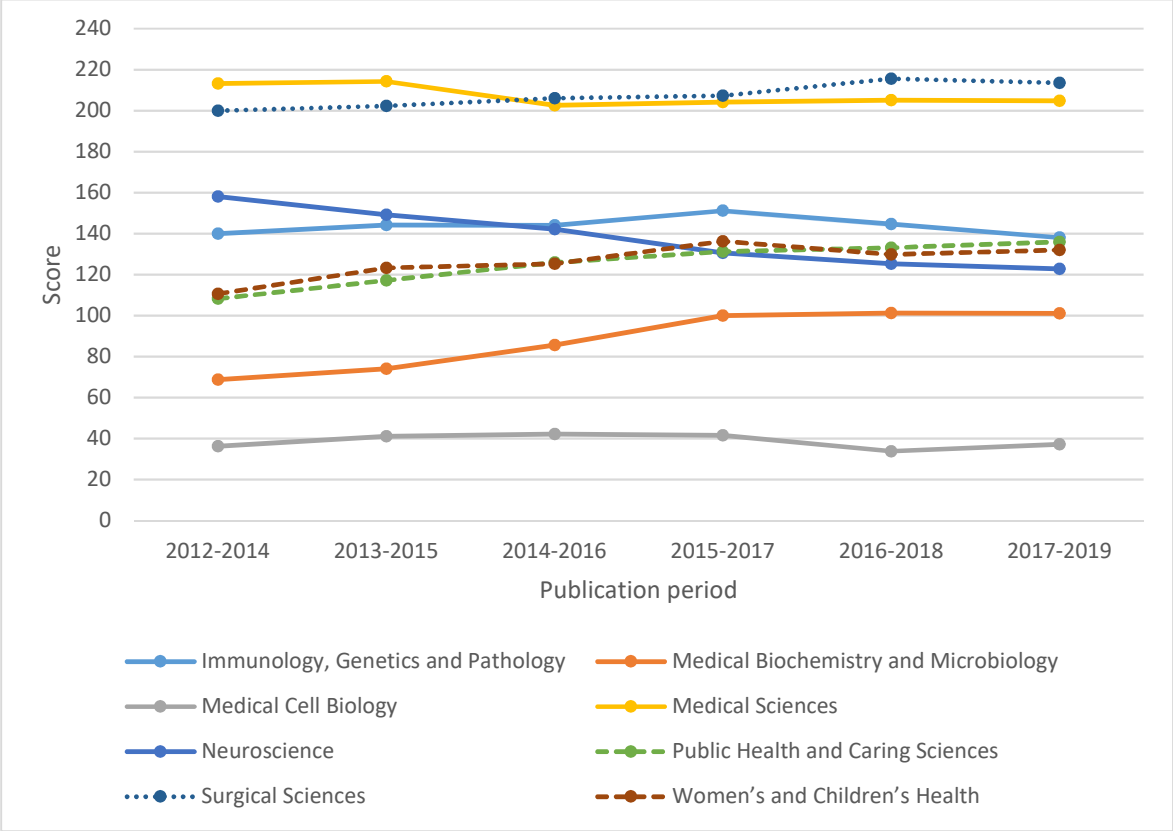

Figure 24. Faculty of Medicine. Norwegian score by publication period. 3-year moving average.

Table 25. Faculty of Medicine. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019
Immunology, Genetics and Pathology	21,2 (296,7)	21,5 (305,1)	22,3 (300,8)	24,1 (307,7)	25,3 (288,8)	25,7 (274,2)
Medical Biochemistry and Microbiology	31,2 (127,3)	32,8 (134,0)	32,4 (155,7)	34,9 (177,1)	33,8 (181,8)	32,4 (184,4)
Medical Cell Biology	18,4 (80,1)	19,5 (89,0)	18,7 (92,2)	17,9 (91,9)	18,2 (74,4)	24,0 (75,5)
Medical Sciences	20,0 (460,9)	19,2 (469,5)	17,8 (450,2)	16,9 (459,5)	17,1 (459,9)	18,3 (450,7)
Neuroscience	16,6 (352,5)	15,8 (341,2)	15,6 (326,1)	14,4 (305,5)	13,1 (296,9)	14,1 (286,5)
Public Health and Caring Sciences	13,6 (257,8)	13,7 (279,1)	15,9 (291,6)	16,6 (302,3)	17,8 (297,9)	18,4 (297,6)
Surgical Sciences	17,5 (445,5)	18,6 (441,7)	18,6 (450,3)	17,2 (466,1)	16,9 (486,8)	15,2 (496,2)
Women's and Children's Health	15,0 (257,2)	13,6 (291,9)	12,4 (302,4)	11,7 (332,9)	12,3 (314,8)	12,2 (320,6)

Faculty of Pharmacy

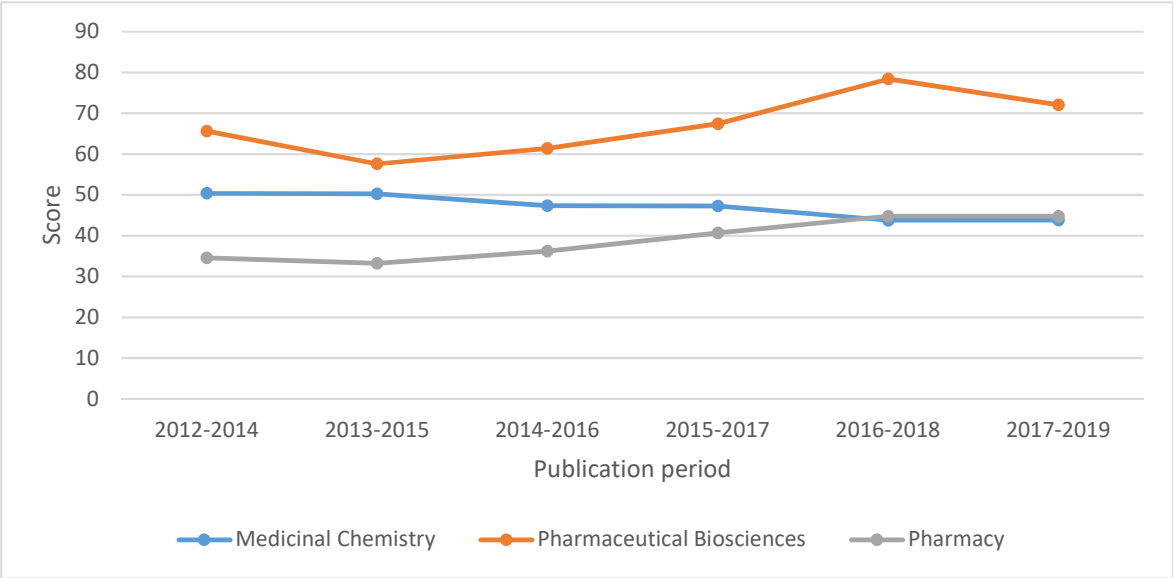

Figure 25 Faculty of Pharmacy. Norwegian score by publication period. 3-year moving average.

Table 26. Faculty of Pharmacy. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019
Medicinal Chemistry	23,9 (103,3)	18,4 (110,8)	16,6 (107,7)	18,8 (103,8)	19,2 (95,5)	18,2 (96,5)
Pharmaceutical Biosciences	16,9 (149,6)	16,4 (132,2)	18,9 (135,4)	20,2 (144,6)	22,7 (162,0)	23,1 (147,9)
Pharmacy	30,8 (65,7)	28,2 (65,3)	29,4 (69,9)	29,1 (77,4)	32,3 (81,8)	31,8 (82,2)

3.3.2 Field normalized citation impact

In each graph in this section, the label of the vertical axis that corresponds to the world average for the citation indicator of the graph is in green color.

Faculty of Medicine

Table 27. Faculty of Medicine. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPPtop10% for the whole publication period 2011-2018.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPPtop10%
Immunology, Genetics and Pathology	776,2 (2623)	1,31	13,0	1,29	13,1
Medical Biochemistry and Microbiology	347,9 (999)	1,52	16,5	1,55	17,1
Medical Cell Biology	196,3 (428)	1,05	11,1	1,07	10,9
Medical Sciences	1017,2 (4042)	1,19	12,0	1,18	12,1
Neuroscience	741,8 (1737)	0,94	8,8	0,99	10,1
Public Health and Caring Sciences	496,1 (1709)	0,94	8,6	0,98	9,3
Surgical Sciences	849,2 (2564)	1,04	10,4	1,11	11,4
Women's and Children's Health	613,4 (1770)	0,87	7,6	0,93	8,5

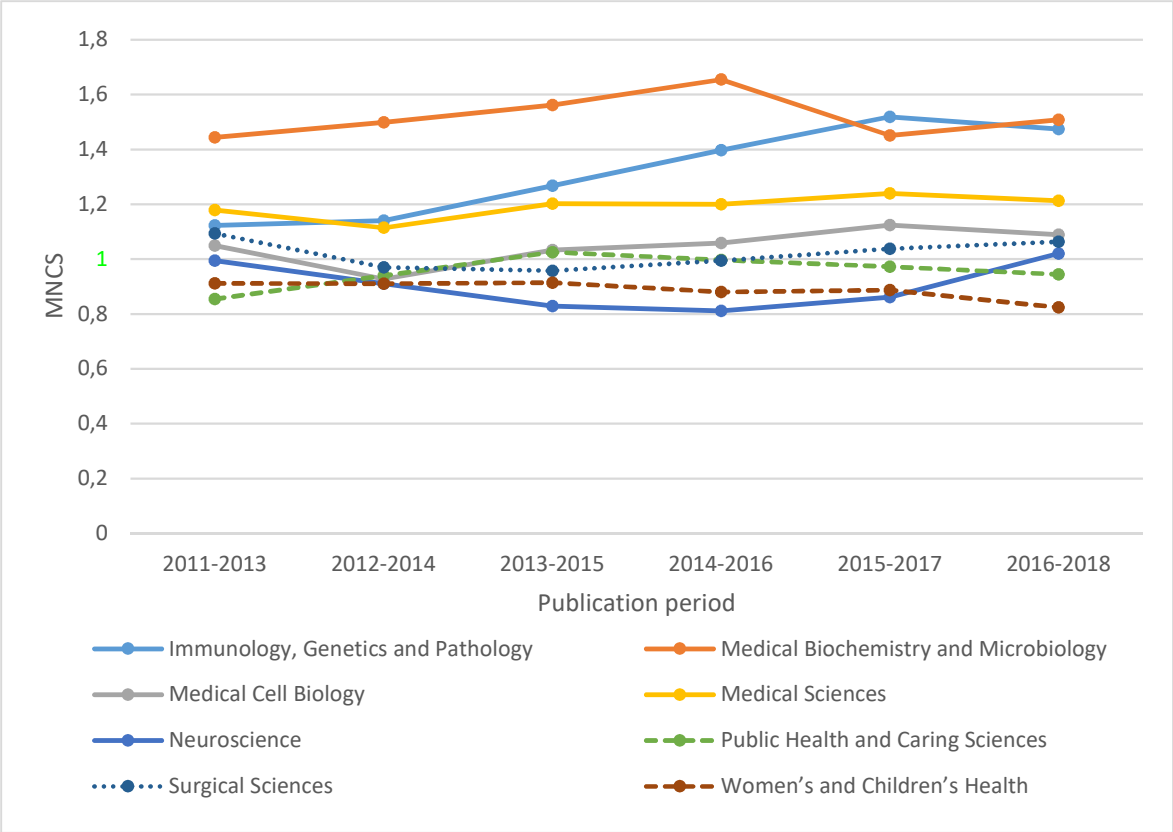

Figure 26. Faculty of Medicine. MNCS by publication period. 3-year moving average.

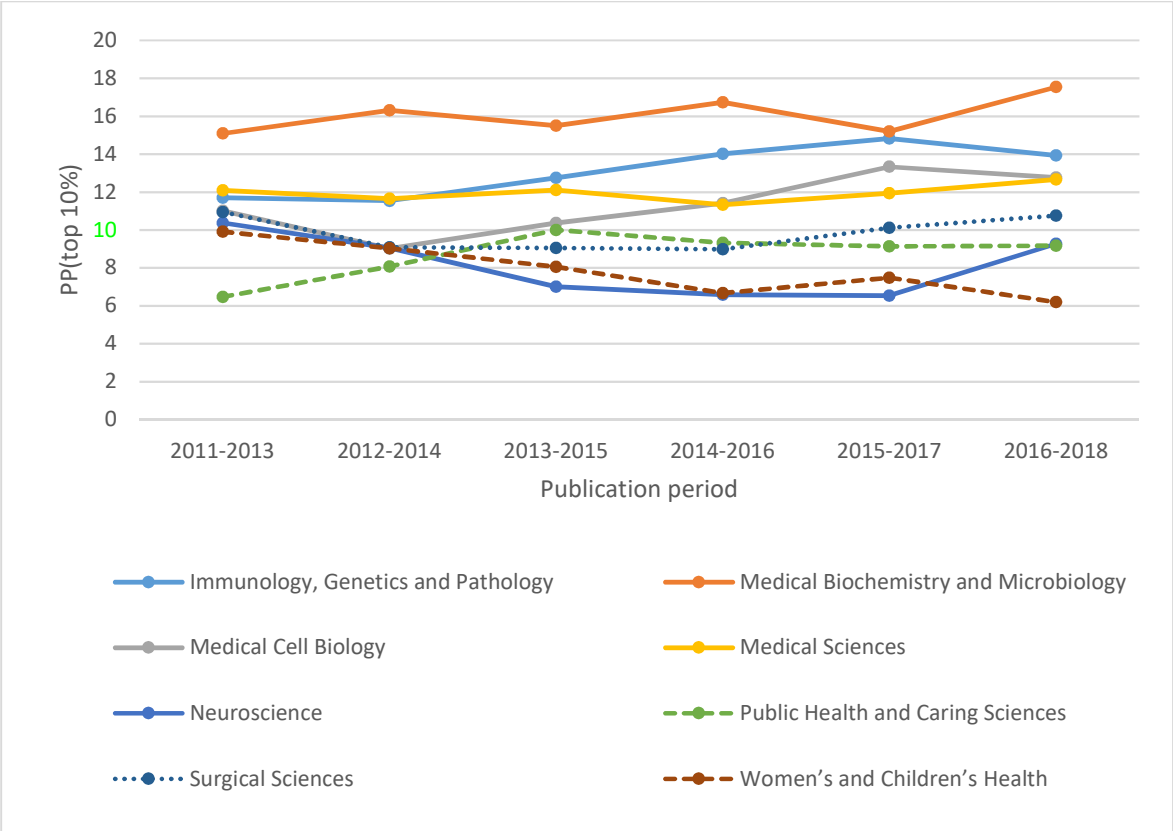

Figure 27. Faculty of Medicine. PP(top 10%) by publication period. 3-year moving average.

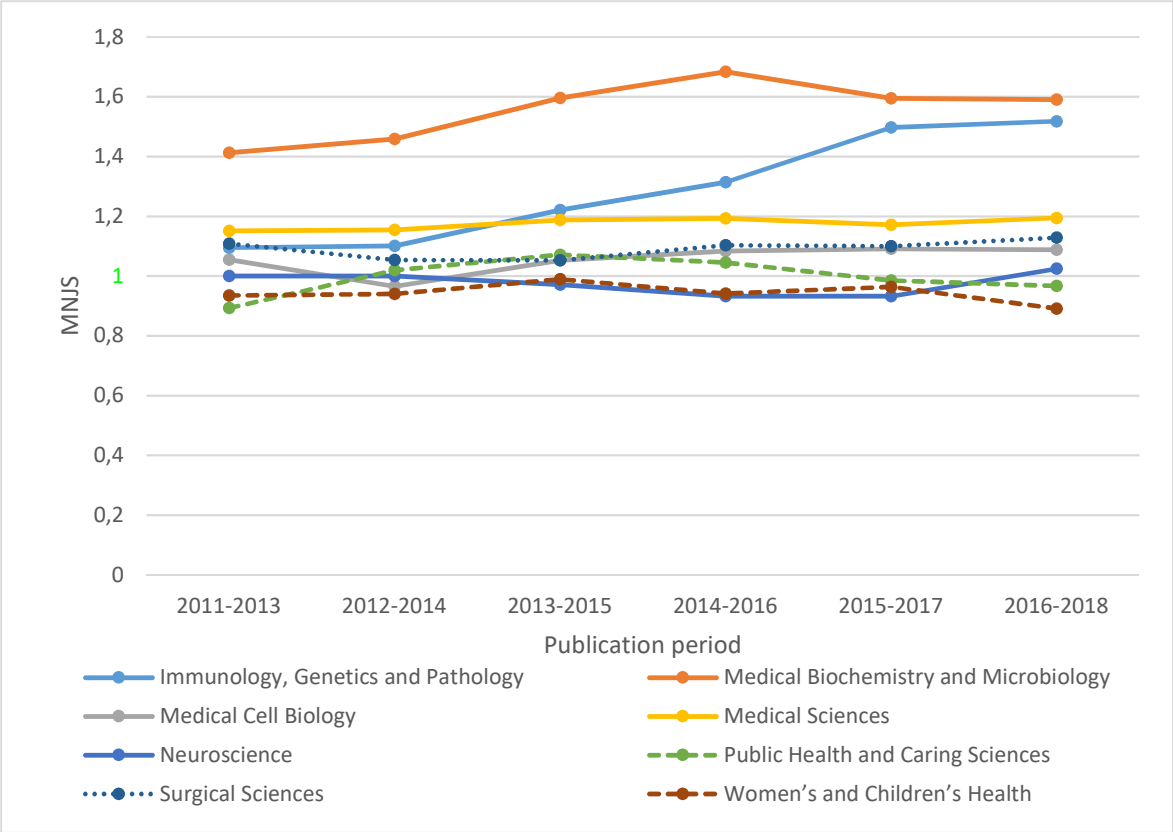

Figure 28. Faculty of Medicine. MNJS by publication period. 3-year moving average.

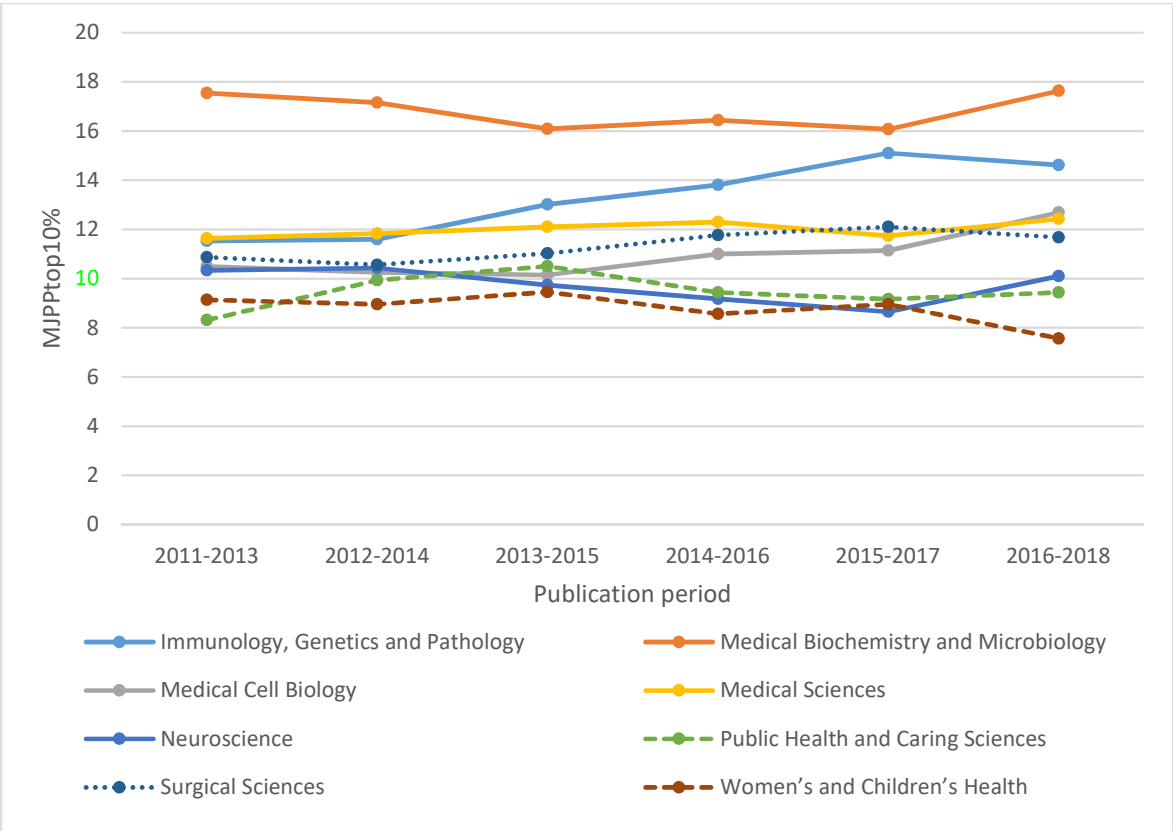

Figure 29. Faculty of Medicine. MJPPtop10% by publication period. 3-year moving average.

Faculty of Pharmacy

Table 28. Faculty of Pharmacy. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPPtop10% for the whole publication period 2011-2018.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPPtop10%
Medicinal Chemistry	217,9 (576)	0,94	8,7	0,93	8,3
Pharmaceutical Biosciences	338,2 (819)	0,93	6,5	0,99	9,2
Pharmacy	167,6 (376)	1,20	16,2	1,34	16,5

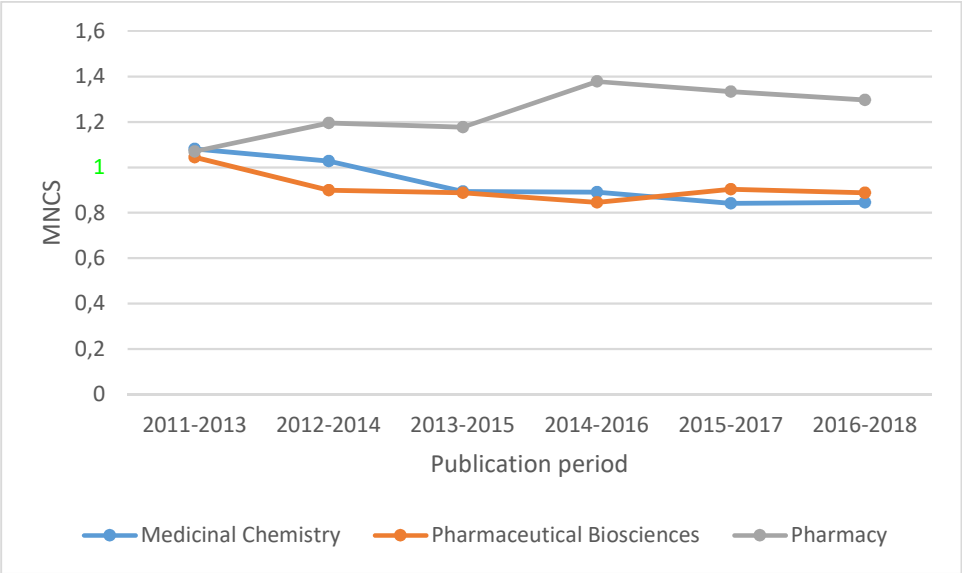

Figure 30. Faculty of Pharmacy. MNCS by publication period. 3-year moving average.

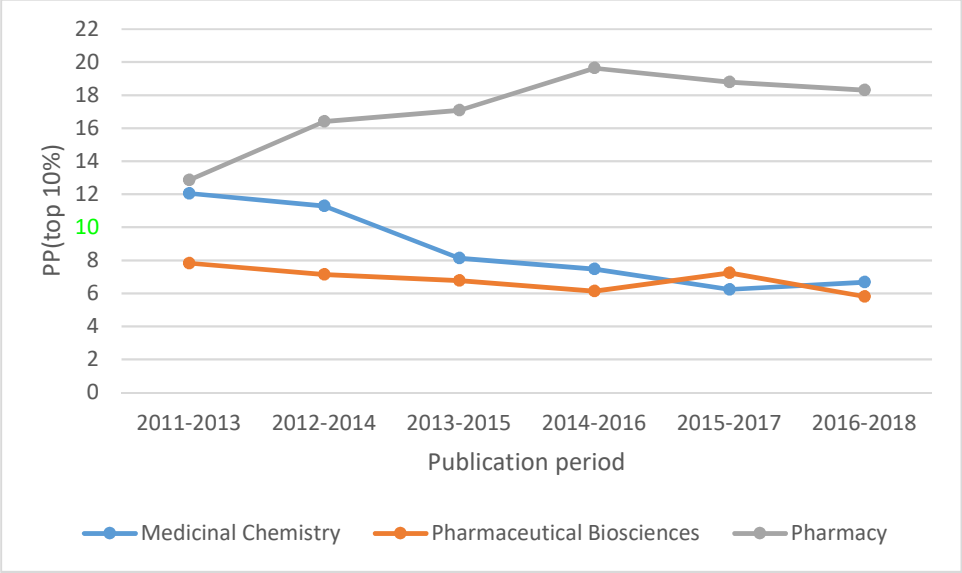

Figure 31. Faculty of Pharmacy. PP(top 10%) by publication period. 3-year moving average.

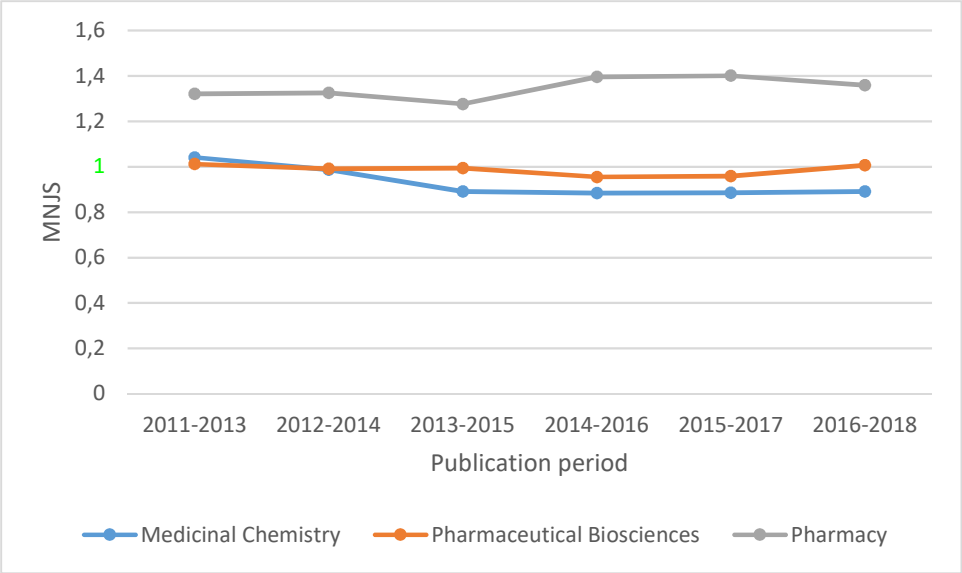

Figure 32. Faculty of Pharmacy. MNJS by publication period. 3-year moving average.

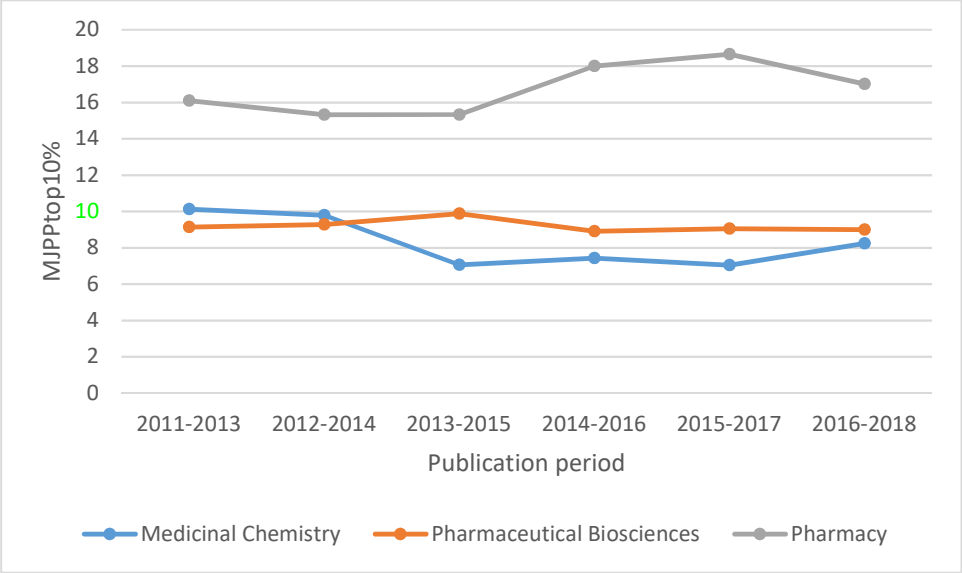

Figure 33. Faculty of Pharmacy. MJPPtop10% by publication period. 3-year moving average.

3.3.3 Collaboration

For all tables in this section, PP(int collab) and PP(industry) are given as percentages.

Faculty of Medicine

Table 29. Faculty of Medicine. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2011-2018.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Immunology, Genetics and Pathology	2623	59,3	14,0
Medical Biochemistry and Microbiology	999	66,9	6,1
Medical Cell Biology	428	47,8	4,5
Medical Sciences	4042	56,9	16,1
Neuroscience	1737	46,0	4,3
Public Health and Caring Sciences	1709	47,8	9,9
Surgical Sciences	2564	48,8	10,5
Women's and Children's Health	1770	46,0	6,3

Table 30. Faculty of Medicine. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Immunology, Genetics and Pathology	56,2 (15,3)	57,0 (14,0)	57,5 (13,2)	60,4 (13,1)	61,7 (13,4)	63,1 (14,0)
Medical Biochemistry and Microbiology	65,7 (7,8)	64,6 (7,7)	63,2 (7,0)	66,1 (6,5)	66,2 (5,1)	68,9 (5,1)
Medical Cell Biology	42,3 (3,8)	43,7 (4,6)	46,6 (5,8)	48,1 (6,1)	50,3 (5,2)	52,0 (3,8)
Medical Sciences	54,2 (14,3)	54,3 (15,8)	55,1 (16,5)	56,6 (17,8)	57,9 (16,3)	60,0 (16,7)
Neuroscience	45,8 (4,7)	40,8 (4,0)	39,9 (3,9)	43,0 (3,0)	47,3 (3,6)	49,9 (4,8)
Public Health and Caring Sciences	44,0 (9,3)	46,6 (10,0)	46,8 (9,9)	48,4 (9,5)	47,0 (9,3)	50,3 (10,3)
Surgical Sciences	46,7 (13,4)	44,2 (11,9)	45,6 (10,3)	48,5 (9,1)	51,4 (9,0)	51,4 (8,9)
Women's and Children's Health	46,1 (7,1)	45,3 (7,3)	40,2 (4,8)	44,8 (3,4)	45,6 (4,4)	49,3 (7,0)

Faculty of Pharmacy

Table 31. Faculty of Pharmacy. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2011-2018.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Medicinal Chemistry	576	49,6	18,9
Pharmaceutical Biosciences	819	60,3	26,4
Pharmacy	376	52,1	32,5

Table 32. Faculty of Pharmacy. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Medicinal Chemistry	50,6 (28,5)	43,6 (25,0)	43,6 (19,5)	46,1 (14,3)	50,4 (13,0)	52,0 (14,3)
Pharmaceutical Biosciences	58,9 (28,4)	62,0 (27,6)	59,3 (28,3)	61,4 (26,4)	59,0 (25,1)	61,0 (23,7)
Pharmacy	38,3 (25,0)	46,0 (28,5)	49,2 (27,4)	58,3 (33,1)	59,1 (35,8)	62,3 (38,3)

3.3.4 Open access

For all figures in this section, proportion OA publications is given as a percentage. Total OA is defined as publications belonging to any type of OA (gold, hybrid or green).

Faculty of Medicine

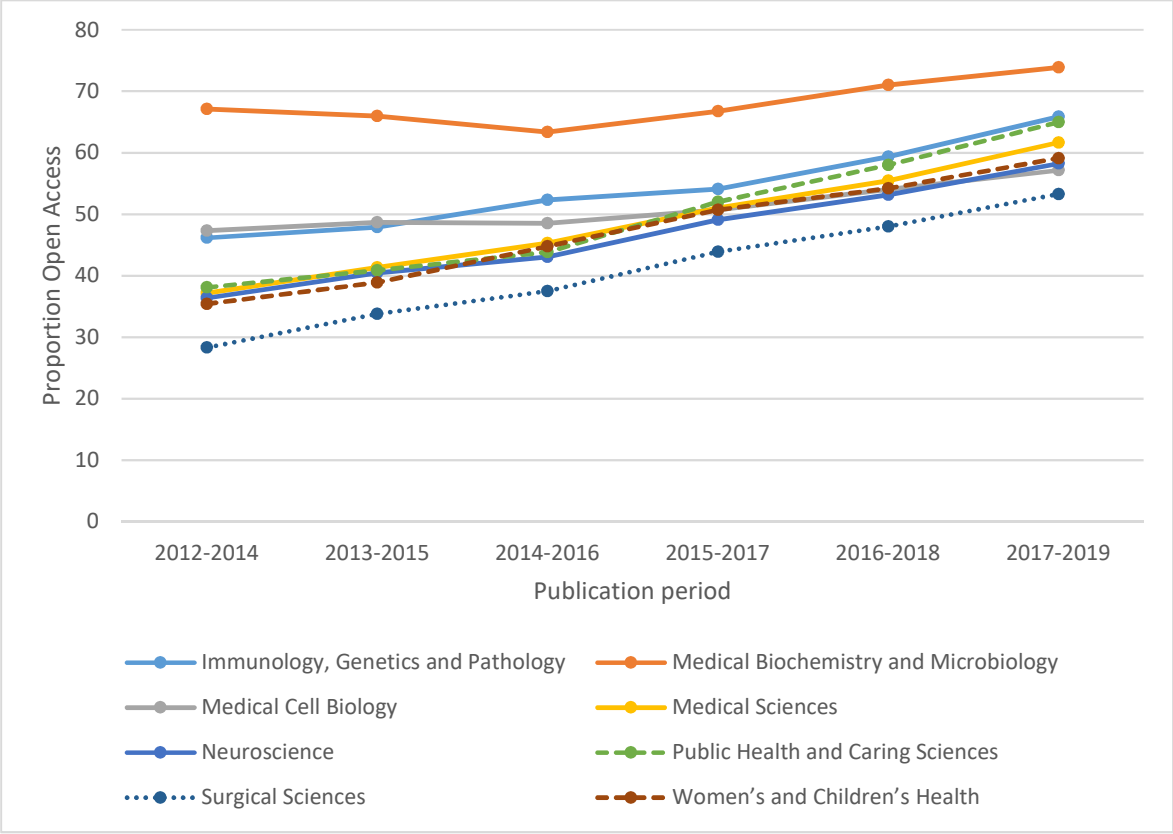

Figure 34. Faculty of Medicine. Total OA by publication period. 3-year moving average.

Faculty of Pharmacy

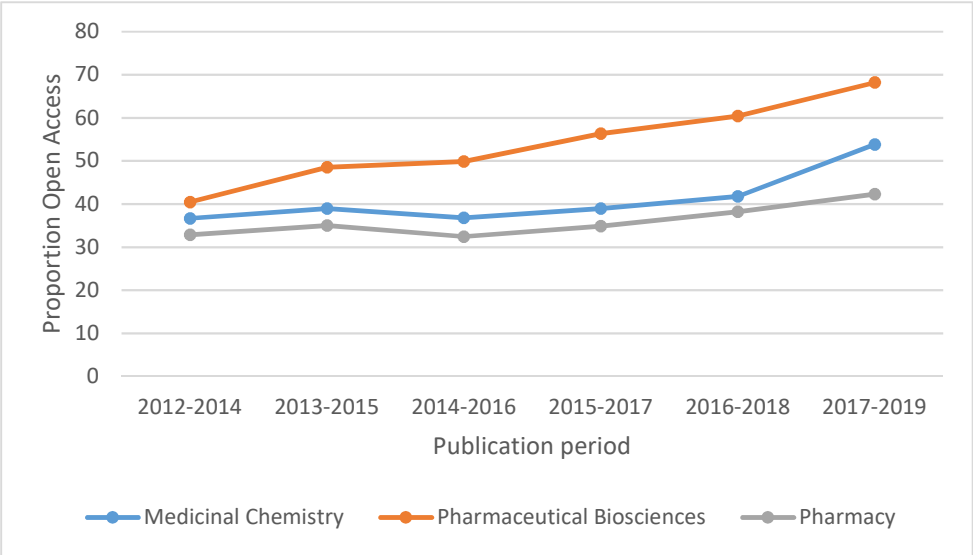

Figure 35. Faculty of Pharmacy. Total OA by publication period. 3-year moving average.

3.4 TekNat

The number of TekNat departments included in ABM is 12. Table 33 reports publication volume, fractional counts and full counts (within parentheses) by department and publication type, and WoS coverage. WoS coverage concerns the number of WoS publications of the four types represented in the table relative to all publications of these types for the department.

Table 33. Faculty of Science and Technology. Publication volume by publication type, and WoS coverage (in %). Publication period: 2011-2019.

Department	Publication type					
	Article	Article in anthology	Monograph	Conference paper	Total	WoS coverage
Cell and Molecular Biology	489,9 (1139)	14,0 (19)	1,2 (2)	5,4 (15)	510,4 (1175)	94,0
Chemistry - BMC	363,2 (927)	9,8 (18)	1,0 (1)	3,9 (10)	377,9 (956)	91,8
Chemistry - Ångström Laboratory	1011,3 (2073)	34,7 (58)	4,2 (8)	15,6 (40)	1065,7 (2179)	92,0
Civil and Industrial Engineering	69,3 (123)	30,9 (44)	13,5 (16)	64,9 (88)	178,7 (271)	25,6
Earth Sciences	887,6 (2143)	54,7 (100)	6,3 (12)	84,4 (145)	1033,1 (2400)	76,0
Ecology and Genetics	863,7 (2048)	15,4 (33)	2,8 (4)	0,4 (1)	882,3 (2086)	93,3
Electrical Engineering	553,3 (994)	13,7 (25)	1,8 (3)	204,6 (345)	773,4 (1367)	71,0
Information Technology	598,4 (1186)	68,9 (97)	5,8 (10)	844,9 (1333)	1518,0 (2626)	60,1
Materials Science and Engineering	969,7 (1907)	39,0 (54)	6,0 (12)	195,7 (303)	1210,5 (2276)	73,6
Mathematics	513,3 (851)	8,7 (9)	3,5 (4)	8,6 (15)	534,0 (879)	88,1
Organismal Biology	383,0 (942)	34,9 (42)	2,2 (3)	26,7 (39)	446,8 (1026)	72,5
Physics and Astronomy	2861,8 (6311)	38,6 (51)	7,2 (9)	197,3 (396)	3104,8 (6767)	89,4

3.4.1 Publishing volume and publishing level–The Norwegian model

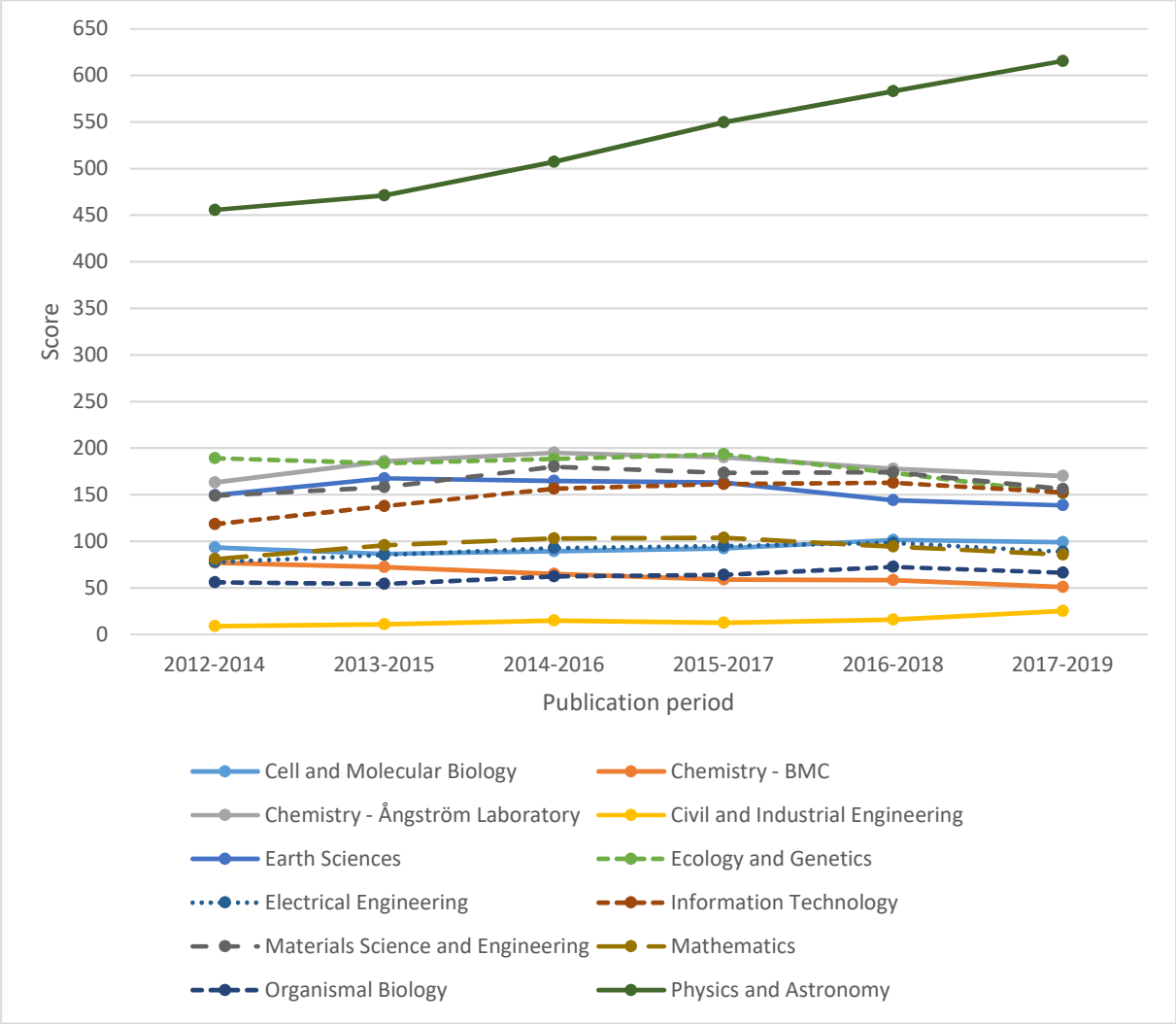

Figure 36. Faculty of Science and Technology. Norwegian score by publication period. 3-year moving average.

Table 34. Faculty of Science and Technology. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019
Cell and Molecular Biology	42,9 (149,1)	34,5 (152,1)	32,6 (161,9)	32,3 (169,2)	31,6 (187,3)	30,5 (185,2)
Chemistry-BMC	34,6 (134,6)	34,6 (128,6)	32,5 (118,4)	30,7 (109,7)	29,3 (111,1)	27,0 (99,9)
Chemistry - Ångström Laboratory	31,9 (298,9)	33,0 (334,3)	31,6 (356,6)	29,6 (355,0)	25,6 (350,3)	21,7 (354,3)
Civil and Industrial Engineering	29,3 (17,1)	14,6 (24,0)	26,5 (32,9)	26,0 (33,5)	25,6 (36,6)	22,8 (48,2)
Earth Sciences	29,3 (285,6)	30,4 (314,9)	31,0 (306,0)	28,8 (311,5)	26,9 (283,3)	26,3 (277,7)
Ecology and Genetics	39,1 (319,3)	40,7 (304,6)	44,7 (301,4)	47,0 (301,3)	44,4 (278,5)	40,4 (253,0)
Electrical Engineering	23,4 (158,9)	22,4 (177,2)	23,8 (189,0)	22,2 (200,1)	23,8 (203,2)	21,8 (189,6)
Information Technology	18,7 (269,3)	17,5 (321,9)	19,1 (357,2)	16,3 (386,4)	16,4 (385,3)	15,0 (369,8)
Materials Science and Engineering	24,4 (303,5)	23,8 (325,2)	25,5 (356,5)	25,0 (344,7)	24,0 (348,9)	18,9 (337,3)
Mathematics	28,6 (153,1)	29,6 (180,7)	34,3 (183,4)	34,2 (185,1)	35,4 (165,8)	31,6 (157,6)
Organismal Biology	27,1 (111,1)	26,9 (106,4)	27,3 (121,5)	25,4 (128,5)	30,8 (135,4)	31,8 (122,3)
Physics and Astronomy	38,6 (773,3)	39,3 (794,3)	35,6 (892,8)	31,1 (1020,7)	29,1 (1107,5)	30,1 (1153,0)

3.4.2 Field normalized citation impact

In each graph in this section, the label of the vertical axis that corresponds to the world average for the citation indicator of the graph is in green color.

Table 35. Faculty of Science and Technology. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPPtop10% for the whole publication period 2011-2018.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPPtop10%
Cell and Molecular Biology	389,2 (959)	1,38	16,7	1,41	16,3
Chemistry - BMC	291,0 (796)	0,90	10,1	1,04	11,7
Chemistry - Ångström Laboratory	793,0 (1691)	1,01	11,1	1,12	12,3
Civil and Industrial Engineering	23,6 (46)	0,71	2,2	0,78	6,1
Earth Sciences	564,6 (1626)	0,92	7,6	1,02	10,3
Ecology and Genetics	671,7 (1752)	1,65	18,5	1,55	17,7
Electrical Engineering	385,7 (732)	0,86	7,6	1,03	10,0
Information Technology	386,6 (832)	1,08	10,4	1,04	10,5
Materials Science and Engineering	709,2 (1490)	0,96	7,1	1,08	10,3
Mathematics	357,7 (652)	1,08	11,2	1,04	10,2
Organismal Biology	231,9 (650)	1,43	13,4	1,36	12,5
Physics and Astronomy	1287,8 (5257)	1,05	10,6	1,04	10,4

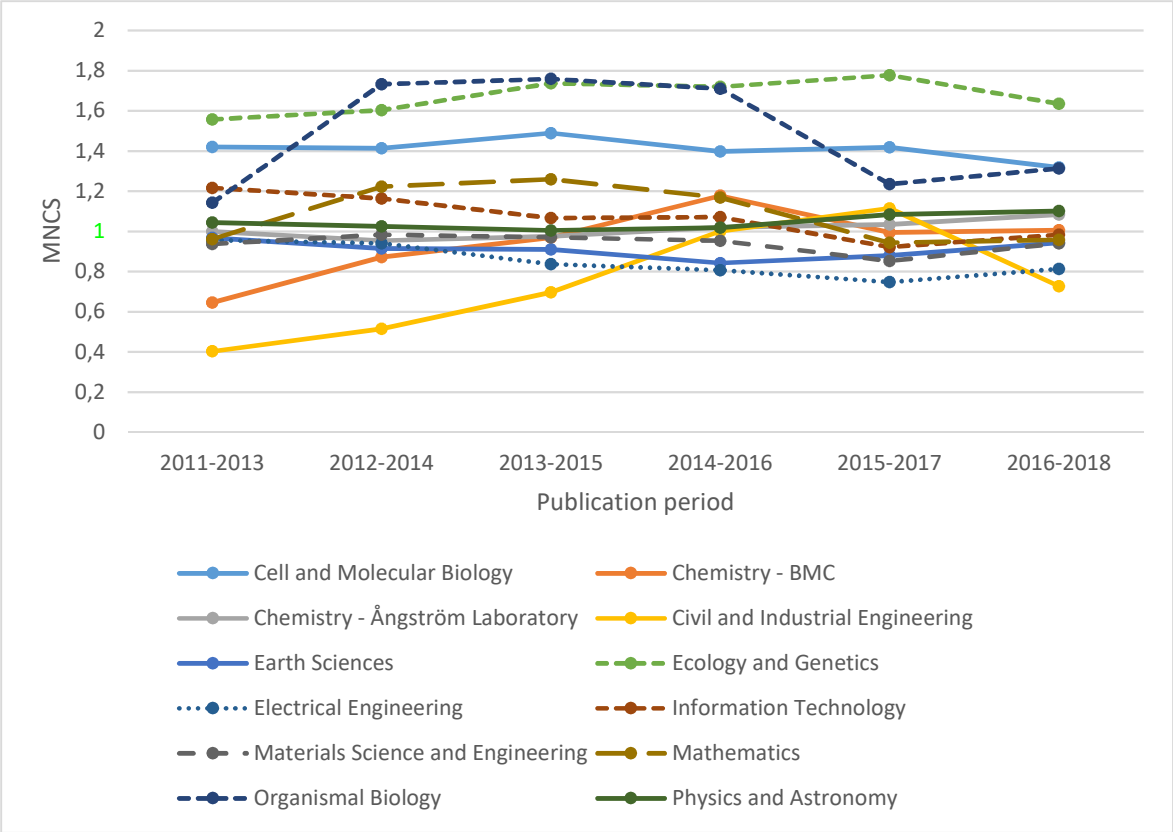

Figure 37. Faculty of Science and Technology. MNCS by publication period. 3-year moving average.

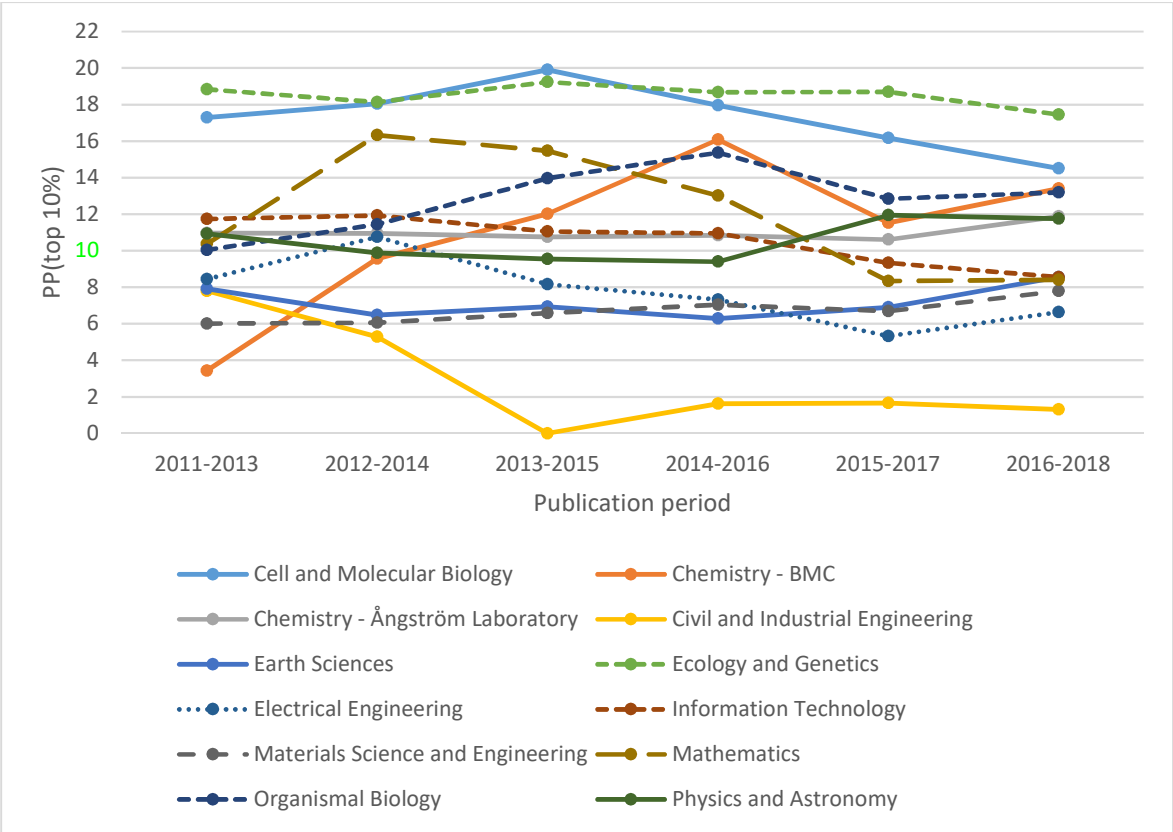

Figure 38. Faculty of Science and Technology. PP(top 10%) by publication period. 3-year moving average.

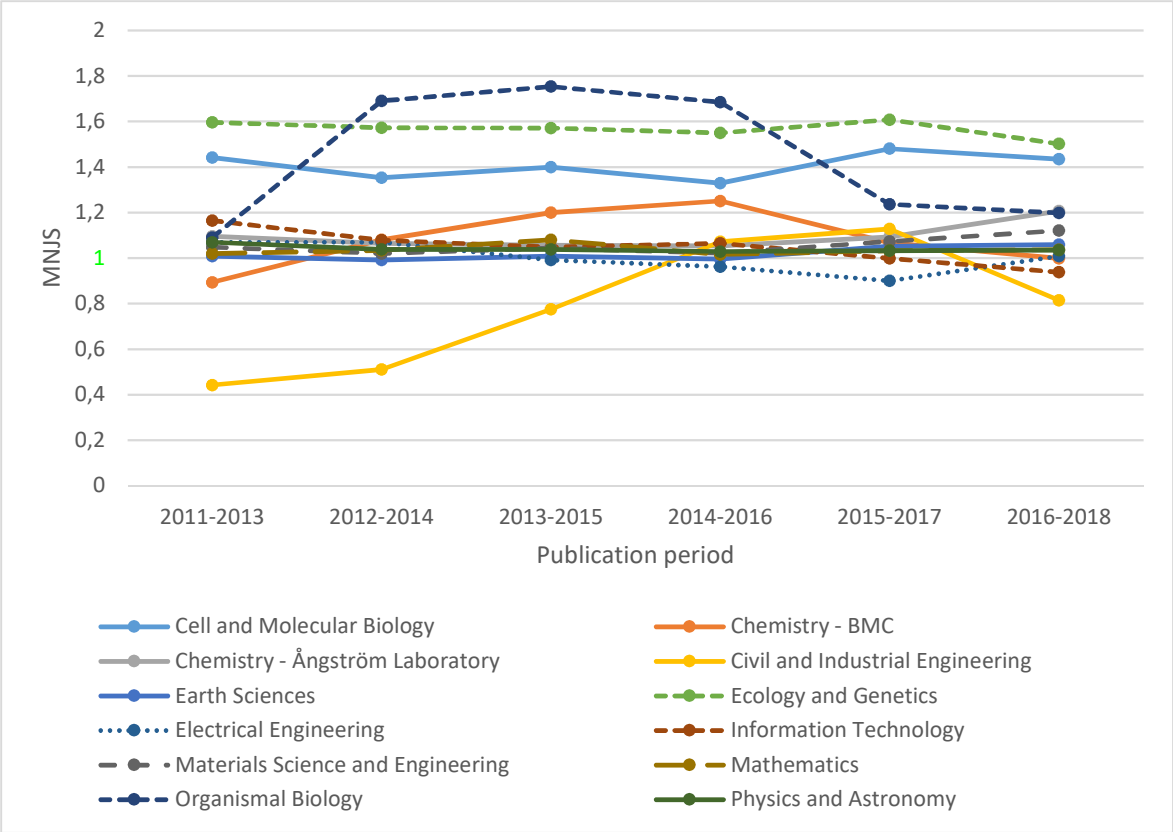

Figure 39. Faculty of Science and Technology. MNJS by publication period. 3-year moving average.

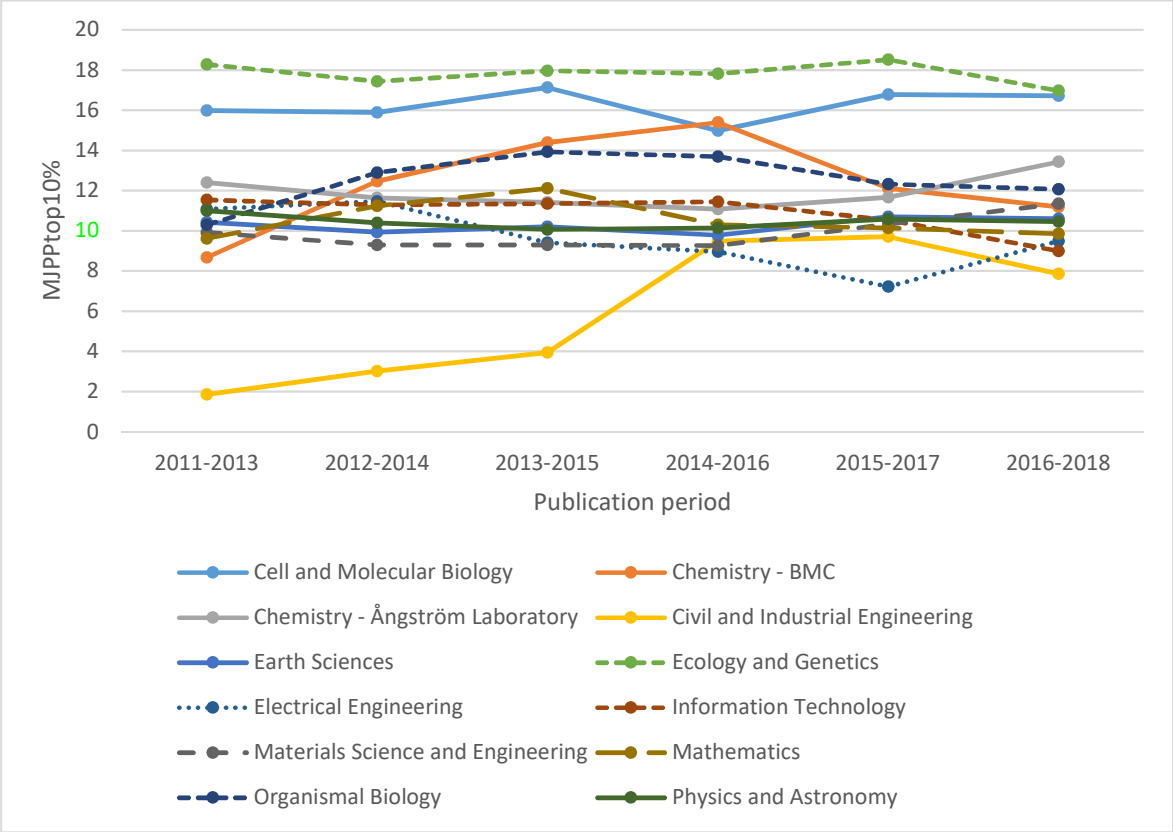

Figure 40. Faculty of Science and Technology. MJPPtop10% by publication period. 3-year moving average.

3.4.3 Collaboration

For all tables in this section, PP(int collab) and PP(industry) are given as percentages.

Table 36. Faculty of Science and Technology. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2011-2018.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Cell and Molecular Biology	959	67,0	8,0
Chemistry - BMC	796	56,2	12,2
Chemistry - Ångström Laboratory	1691	61,1	5,4
Civil and Industrial Engineering	46	52,2	4,3
Earth Sciences	1626	80,2	6,2
Ecology and Genetics	1752	75,2	3,7
Electrical Engineering	732	51,5	11,9
Information Technology	832	59,3	6,5
Materials Science and Engineering	1490	49,9	11,1
Mathematics	652	62,9	2,0
Organismal Biology	650	73,2	2,8
Physics and Astronomy	5257	87,2	6,2

Table 37. Faculty of Science and Technology. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Cell and Molecular Biology	62,1 (10,6)	63,3 (9,1)	66,5 (6,4)	67,6 (7,6)	68,1 (6,7)	70,0 (7,3)
Chemistry - BMC	56,6 (13,2)	51,5 (10,7)	48,8 (7,6)	52,3 (11,0)	56,3 (11,0)	60,9 (14,0)
Chemistry - Ångström Laboratory	60,1 (5,0)	59,4 (5,7)	58,8 (4,2)	60,3 (4,4)	61,2 (4,7)	63,5 (6,3)
Civil and Industrial Engineering	75,0 (0,0)	66,7 (0,0)	56,2 (0,0)	61,9 (4,8)	55,0 (5,0)	40,0 (8,0)
Earth Sciences	81,5 (5,3)	79,4 (6,0)	78,1 (5,8)	79,6 (6,2)	80,7 (5,9)	80,9 (7,0)
Ecology and Genetics	69,7 (1,8)	70,6 (2,7)	73,1 (3,2)	76,2 (4,5)	78,4 (3,9)	80,1 (5,0)
Electrical Engineering	46,0 (12,8)	48,4 (10,8)	51,0 (11,7)	52,4 (11,4)	53,8 (11,2)	54,0 (11,9)
Information Technology	51,5 (5,2)	56,4 (3,5)	60,8 (5,0)	60,8 (5,9)	59,7 (8,5)	62,8 (7,5)
Materials Science and Engineering	40,9 (13,1)	42,1 (11,7)	45,9 (11,2)	49,5 (11,2)	53,9 (10,7)	57,3 (9,7)
Mathematics	61,6 (1,4)	64,1 (1,4)	61,7 (2,0)	60,0 (2,2)	64,0 (2,1)	65,1 (2,4)
Organismal Biology	64,9 (2,1)	70,3 (1,5)	69,2 (2,3)	73,6 (3,0)	78,2 (3,4)	80,0 (3,5)
Physics and Astronomy	86,2 (3,1)	87,1 (3,4)	87,8 (4,0)	87,8 (5,1)	87,1 (5,2)	87,4 (9,6)

3.4.4 Open access

In Figure 41, proportion OA publications is given as a percentage. Total OA is defined as publications belonging to any type of OA (gold, hybrid or green).

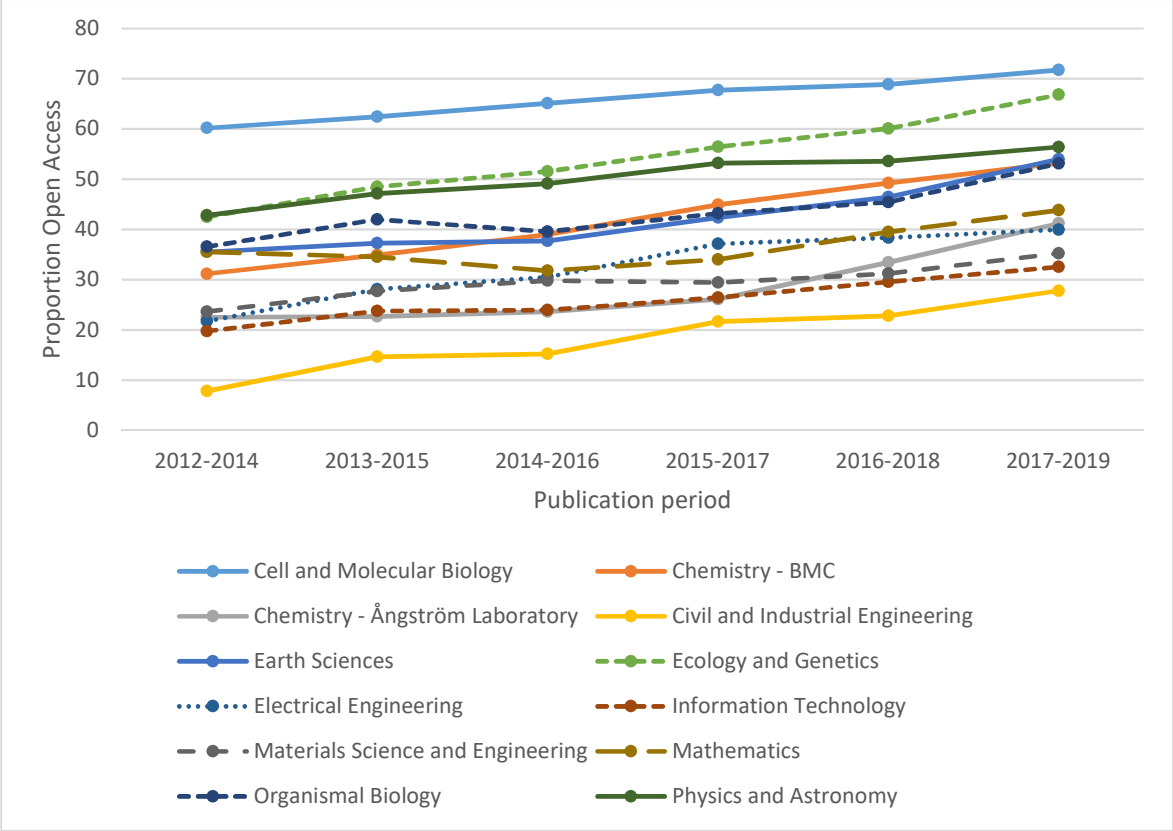

Figure 41. Faculty of Science and Technology. Total OA by publication period. 3-year moving average.

4 Brief summary of the results

HumSam

Regarding the Norwegian model, the increase in proportion of publication fractions at level 2 for some departments in the *Faculty of Arts* is noteworthy (Table 7). *ALM* and *History* have an increase of about 21 and 19 percentage units from the publication period 2012-2014 to the publication period 2017-2019, respectively. *Faculty of Education* has a corresponding increase of about 18 percentage units (Table 8), and this is the case also for *English* in the *Faculty of Languages* (Table 9). In the *Faculty of Social Sciences*, the corresponding increase is most noteworthy for *Economic History* (about 23 percentage units) and *Economics* (about 19 percentage units) (Table 10). The highest observed value for the indicator across the considered publication periods is the value for *Economics* (57,6%, for the period 2017-2019).

When it comes to citation indicators, *Peace and Conflict Studies* is worth mentioning, since the department has high figures for all four indicators with respect to the whole publication period, in particular for the two publication-level indicators, MNCS and PP(top 10%) (Table 14). Moreover, the proportion of publication fractions at level 2 is high for this department, regardless of publication period (Table 10).

In general, the HumSam departments/faculties have an increasing trend for proportion OA. An example of a department with a strictly increasing trend across the periods is *Art History* (Figure 20). The extreme OA trend for *Game Design* under the *Faculty of Arts* is mostly explained by a two-year period (2015-2016) with quite many book chapters made freely available.

MedFarm

Regarding the *Faculty of Medicine*, the highest values on the citation indicators, with respect to the whole publication period, are observed for the two departments *Medical Biochemistry and Microbiology* and *Immunology, Genetics and Pathology* (Table 27). The latter department has an upward trend from the publication period 2012-2014 to the period 2016-2018 with respect to the journal-level indicator MNJS, whereas the former department has the highest PP(top 10%) value across the periods, about 18% (Figures 28 and 27, respectively). In general, the departments of the faculty have an increasing trend for proportion OA (Figure 34).

For the *Faculty of Pharmacy*, the *Pharmacy* department has very high values on the PP(top 10%) indicator in the last three publication periods, values in the interval 18-20 (Figure 31). *Pharmacy* further have high values of the collaboration indicator PP(industry), especially in the last period (2016-2018): about 30% of its publications in the period have been co-authored with one or more industrial organizations (Tables 31 and 32).

TekNat

For the *Faculty of Science and Technology*, the three biology departments, *Cell and Molecular Biology*, *Ecology and Genetics* and *Organismal Biology*, all have high values on the citation indicators with respect to the whole publication period (Table 35). With regard to the Norwegian model, *Ecology and Genetics* shows high figures with regard to proportion of publication fractions at level 2, regardless of period (Table 34).

Noteworthy is also the high values on the international collaboration indicator, PP(int collab), for the two departments *Earth Sciences* and *Physics and Astronomy* (Tables 36 and 37).

The overall trend for proportion OA is increasing for the entire faculty.

5 Concluding remarks

In this report, we have we have described the data and methods used in UU ABM 2020, and we have reported results on publication volume, publishing level, citation impact, collaboration (in terms of co-publishing) and OA. For the measurement of citation impact, four advanced bibliometric indicators were used.

We believe that the results of ABM are of interest, not only for the university management, but also for the heads of the departments of UU. However, bibliometric statistics should be interpreted with great caution when underlying publication sets are small. For some of the departments covered by ABM, this is the case.

In our view, and as is pointed out in the Leiden Manifesto for research metrics (Hicks et al., 2015), bibliometric statistics should support peer review assessments, not replace such assessments. The use of bibliometric statistics can indeed strengthen peer review, since such statistics can be used to question bias tendencies in peer review. As is also pointed out by Leiden Manifesto for research metrics, variation by field in publication and citation practices should be controlled for in bibliometric research evaluation. In UU ABM 2020, and with respect to citation impact, this principle is taken into account.

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Appendix 1 Formal definitions of citation indicators used in UU ABM

In this appendix, we describe the calculation of the four field normalized citation impact indicators used in UU ABM.

The following indicators are defined in this appendix:

- Mean normalized number of citations per publication (MNCS).
- Proportion of frequently cited publications (top 10%) (PP(top 10%)).
- Mean normalized journal impact score per publication (MNJS).
- Mean journal proportion of top 10% publications (MJPP(top 10%)).

MNCS and PP(top 10%) are publication-level indicators, whereas MNJS and MJPP(top 10%) are journal-level indicators.

Regardless of indicator, a subject classification of publications is used for field normalization purposes. The classification is generated by application of an advanced clustering methodology, in which a publication-publication relatedness measure based on direct citations between publications is utilized (Waltman & van Eck, 2012). The classification, which contains about 4,000 classes, is such that each publication belongs to exactly one class.[11] The classification has been created by CWTS, Leiden University, Netherlands.

This appendix treats the case, in which fractional counts are used in the calculations of indicator values. In case whole counts should be used in the calculations, a_i in Eq. (1) below is set to 1.

Let A be a unit of analysis, and n the number of publications for A. Let r_i be the number of authors of the ith publication for A. Let a_i be the *author fraction* A has of the ith publication. We consider two cases. s

(**a**) A is a department. a_i is then defined as

$$a_i = \sum_{j=1}^{m_i} \frac{uuaff_j}{totaff_j} \times \frac{1}{d_j} \times \frac{1}{r_i} \quad (1)$$

where m_i is the number of authors affiliated to A regarding the ith publication, d_j the number of UU department affiliations of the jth of these A authors, $uuaff_j$ the number of UU affiliations listed in WoS

[11] Cf. footnote 4 in this report.

for the *j*th author, and $totaff_j$ the total number of affiliations listed in WoS for the *j*th author. Note that the right-hand side in Eq. (1) is equal to m_i/r_i when each A author has exactly one affiliation in the *i*th publication.[12]

(**b**) A is an individual author. a_i is in this case defined as $1/r_i$.

We define MNCS for A, MNCS(A), as

$$\text{MNCS(A)} = \frac{\sum_{i=1}^{n} a_i \text{NCS}_i}{\sum_{i=1}^{n} a_i} \tag{2}$$

$$\text{NCS}_i = c_i / \mu_{sc\_i}$$

$$\mu_{sc\_i} = \frac{1}{k_i} \sum_{j=1}^{k_i} c_j$$

where NCS_i is the normalized citation score for the *i*th publication of A, c_i is the citation score of the *i*th publication, *sc_i* the subject class to which the *i*th publication has been (algorithmically) assigned, k_i the number of publications in *sc_i* with the same publication year as the *i*th publication, and c_j the citation score of the *j*th publication among these latter publications. μ_{sc_i} is the field reference value that c_i is normalized against. The normalization gives rise to a normalized citation score for the *i*th publication. Clearly, MNCS(A) is a weighted mean across the publications of A, a fact that also holds for the other three citation indicators treated in this report (Section 2.2).

We define PP(top 10%) for A, PP(top 10%)*(*A), as

$$\text{PP(top 10\%)(A)} = \frac{\sum_{i=1}^{n} a_i b_i}{\sum_{i=1}^{n} a_i} \tag{3}$$

$$b_i = \frac{\max(y_{sc\_i}^{c_i+1} - \max(0.9, y_{sc\_i}^{c_i}), 0)}{y_{sc\_i}^{c_i+1} - y_{sc\_i}^{c_i}}$$

where $y_{sc\_i}^{c_i}$ ($y_{sc\_i}^{c_i+1}$) is the proportion publications–with respect to the citation distribution, which concerns the publications in *sc_i* with the same publication year as the *i*th publication of A–with less than c_i ($c_i + 1$) citations. $\max(y_{sc\_i}^{c_i+1} - \max(0.9, y_{sc\_i}^{c_i}), 0) / y_{sc\_i}^{c_i+1} - y_{sc\_i}^{c_i}$ is the fraction of the *i*th publication with which the publication is assigned to the 10% most frequently cited publications (Waltman & Schreiber, 2013).

We define MNJS for A, MNJS(A), as

$$\text{MNJS(A)} = \frac{\sum_{i=1}^{n} a_i \text{NJS}_i}{\sum_{i=1}^{n} a_i} \tag{4}$$

[12] The data source we use with respect to the Norwegian model, i.e. DiVA/GLIS, has typically not information on the total number of affiliations listed in WoS for an author that is affiliated to UU in a publication covered by WoS. Therefore, the leftmost factor in Eq. (1) is dropped regarding author fractionalization and the Norwegian model.

$$\mathrm{NJS}_i = \frac{\sum_{j=1}^{p_i} \mathrm{NCS}_j}{p_i}$$

$$\mathrm{NCS}_j = c_j / \mu_{sc\_j}$$

$$\mu_{sc\_j} = \frac{1}{k_j} \sum_{l=1}^{k_j} c_l$$

where NJS_i is the normalized journal score of the journal, say J_i, of the ith publication, p_i the number of publications in J_i, NCS_j (c_j) the normalized citation score (citation score) of the jth publication in J_i, say P_j, sc_j the subject class to which P_j has been assigned, k_j the number of publications in sc_j with the same publication year as P_j, and c_l the citation rate of the lth of these latter publications. μ_{sc_j} is the field reference value that the citation score of P_j, c_j, is normalized against, and the normalization gives rise to a field normalized citation score for P_j (cf. the definition of MNCS above).

We define the MJPPtop10% for A, MJPP(top 10%)(A), as

$$\mathrm{MJPP(top\ 10\%)(A)} = \frac{\sum_{i=1}^{n} a_i \mathrm{JPP(top\ 10\%)}_i}{\sum_{i=1}^{n} a_i} \tag{5}$$

$$\mathrm{JPP(top\ 10\%)}_i = \frac{\sum_{j=1}^{q_i} b_j}{k_i}$$

$$b_j = \frac{\max(y_{sc\_i}^{c_j+1} - \max(0.9, y_{sc\_i}^{c_j}), 0)}{y_{sc\_i}^{c_j+1} - y_{sc\_i}^{c_j}}$$

where k_i is as in Eq. (2), q_i the number of publications in sc_i with (a) the same publication year as the ith publication of A, and (b) belonging to the journal of the ith publication of A. $\max(y_{sc\_i}^{c_j+1} - \max(0.9, y_{sc\_i}^{c_j}), 0) / y_{sc\_i}^{c_j+1} - y_{sc\_i}^{c_j}$ is the fraction of the jth publication, in sc_i and satisfying the conditions (a) and (b), with which the publication is assigned to the 10% most frequently cited publications with respect to the citation distribution determined by sc_i and the publication year of the ith publication of A.

JPP(top 10%)i is then the extent, on average, to which the publications that belong to sc_i, with the same publication year as the ith publication of A and belonging to the same journal as the ith publication of A, belong to the 10% most frequently cited publications with respect to the citation distribution determined by sc_i and the publication year of the ith publication.