

***Final Report - 8***

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# Bibliometric Analysis of the Czech Republic Research Output in an International Context

1993-2009

**CWTS**

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INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ



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## 1. Introduction

This report provides a background document to the CWTS data deliveries on the Czech Republic's research performance during the years 1993-2009, overall and at the institutional level (meso-level). Within the context of the International Audit, the bibliometric data analysis was expected to provide input and support to the analyses related to the Quality of the Research (see Final Report, 3) and the International Co-operation (see Final Report, 6).

In the first section of this report, we briefly describe, in a non-technical fashion, the main features of the CWTS information system and methodology that was used to produce the quantitative 'bibliometric' data.

In the second section we describe the main findings related to the position of the Czech Republic's performance in an international context and provide a comparison with some benchmark countries. In the third section, the results of the analyses at institutional level are reported.

In addition, Appendices have been added in a separate report. Finally, also extra tables (excel file: "EXTRA MATERIAL CZECH AUDIT.xls") have been provided, including the temporal evolution –block approach– for all the main indicators for the first 100 Czech research institutions.

## 2. The CWTS information system and methodology

### 2.1 CWTS information system

The publication output data and citation impact data were extracted from CWTS's proprietary version of the database *Web of Science* (WoS). This source of information is specifically designed for statistical 'bibliometric' analyses of the worldwide research literature.<sup>1</sup> The WoS database contains selected bibliographic information from all research papers published in about 12,000 'sources', including the paper's title and abstract, author names<sup>2</sup>, author affiliations, full text, reference list, document type, and other bibliographic identifiers such as the journal's ISSN number. Some 11,000 of these sources are fully covered peer-reviewed international scientific and technical journals, the remainder being journals and conference proceedings that are often only partially covered.

The CWTS/WoS database is an upgraded and dedicated 'bibliometric' version of the widely available online/offline 'bibliographic' versions of the database provided by Thomson Reuters Scientific to its customers. The CWTS/WoS database covers the years 1980 up to and including the most recent publication year (currently 2009). The WoS is one of very few international multidisciplinary databases that offer a broad and high-quality coverage of the worldwide research literature, and has effectively been the common source for all large scale comparative bibliometric studies over the last two decades. The only other comparable database is *SCOPUS*, a relatively recent source produced by the science publisher *Elsevier* of thus far unknown added value compared to the WoS. Numerous other databases have a limited disciplinary scope, often focusing on specific scientific fields or research domains, such as *Inspec* (for physics and electrical engineering), *Medline* (medicine and health care), to name a few.

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<sup>1</sup> Thomson Reuters (Philadelphia) is the producer and publisher of the Web of Science (WoS). For the earliest years the data will be extracted from the predecessor of the Web of Science, the Citation Index, covering the Science Citation Index, the Social Science Citation Index, the Arts & Humanities Citation Index, and the 'specialty' citation indexes (CompuMath, Biochemistry and Biophysics, Biotechnology, Chemistry, Material Science, Neurosciences). CWTS owns a license agreement with the database producer, *Thomson Scientific* to supply WoS-based bibliometric information to clients worldwide on a commercial basis.

<sup>2</sup> Authors are institutional authors, i.e. a person and his or her institutional address at the time of the publication and listed in the heading or in a footnote of a research publication.

The CWTS bibliometric information system integrates the CWTS/WoS database and a series of software routines and research performance indicators based on publication output and citation impact statistics (section 6 provides more details about these indicators). Note that these indicator-based statistics may differ slightly from the results of similar citation analysis which are performed with other, on-line or off-line, 'bibliographic' (campus license) editions of the *Web of Science*, or CD-ROM versions of WoS predecessor databases such as the *Science Citation Index*, because of minor differences in coverage, definitions of admissible document types, time spans, or data upgrading by CWTS to improve the quality the WoS database (see section 2).

## 2.2 Data processing and address standardization for bibliometric analysis

CWTS invests considerable resources and efforts, on a continuous basis, to upgrade the *Thomson Reuters Scientific's* bibliographic edition of the WoS into a CWTS bibliometric version thus improving the accuracy and comprehensiveness of the data. Part of this computerized procedure includes the cleaning and standardization of the names of organizations listed in the author affiliate address information.

Another step in the data processing is the 'unification' or standardization of the research output in the WoS for address information, both on country, city, and institutional level, as well as apparent errors that need to be re-attributed before analysis. In this standardization process, addresses are aggregated under the label of major organizations within a country or region.

For the standardization of the addresses of research organizations within the Czech Republic the following criteria was adopted:

1. Publications are only assigned to the different main organizations when the information in the affiliate address enables a reliable and unambiguous identification for those organizations.
2. When in the same string of an affiliation appears more than one entity (for example, Charles University and a governmental institute), the paper is assigned to the entity that appears in the first place.
3. In the case of Hospitals combined with Universities, the paper is assigned to the hospital if there is not explicit mention to any university in the string. If in the same address string the hospital appears combined with a university, then the string is attributed to the university. Examples:

*"Univ Hosp Motol Prague, HSC Transplant Unit, Prague, Czech Republic"*

This address is attributed to the University Hospital Motol.

*"Charles Univ & Hosp Prague Motol, Fac Med 2, Dept Pathol & Mol Med, Prague 15006, Czech Republic"*

This address is attributed to the Charles University in Prague.

4. Organizations were defined at their 'main' organisational level, such as universities, higher education and research institutes, and institutes of the Academy of Sciences. This implies that production of institutes or departments within universities were not disaggregated, and the same applies to laboratories, units and departments within the different institutes of the Academy of Sciences (for example, the Biology Center of the Academy of Sciences has been considered as a whole, integrating all the production of the different institutes that constitute the Biology Center).
5. The final standardization was checked by experts in the Czech Republic, matching the current standardization with previous information provided by them. We found a high degree of agreement between both systems and also in the criteria adopted. Minor differences were corrected, and the organizations were labelled with the names and acronyms suggested by the commissioning agency (the Technology Center).

The standardization process of the data is one of the most important and crucial steps in all bibliometric studies. Therefore we present also some indicative figures on the standardization process carried out at CWTS for the analysis of the scientific production at the institutional level in the Czech Republic. These figures can contribute to understand the completeness and accuracy in the results finally presented in the report:

- A total of 66,585 different address strings from the Czech Republic were processed.
- Address strings with at least 5 occurrences were standardized (although minor variants of major institutions were also standardized as they were detected).
- 94% (62,820) of all strings were finally properly standardized.
- The standardization of the Academy of Sciences involved also the identification of the different institutes within the Academy. 99% of the production of the Academy of Sciences was properly assigned to the different institutes.
- Bibliometric indicators were finally calculated for the 100 main institutions (by production) in the country.

### 2.3 Defining the fields of science

Each source journal within the CWTS/WoS database is attributed to one or more Thomson Scientific Reuters-defined *Journal Subject Categories (JSC's)*, a collection of journals covering the same, or closely related, research topics or areas. *Thomson Reuters Scientific* has assigned these journals to these categories according to the opinions of subject experts and inter-journal citation patterns (more about citations in section 6.2). Each journal category is, basically, equivalent to a subfield of science. Wide-scope journals are often assigned to more than one subfield. The prestigious general journals with broad multidisciplinary scopes, such as *Nature* and *Science*, are assigned to a journal category of their own, denoted by *Thomson Reuters Scientific* as 'Multidisciplinary Sciences' and included in the CWTS system under the heading 'Multidisciplinary journals'.

The CWTS bibliometric information system offers customers the possibility to tailor research fields and design their own classification systems based on the groupings of the journal categories. In this study we have applied the disciplinary grouping of JSCs into about 40 main fields<sup>3</sup> of science resembling the classification scheme applied in the Dutch Observatory of Science & Technology (NOWT, see [www.nowt.nl](http://www.nowt.nl)), with some minor changes suggested by the Technology Centre, making the schedule better fitting the Czech output<sup>4</sup>.

### 2.4 Selecting benchmark countries

In this study, the choice was made to compare the Czech Republic's performance with the national output and impact of the following eight countries within Europe: Austria, Denmark, Finland, Germany, Hungary, the Netherlands, Slovenia, and Sweden.

### 2.5 Research performing organizations in the Czech Republic

In this meso-level analysis, the focus is on the main scientific institutions and organizations in the Czech Republic with production in the Web of Science. For analytical purposes we finally present statistics for the 100 most productive organizations in the country.

In the general text of the report tables include up to 25 institutions (plus the Academy of Sciences as global), and in the figures up to the 10 most important institutions. The full list of institutions (100) can be found in the Appendices at the end of the report.

In addition, institutions have been also classified in main institutional scientific sectors<sup>5</sup>. These main sectors are the following:

- Universities. Here we find the universities of the Czech Republic. Also other institutions such as the Institute of Chemical Technology in Prague, the Academies of Arts in Prague or the University of Defense, among others, are included.

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<sup>3</sup> We here use the definition of fields based on a classification of scientific journals. Although this classification is not perfect, it provides a clear and 'fixed', consistent field definition.

<sup>4</sup> An overview of the classification scheme applied in this study is attached to this report in Appendix B.

<sup>5</sup> This classification in scientific sectors is used only with summarizing purposes (actually it is not requested in the tender of the proposal). For this reason we have used the standard sector classification used at CWTS. The purpose of this classification is only to give a general perspective of the scientific production from a broader perspective by aggregating the production of the different individual sectors in more general classes.

- Research organizations. Under this sector we find mainly the production of the Academy of Sciences, but also the production of other major research institutes located within the Czech Republic such as the Institute for Clinical and Experimental Medicine, the Veterinary Research Institute, the Institute of Animal Science, etc.
- Hospitals. As we explained before, here we find the production of the main Czech Hospitals, provided in the address string there is no mention to any particular university. Thus, among these hospitals we find: the General University Hospital in Prague, the University Hospital in Brno, the University Hospital Motol, the Prague Psychiatric Centre, etc. We acknowledge the problem that many of these hospitals have strong links with the universities and sometimes their production can be assigned to the university (when the university appears in the string of the address, we give the credit to the university).
- Government. This sector refers mainly to institutions that are governmental and that research is not their main task, although is implicit in some of their activities. This includes for example the National Institute of Public Health and its regional branches, the Czech Army, or the Czech National Bank among others.
- Companies. Here we include private companies such as Zentiva, the Research Institute of Organic Syntheses (VUOSAS), or the Nuclear Research Institute Rez, among others.
- Other. Finally, under this denomination (when used) other more general organizations are classified, including some of the most important Museums of the Czech Republic, like the National Museum or the Moravian Museum.

These institutional sectors can provide a general picture of the distribution of publications among institutions in the country.

## 2.6 Database year & publication year

All calculations and statistics refer to database years – i.e. the year in which *Thomson Reuters Scientific* processed the publications for its WoS database. These measurements can slightly differ from those based on publication years, which refer to the publishing date of the journal issue. Some 5-10% of the publications that were issued in publication year  $t$  are processed by *Thomson Reuters Scientific* for the WoS database in the following two years  $t+1$  and  $t+2$ .

The general period of analysis comprises publications from 1993 to 2009. Only publications that during this period presented any address with the standard string “Czech Republic” were considered for the analysis (thus, publications under the denomination Czechoslovakia were not included in the study).

For the presentation of the temporal evolution of the production and impact of the different institutions and main scientific sectors, two general approaches have been used. On the one hand we have used a temporal evolution year by year (i.e. one value per year of analysis), and on the other hand a block analysis.

The year by year analysis is very straightforward and clear, but presents the disadvantage that these can present strong fluctuations (mainly due to outlier papers) that sometimes make the analysis and interpretation of the results tough.

The block analysis consists on the calculation of the different indicators for groups of years (in this case, blocks of four years). Thus, it is possible to see in a smoother way the evolution of the different indicators, making it possible to detect significant changes over time. The limitation of this approach can be that it can present more difficulties for the not well versed users of bibliometric indicators

## 2.7 CWTS Bibliometric indicators

The package of quantitative indicators defined for this study comprises of a set of country level ‘macro’ indicators, comparing the research performance of Germany with other countries (see section 4). These indicators can be subdivided into two classes: publication output indicators and citation impact indicators. For a more detailed technical description we refer to Appendix B.

### *2.7.1 Publication output indicators*

Each journal publication that is indexed by the CWTS/WoS database is fully attributed to all countries listed in the author address list of the publication. The same applies to all affiliate main organizations in the author address list as well as the corresponding (main) institutional sectors of each organization. A publication that lists different units of an identical main organization is counted only once (e.g. different research departments of the same university, or subsidiaries of the same parent company).

The publication output is equal to the total number of papers published by a country during the entire period under investigation. These papers relate only to research-based publications that are published in peer-reviewed international scientific and technical journals (see section 1). Only publications reporting on original research findings are included – i.e. the document types ‘normal article’, ‘letter’, ‘note’, and ‘review article’. ‘Meeting abstracts’, ‘Corrections’, ‘Editorials’ and other document types are not included. Apart from this selection, all publications are treated equally in the computations. In a very few cases publications are published in a journal that is not fully indexed within the CWTS/WoS database; such publications are not included in analyses (see section 1).

### *2.7.2 Citation impact indicators*

Each research publication may or may not be read by other scientists and scholars, and its contents may or may not be used in their follow-up research – either by the author(s) or by others. In the event this follow-up research is published in a research article in an international journal, the corresponding researchers and scholars tend to acknowledge the value of the research publication by adding its bibliographic details to in their list of relevant literature (the ‘reference list’). These ‘citations’ to the previous literature can be used as measure of the (international) intellectual influence and scientific impact of a piece of published research.

Hence, the international scientific impact of a country or organization is calculated on the basis of the quantity of citations received by its research papers. A cited publication is assigned in full to all countries and regions included in the author address list. The citation frequency counts in this study refer only to citations that were recorded within the WoS-indexed set of international peer-reviewed journals.

Our assumption is that, at high aggregate levels, a significant positive correlation exists between citation impact frequency and scientific ‘quality’. The number of observed citations obviously depends on the time span of measurement. The number of citations received also tends to be field-dependent, and are also related to the different document types (for example, review papers tend to receive more citations than other document types).

The citation frequency distribution of research publications worldwide is also highly skewed: at high aggregate levels some 20% of the publications tend to receive about 80% of all citations. The top percentiles of most heavily cited publications reflect the best research worldwide. The share of a country within these top publications indicates its contribution to cutting edge research worldwide and provides a crude indicator of research excellence within a domestic science system. The publications in the top percentiles are determined separately for each subfield of science. Each publication is assigned in full to all countries included in its author address list.

The citation frequencies depend on the time-interval after the publication date during which the citations will accumulate and are counted. The accumulation of citations is counted within a pre-set time-interval – the ‘citation window’, which can be defined according to several operational criteria. These windows tend to vary from 1-2 years (short term impact, as measured in the infamous Journal Impact Factor) to as much as 10 years or longer (long term impact). A period of 4-6 years is generally considered to be of appropriate length in most fields of science to assess medium-term impact levels with a sufficient degree of validity. In this study the window was aligned to the publication window – i.e. the set of publication years and citation years are identical, and set to four years (the block system explained in section 4).

Citation may or may not include self-citations – i.e. a self-citation to a paper is a citation given in a publication of which at least one of the authors (either first author or a co-author) is also an author of the cited paper (again either first author or a co-author). These self-citations

were excluded in this study. When focusing on 'external' impact, the counts should always exclude the author self-citations.

Within the CWTS citation analysis, field normalization is applied. This means that every paper, and particularly its impact, is compared with the papers in its own environment. As citation practices differ among fields, it is necessary to create benchmark values for citation data, in order to do right to the specific character of a country's or unit's output profile. Within this field-normalized impact measurement, we take into consideration the type of document (as various types of documents have different citation characteristics), and the age of the publications (as stated above, older publications have had more time to collect citation impact) as well.

Another approach in citation impact analysis is a focus on the top of the worldwide literature, and the position in that top by a country, institution, or group. Contrary to an average based impact score', we determine the actual number of publications in the fields to which the journal belongs in which the papers were published, thereby focusing on the position among other top publications. To assess the number we found, we compare the observed number of highly cited publications with the top 10% value of the countries in this analysis (which we consider as an expected value). If the actual number exceeds the expected number of highly cited publications, the ratio of this comparison will be above the value 1, indicating a relative overrepresentation of the country among the top 10% most highly cited publications, whereas a score below the value 1 indicates an under-representation of the country among the top 10% most highly cited publications. In this specific analysis we only focus on articles and reviews, as letters are considered as a too heterogeneous type of scientific communication, being often of a different nature than articles and reviews, and in some fields very rare, thus creating statistical unreliability. The analysis of highly cited publications is based on single publication years, in combination with a fixed four-year citation window. This needs to be fixed, as this gives every single publication in every single year an equal chance to contribute to the top-down ranking per field, and makes annual analyses easier. Overall, all values are aggregated, leading to one score per country. For the years 2006-2008, citation windows of 3, 2, and 1 year (for respectively 2006, 2007, and 2008 publications) are simply too short to conduct valid citation analysis, as in most fields a citation window of three to four years is needed to reach the so-called 'peak in numbers of citations received'.

As discussed above, our **field-normalized impact indicator (CPP/FCSm)** is a particularly powerful indicator of citation impact. This indicator relates the measured impact of a unit of analysis (a country, an institute, etc.) to a worldwide, field-specific reference value. This is then an internationally standardized impact indicator. This indicator enables us to observe immediately whether the performance of a unit of analysis is significantly far below (indicator value < 0.5), below (indicator value 0.5 - 0.8), around (0.8 - 1.2), above (1.2 - 2.0), or far above (>2.0) the international (western world dominated) impact standard of the field.

We stress however that the meaning of the numerical value of the indicator is related to the aggregation level of the entity under study. It is necessary to give some 'exegesis of the 'crown' indicator. The higher the aggregation level, the larger the volume of publications and the more difficult it is to obtain a citation impact significantly above the international level. So for example, at the 'meso-level' (e.g., a whole university, or a large institute, about 500 – 1,000 publications per year), a CPP/FCSm value above 1.2, means that the institute's impact as a whole is significantly above (the western-) world average. Then, the institute can be considered as a scientifically strong organization, with a high probability of finding very good to excellent groups. Therefore, it is important to split up large institutes into smaller groups. Only this allows a more precise assessment of research performance. Otherwise, excellent work will be 'hidden' within the bulk of a large institute or faculty.

At the level of a research group a CPP/FCSm value above 2 indicates a very strong group, and above 3 the groups can be, generally, considered as excellent and comparable to top-groups at the best US universities.

### *2.7.3 The context of bibliometric output and impact indicators*

It is important to note that this study covers publications output and citation impact measures. Publication output numbers are not synonym for productivity, and just as output measures derived according to the methodology described above are proxies of a certain overall output, so are productivity measures, as this completely depends on what you include

in the formula to calculate productivity per researcher. Next, citation impact measures are by no means to be directly interpreted as synonym for 'scientific quality'. As citation impact measures express the influence of your work on that of other researchers, the large scale quantification of citation impact data points into international influence or visibility. CWTS does not support the idea that citation impact measures could be directly interpreted as *the* measure of scientific quality, as scientific quality is a much more multi-dimensional concept, that takes into account other aspects of scientific activity as well (e.g., as can be measured through peer review, dealing with issues such as numbers of publications in other sources as international journals, grants, prizes, editorships, etc.).

Yet another statement we need to make in this section relates to the general characteristics of this particular bibliometric analysis. Within the field of bibliometrics, and the applications thereof in the assessment of research, we roughly distinguish between top down analyses, mostly focusing on country level (comparison), research fields and institutions, and bottom up analyses (in which the focus is on institutions and research group level, and even more and more individual researcher level). The both approaches require different 'rules of the game', for example country level analyses hardly require any interaction with experts in the respective countries, while institutional analysis in the top down mode requires information on the level addressing the proper organizations. As the level of detail is low, and the insight limited to global characteristics of the science system under study, the character of this type of studies is descriptive of nature. In the bottom up approach, more profound insights are necessary to create more detail in the analyses. This requires more interaction with research managers and researchers, even to work floor level to construct valid sets of publications, directly forthcoming from the units under study. Issues like mobility, re-organizations, etc. become important to get a proper insight into the whereabouts of the institutes, groups, or individuals under study. Given the more detailed insights required during this latter type of studies, the results can be of a much more evaluative nature, thereby allowing for more far reaching conclusions as one could ever draw based on a top down, descriptive, macro level analysis such as this. From this, we state that this is not an evaluation of the Czech science system the way it is commonly understood. For a proper evaluation of the research on work floor level, one should collect data in a completely different manner, a process CWTS has a vast experience, thereby producing bibliometric statistics on (mainly) groups level, the results of which are transferred to peer review committees who judge the research performance of groups. In this process, bibliometric scores play an instrumental role, supporting the work of the committee, in which bibliometric data are only one of the pillars of the whole process.

Finally, for the proper use and interpretation of bibliometric indicators (especially in order to avoid the possible influence of potential manipulative or "gaming" strategies) it is important to use internationally normalized indicators (such as the ones presented in this report – **CPP/FCSm**, **CPP/JCSm**, **JCSm/FCSm**, etc.), as well as the combination of several indicators for the analyses instead of relying only one or two of them. The combined use of different bibliometric indicators provide a more complete picture of the scientific performance of the different units, and also reduce the possible influence of manipulative strategies.

Table 1: Overview of standard CWTS bibliometric indicators

|                                    |                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>P</i></b>                    | Number of articles (normal articles, letters, notes and reviews) published in journals processed for the internet version Web of Science (WoS) of the Thomson Scientifics' Citation Indexes (CI).                                                                                                                                                 |
| <b><i>C-sc</i></b>                 | Number of citations recorded in CI journals to all articles involved. Self-citations are excluded.                                                                                                                                                                                                                                                |
| <b><i>CPP</i></b>                  | Average number of citations per publication. Self-citations are not included.                                                                                                                                                                                                                                                                     |
| <b><i>JCSm</i></b>                 | Average citation rate of all articles published in the journals in which an institute/group has published (excluding self-citations). This indicators is not included in the tables, but is calculated for other indicators.                                                                                                                      |
| <b><i>FCSm</i></b>                 | Average citation rate of all articles in the fields in which the institute/group is active. Also indicated as the world citation average in those fields. Fields are defined by means of Thomson Scientific journal categories (excluding self-citations). This indicators is not included in the tables, but is calculated for other indicators. |
| <b><i>CPP/FCSm</i></b>             | Impact of an institute/group's articles, compared to the world citation average in the (sub)fields in which the institute/group is active.                                                                                                                                                                                                        |
| <b><i>CPP/JCSm</i></b>             | Impact of an institute/group's articles, compared to the average citation rate of the institute/group's journals.                                                                                                                                                                                                                                 |
| <b><i>JCSm/FCSm</i></b>            | Impact of the journals in which an institute/group has published, compared to the world citation average in the fields covered by these journals.                                                                                                                                                                                                 |
| <b><i>%nc</i></b>                  | Percentage of articles not cited during the time period considered.                                                                                                                                                                                                                                                                               |
| <b><i>%sc (Self-citations)</i></b> | Percentage of self-citations. A self-citation is defined as a citation in which the citing and the cited paper have at least one author in common (first author or co-author).                                                                                                                                                                    |

## 2.8 Specific bibliometric analyses delivered to the Czech government

### 2.8.1 Scientific cooperation Analysis

Indicators for scientific collaboration are based on an analysis of all addresses in papers published by a research unit. Each paper is classified in one of three categories. First, we identified all papers authored by scientists from one research unit only. These papers are classified as 'single institute', as they involve no collaboration or only 'internal' collaboration. The remaining papers are classified as 'national collaboration' when all addresses on a paper are from the same country (i.e. the Czech Republic). Finally, papers containing addresses from at least two different countries (i.e. Czech Republic and other countries) are assigned to the type 'international collaboration'. Papers in each of the three categories are aggregated for each unit of analysis, and for each of these aggregated sets, impact and output indicators are computed.

The purpose of this analysis is to show (1) how frequently a research unit has co-published papers with other research units, (2) how the impact of papers resulting from national or international collaboration compares to the impact of papers authored by scientists from one unit of analysis only, and (3) how this collaboration and its impact (mainly the CPP/FCSm) has evolved over time for the different research institutions in the Czech Republic.

Finally it is important to remark that the analysis of collaboration is intended to represent the scientific work done among different partners or institutions in the development of their scientific activities, strategies and objectives. In this sense, cases like double appointments of researchers or PhD students between two organizations (e.g. the Academy of Sciences and the University) would be considered as collaboration from the bibliometric data point of view.

### 2.8.2 Extra material provided

Different tables in EXCEL format have been also delivered as a result of the development of this report. These tables are the following:

- **EXTRA\_MATERIAL\_1:** This table includes the basic indicators for all the 100 main research organizations in the Czech Republic. The different columns included are the following:
  - *English name:* this is the standardized name of the individual institution.
  - *Indicator:* this refers to the different indicators explained in the chapter 6.3 (excluding only *FCSm* and *JCSm*) that are presented in the different rows for each of the institutes presented.
  - *Total:* this is the total value of each indicator for the different individual institutions.
  - *Block periods from 1993-1996 to 2006-2009:* scores in the different indicators for each indicator referring only to the block period indicated in this column.
- **EXTRA\_MATERIAL\_2:** This table includes the same information as in the previous table but in this case including the information disaggregated for the different types of collaboration of the publications.
- **EXTRA\_MATERIAL\_3:** Again this includes the same information as in the previous tables but this time disaggregating the indicators for each of the fields defined (only fields with at least 5 publications are shown for each institution).

### 3. Overall performance in an international context

#### 3.1 Overall bibliometric results

In this section we will start from an overall perspective, describing the situation of the Czech Republic science system over the period 1993 to 2009. Before we could start analyzing the position of the Czech Republic's performance in an international context, we start with a description of the situation of the Czech Republic's research output.

In Table 2, the standard bibliometric indicators are presented for the scientific production of the Czech Republic. An extensive explanation of the indicators is given in Appendix B. For the interpretation of the table, we will describe the overall scores for the Czech Republic over the full period 1993-2009.

Table 2: Bibliometric statistics for Czech Republic, 1993-2009

| Period    | P      | C       | C-sc    | %no-cited | CPP   | CPP-sc | CPP/FCSm | CPP/JCSm | JCSm/FCSm | %Self-citations |
|-----------|--------|---------|---------|-----------|-------|--------|----------|----------|-----------|-----------------|
| 1993-2009 | 85,572 | 716,375 | 492,613 | 36.21%    | 8.37  | 5.76   | 0.64     | 0.88     | 0.72      | 31.24%          |
| 1993-1997 | 14,797 | 24,757  | 12,922  | 72.82%    | 1.67  | 0.87   | 0.53     | 0.82     | 0.65      | 47.80%          |
| 1994-1998 | 18,986 | 41,849  | 22,801  | 67.36%    | 2.20  | 1.20   | 0.53     | 0.82     | 0.65      | 45.52%          |
| 1995-1999 | 19,899 | 46,651  | 25,437  | 66.12%    | 2.34  | 1.28   | 0.54     | 0.82     | 0.65      | 45.47%          |
| 1996-2000 | 20,787 | 50,487  | 27,717  | 64.78%    | 2.43  | 1.33   | 0.54     | 0.83     | 0.65      | 45.10%          |
| 1997-2001 | 21,582 | 55,418  | 31,569  | 63.19%    | 2.57  | 1.46   | 0.57     | 0.84     | 0.68      | 43.03%          |
| 1998-2002 | 22,534 | 61,315  | 35,546  | 61.68%    | 2.72  | 1.58   | 0.60     | 0.86     | 0.70      | 42.03%          |
| 1999-2003 | 23,824 | 69,481  | 41,490  | 60.22%    | 2.92  | 1.74   | 0.63     | 0.88     | 0.72      | 40.29%          |
| 2000-2004 | 24,951 | 75,578  | 46,069  | 58.69%    | 3.029 | 1.85   | 0.65     | 0.89     | 0.73      | 39.04%          |
| 2001-2005 | 26,966 | 87,918  | 54,907  | 56.39%    | 3.26  | 2.04   | 0.67     | 0.90     | 0.74      | 37.55%          |
| 2002-2006 | 28,724 | 99,373  | 63,359  | 54.57%    | 3.46  | 2.21   | 0.70     | 0.93     | 0.76      | 36.24%          |
| 2003-2007 | 30,659 | 114,257 | 73,833  | 53.39%    | 3.727 | 2.41   | 0.75     | 0.96     | 0.78      | 35.38%          |
| 2004-2008 | 33,880 | 134,351 | 87,244  | 52.09%    | 3.965 | 2.58   | 0.78     | 0.98     | 0.80      | 35.06%          |
| 2005-2009 | 37,341 | 157,770 | 103,008 | 50.23%    | 4.225 | 2.76   | 0.79     | 0.98     | 0.81      | 34.71%          |

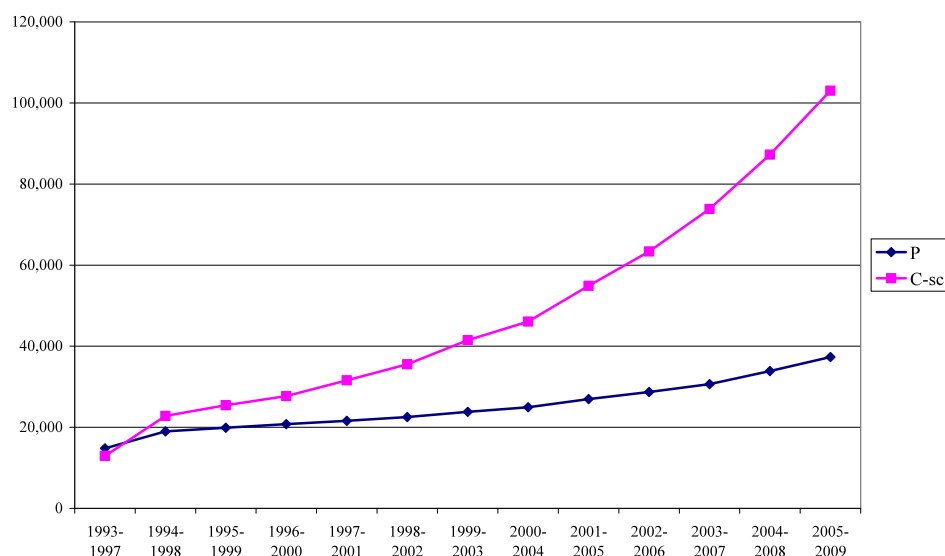
The total output of the Czech Republic during the period of analysis amounts a total of 85,572 publications and a total of 492,613 citations (excluding self-citations). In total, 36% of all publications that were produced by the Czech Republic were not cited at all in that period. The average impact is 8.37 citations per publication, while the mean impact after correction for self-citations is 5.76 citation per paper. Self-citing is a normal phenomenon in science, as scientists need to cite their one work when they build up a consistent output over the years. Furthermore, due to publication delays, scientists are citing their own work more often as external citations can only arrive after their publications have been made public.

The percentage of self citations is still within a reasonable band width (as we normally observe between 20-40% self citations in our studies. The field normalized impact score CPP/FCSm is 0.64, that is, 36% below worldwide average impact level. The publications appeared in journals with a low status in the field to which the journal belonged (JCSm/FCSm is 0.72). The normalized indicators show that the Czech Republic is performing below the international level. However the trend analysis presents an increasing positive pattern in all the indicators. These trends are worked out in more detail below.

Figure 1 shows that both the scientific production (P) and the impact in absolute terms (numbers of citations without self-citations, C-sc) are both increasing during the period of analysis. It is remarkable to observe the sustained increment of the impact, developing at a much faster pace than the number of publications, thus indicating a remarkable improvement in the quality of the scientific publication output of the Czech Republic over time.

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Figure 1: Output and impact numbers for Czech Republic, 1993-2009.



In the same line as in Figure 1, Figure 2 shows how the percentages of papers without citations as well as the percentage of self-citations decrease over time (roughly 30% for both indicators). As both indicators cover specific aspects of visibility, through citation flows, either directly (percentage not cited) or indirectly (percentage not cited), these two indicators are important when we consider the research performance of scientists in the Czech R&D system.

The percentage publications not cited (within a five year period) decreases from over 70% in the early years of the period of analysis, to 50% in the period 2005-2009. This is a decrease of nearly 30%. The percentage self-citation decreases from nearly 50% in the early years of the analysis, to 35% in the later year blocks of the trend analysis. Thereby, this percentage ends at an international level of 'normal' level, as we often observe in our studies self-citations shares to vary between 20-40% in a five-year period.

So concluding we can state that these two indicators suggest that the output of the Czech Republic becomes more internationally visible over the period 1993-2009.

Figure 2: International visibility of the Czech Republic as indicated by percentages of publications not cited and self citations, 1993-2009.

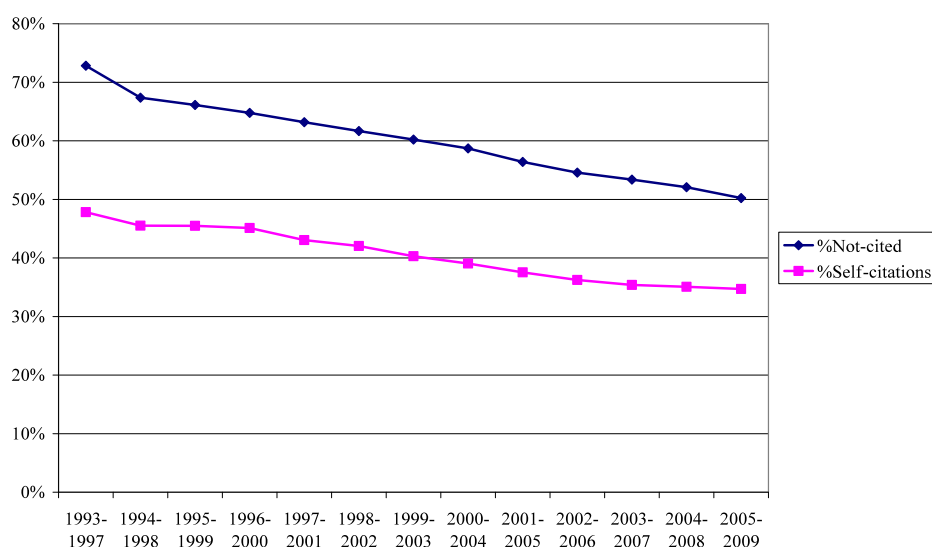
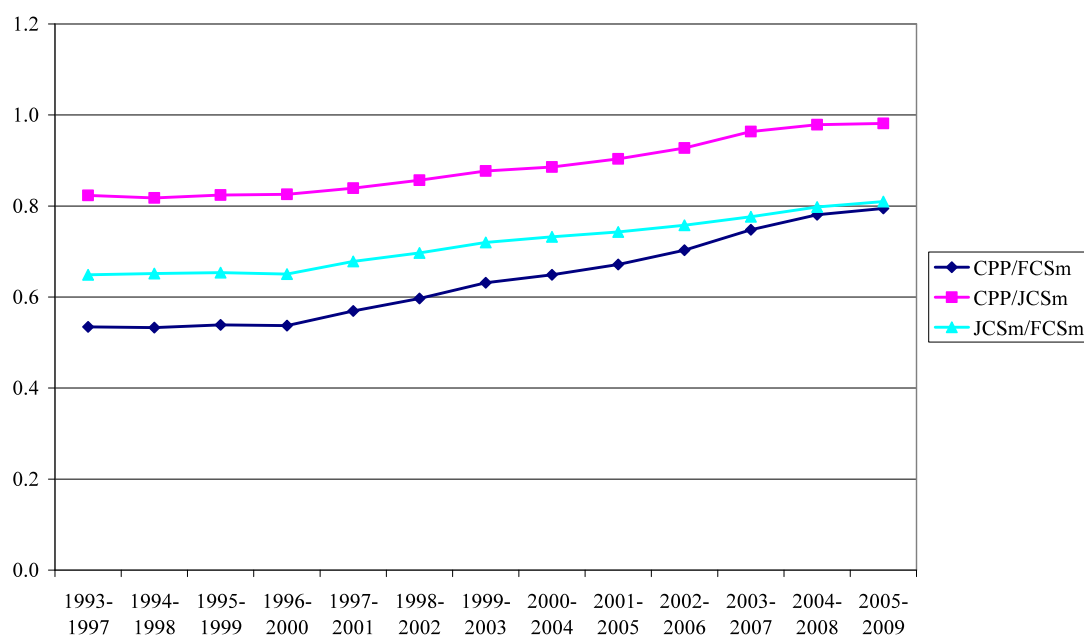


Figure 3 contains the trends for the three ratio indicators CPP/JCSm, CPP/FCSm, and JCSm/FCSm. For all three, we find that the values are still below the value 1 (international field impact level) during the full period, however we also observe a pattern of increasing values for all three normalized impact indicators.

It is important to note that the researchers in the Czech Republic have chosen for journals with higher impact throughout the period of analysis (compared to the previous period), so increasing impact levels are not due to publishing in mediocre or low impact journals, we observe an ambitious publication strategy.

The incremental pattern for the three normalized impact scores is particularly clear for the CPP/FCSm, and an interesting observation in the trend analysis relates to the period 1996-2000, as this period marks a change in the impact pattern of Czech publications.

Figure 3: Normalized impact scores for the Czech Republic, 1993-2009.



### 3.2 Research profile of the Czech Republic

In this section the research profile for the Czech Republic over the period 1993-2009 is presented. Figure 4 shows this profile.

The largest field is Physics & materials science, covering over 18% of the total Czech output in the period 1993-2009, followed by Chemistry & chemical engineering (with over 16% of the national output of the Czech Republic). The 35% of the output in these two fields of the natural sciences makes the research profile of the Czech Republic a very traditional European continental profile, resembling the profiles of particularly Germany, France and Italy (contrary to a more Anglo-Saxon profile, in which the life and medical sciences play a more dominant role).

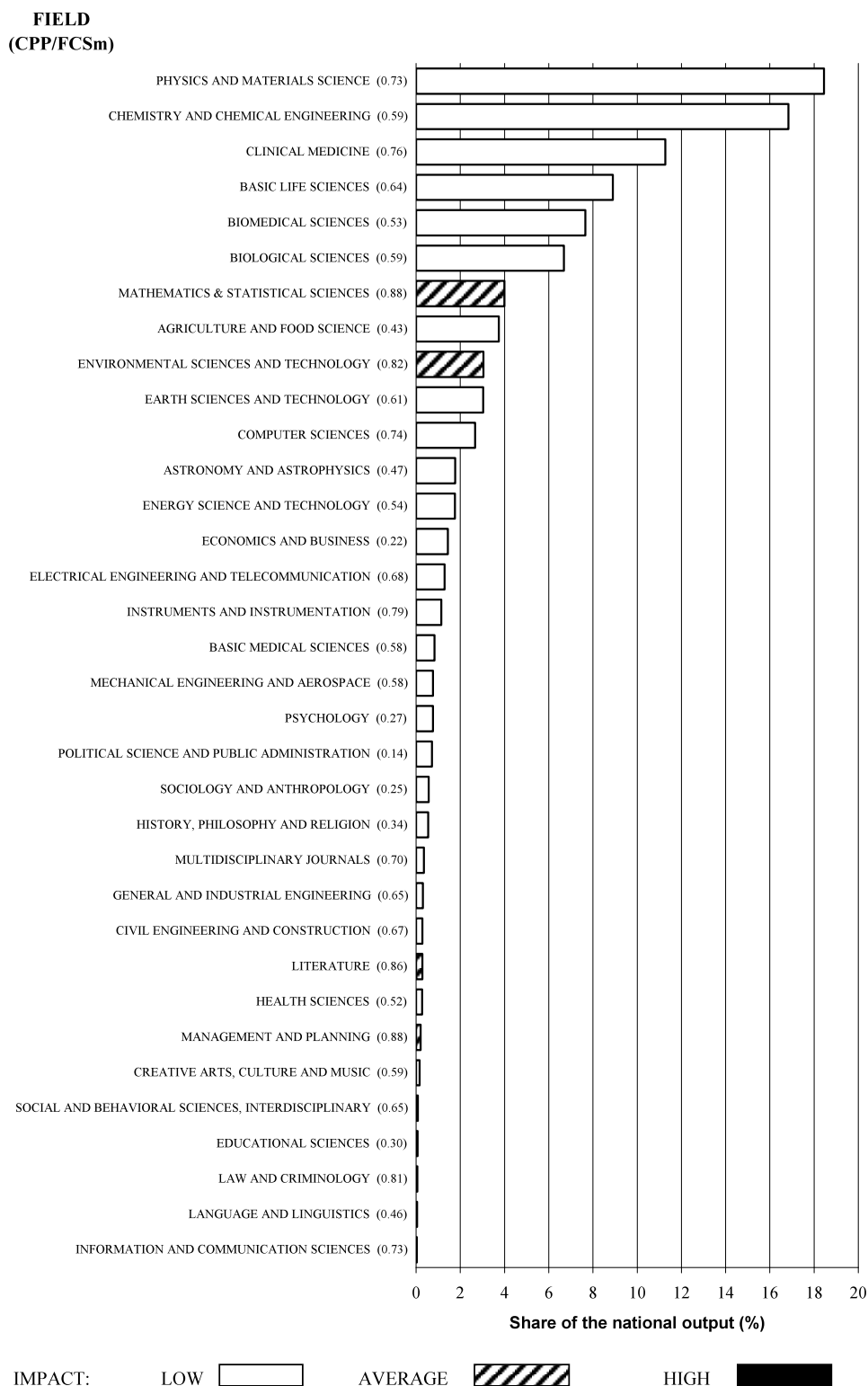
Clinical medicine covers only 10% of the national output, thereby further underlining the observed preference for the natural sciences (in similar large countries, like Denmark and the Netherlands, countries with this Anglo-Saxon profile, the contribution to clinical medicine can rise to shares varying between 25-30% of the national research output).

Other disciplines covering more than 5% of the national output are Basic life sciences, Biomedical sciences, and Biological sciences. In all of the abovementioned disciplines, we observe low impact scores, i.e. representing values below the value of 0.80 on the indicator CPP/FCSm, the field normalized impact score.

## International Audit of Research, Development & Innovation in the CR Final Report - 8: Bibliometric Analysis

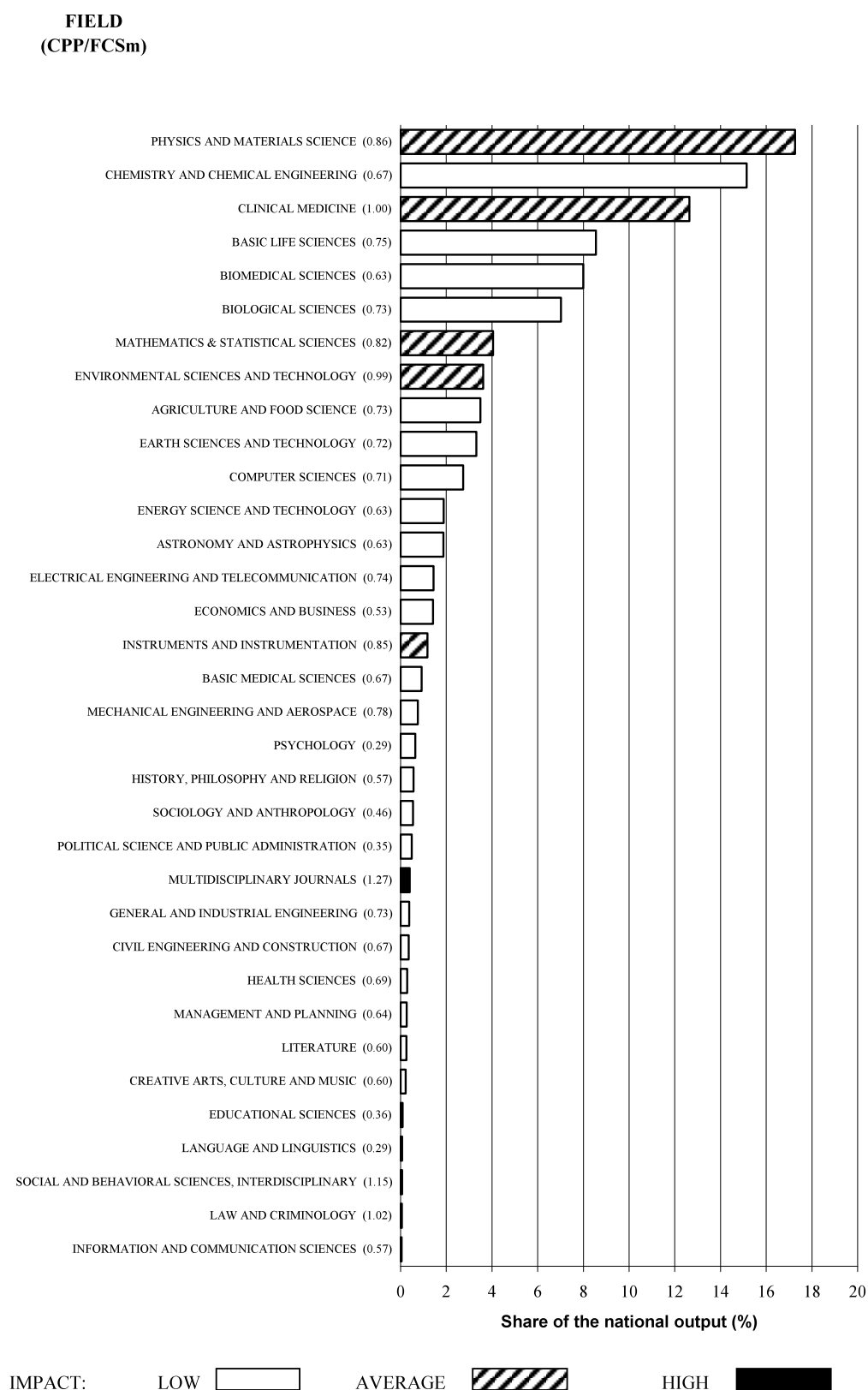
In the profile we observe only a few disciplines with average impact levels, namely mathematics & statistical sciences, Environmental sciences and technology, and with a much smaller output, Literature, Management and planning.

Figure 4: Research profile of Czech Republic's research output, period 1993-2009



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Figure 5: Research profile of Czech Republic's research output, period 2005-2009



In Figure 5 we present the research profile of the Czech Republic representing the research output of the last period (2005-2009). The profile has a similar composition as the one describing the full period 1993-2009, with a few remarkable differences.

A first difference relates to the somewhat more modest volume of publications in the hard natural sciences related to physics and chemistry (Physics and materials science and Chemistry and chemical engineering), compared to the life and medical sciences related disciplines.

A second difference relates to the increased impact of two of the six largest disciplines in which Czech scientists are active in the period 2005-2009 (Physics and materials science and Clinical medicine). However, also the other top ranking disciplines in the profile display an increasing impact for Czech science. Other fields in which the impact has increased for Czech science are mathematics & statistical sciences, Environmental sciences and technology, Instruments and instrumentation, and notably, Social and behavioural sciences, interdisciplinary applications, all with average impact levels, while in Multidisciplinary sciences, a field that covers multidisciplinary top journals such as Nature, Science, and the Proceedings of the National Academy of Sciences of the USA, we note an even high impact score for Czech publications.

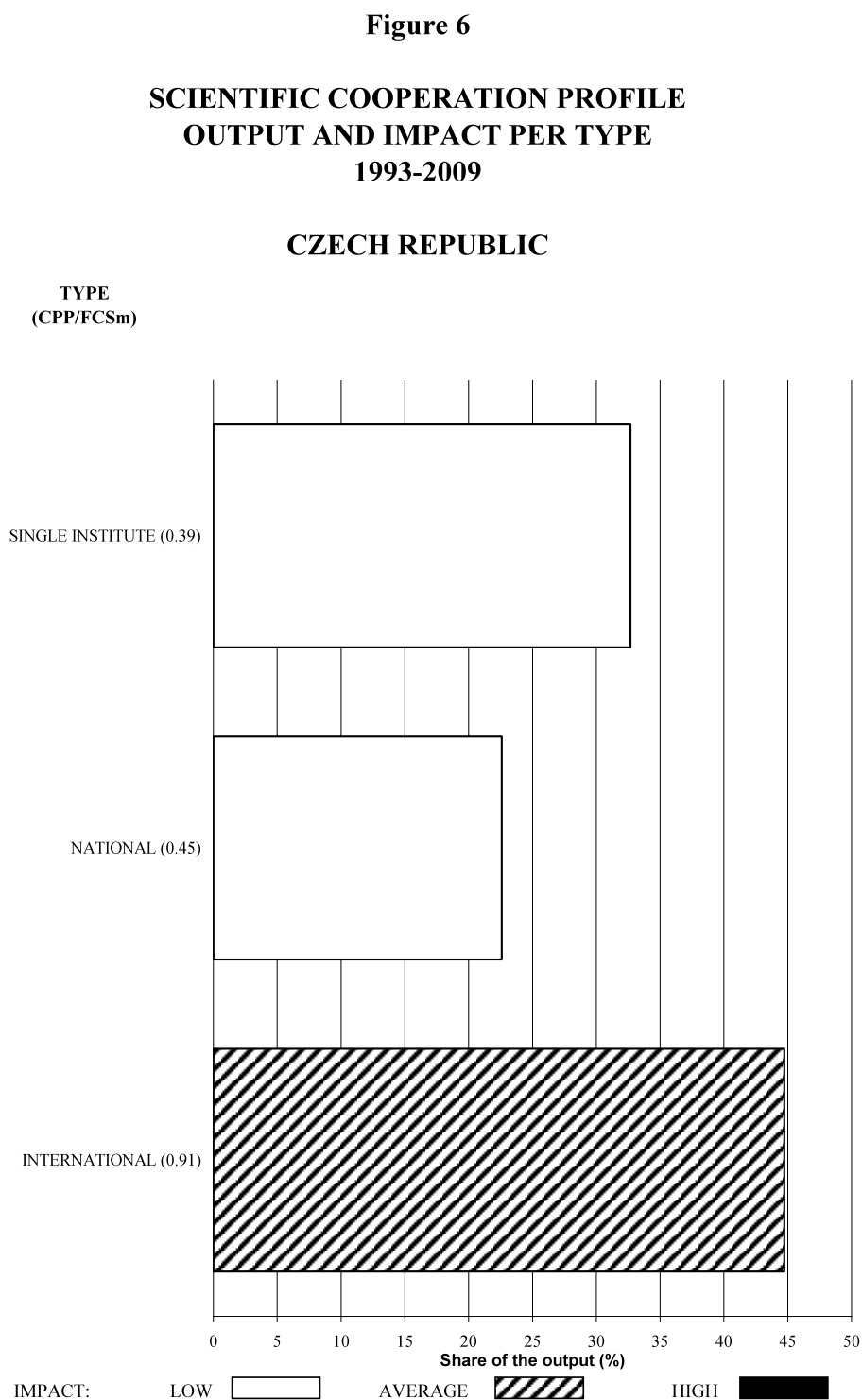
### 3.3 Scientific cooperation analysis on Czech research papers

Figure 6 shows the importance of collaboration for Czech researchers as over two/third of the Czech output is somehow the effect of scientific cooperation.

Although over 30% of the Czech research output carries only one Czech address, most publications carry either two national and/or international addresses.

An important observation relates to the impact generated by publications forthcoming from national or particularly international cooperation. Publications resulting from international cooperation have an impact level twice as high as the publications resulting from national cooperation.

Figure 6: Scientific Cooperation profile – output & impact per type, 1993 - 2009



## International Audit of Research, Development & Innovation in the CR Final Report - 8: Bibliometric Analysis

Figure 7 contains the development over time for the three types of scientific activity for the Czech science system. In this graph, we observe an interesting and important development, namely that of the decreasing relevance of the publications resulting from activities strictly local, that carrying only one address (changing from 45% of the national output in the period 1993-1997 to 27% in the period 2005-2009), while on the other hand we notice a strong growth of publications that involve either national cooperation (a change from 15% to 27% of the Czech output in the two periods mentioned above) or international cooperation (which shows a much smaller increase, from 40% in 1993-1997 to 46% in 2005-2009).

Figure 7: The evolution of the three collaboration types , 1993-2009

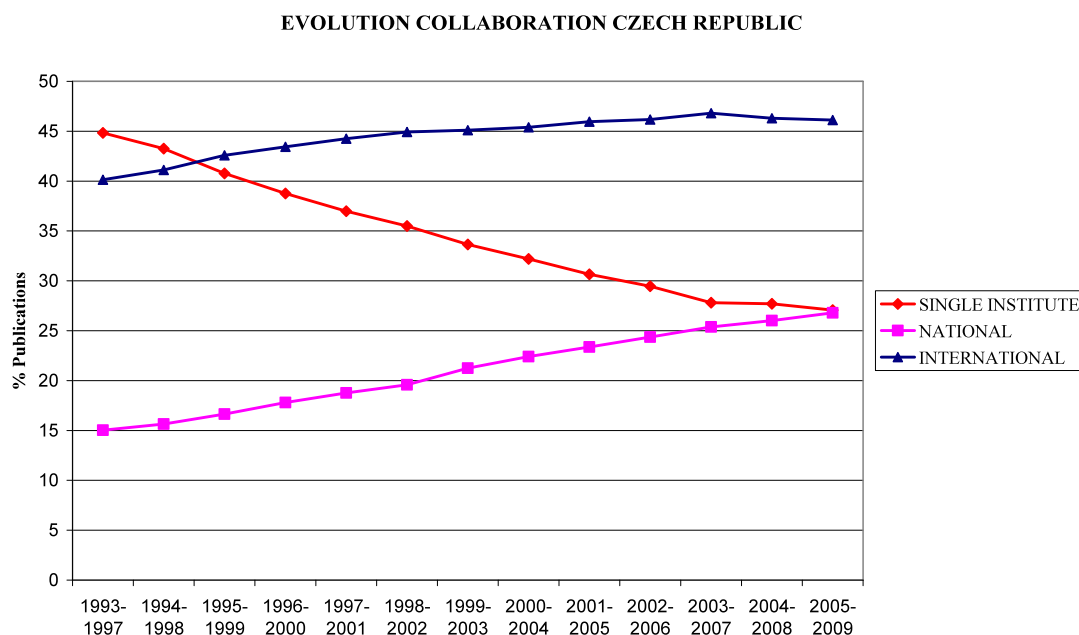


Figure 8 contains the impact trends over time for the three types of scientific activity for the Czech science system. In this graph, we observe increasing trends in the impact for all three types.

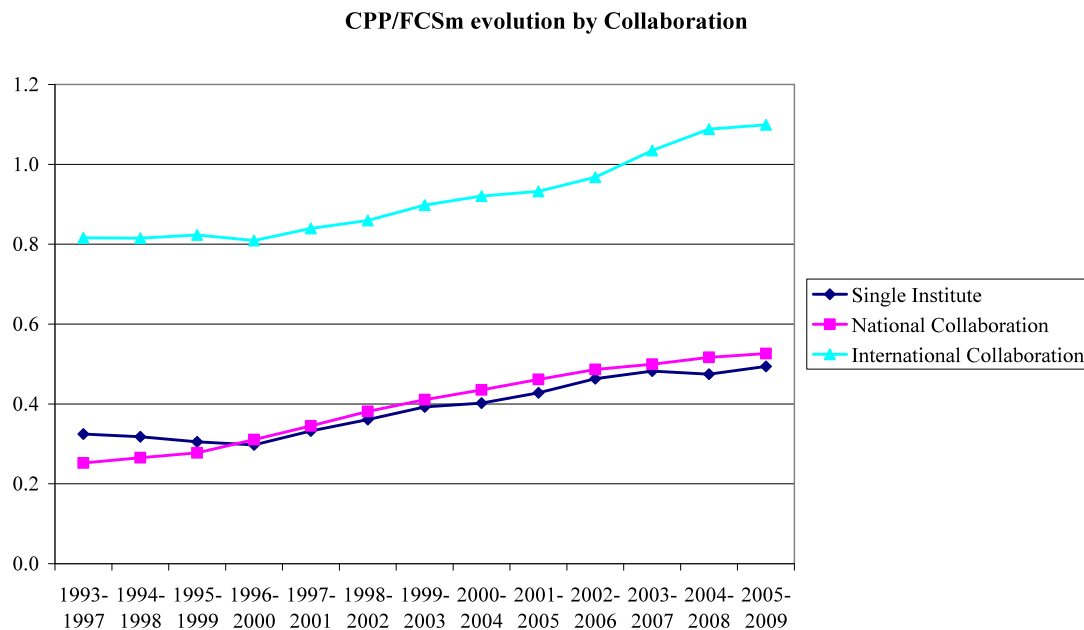
The highest impact is generated by the publications resulting from international cooperation (increasing from 20% under worldwide field average impact level in 1993-1997 to 10 % above worldwide field average impact level). This latter development is a common phenomenon, which we observe more often for other countries (van Leeuwen, 2009).

However, also the impact of the other two types of scientific activity show increasing impact levels, of roughly 75% below field average impact level to 50% below worldwide field average impact level. And although this is still below worldwide average field impact level, this is a twice as high impact, which is a clear indication of the process of change in which the science system of the Czech Republic is involved.

Please note that the change in development is occurring for both single address publications and international collaborative publications from the period 1996-2000 onwards, while the output resulting from national cooperation has increased from the first year block covered by the trend analysis.

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Figure 8: Impact trends of the three collaboration types, 1993-2009



### 3.4 Benchmarking analysis of the Czech output in an international context

Finally, in Table 3 we present the results of the comparison of the Czech Republic with eight benchmark countries (Austria, Denmark, Finland, Germany, Hungary, the Netherlands, Slovenia, and Sweden). The data in the Table cover the period 1993-2009.

The data in the table show that the **Czech Republic's output** is among the smallest among this set of countries. The output volumes of the Czech Republic, Hungary and Slovenia are of a similar volume, compared to the other six countries in the comparison. Next, we also observe the number of received citations is small, only Slovenia received less citations compared to the Czech Republic. With respect to the normalized impact scores, we find the Czech Republic again next to Hungary and Slovenia, two countries with a similar impact level, although the latter two countries tend to publish in journals that somewhat higher impact levels in the field to which the journals belong. Countries with high impact scores are Finland, Sweden, Denmark, and the Netherlands (with impact levels of 19%, 20%, 27%, and 30% above worldwide average field impact level, respectively).

Table 3: Bibliometric statistics for Czech Republic and the 8 benchmark countries, 1993-2009

| COUNTRIES      | P         | C+sc       | C-sc       | %not cited | CPP   | CPP-sc | CPP/FCSm | CPP/JCSm | JCSm/FCSm | %Self-citations |
|----------------|-----------|------------|------------|------------|-------|--------|----------|----------|-----------|-----------------|
| CZECH REPUBLIC | 85,572    | 716,375    | 492,613    | 36.21%     | 8.37  | 5.76   | 0.64     | 0.88     | 0.72      | 31.24%          |
| AUSTRIA        | 135,685   | 1,973,675  | 1,567,413  | 24.83%     | 14.55 | 11.55  | 1.05     | 1.07     | 0.99      | 20.58%          |
| DENMARK        | 143,097   | 2,691,612  | 2,163,410  | 17.82%     | 18.81 | 15.12  | 1.27     | 1.14     | 1.11      | 19.62%          |
| FINLAND        | 131,212   | 2,209,274  | 1,775,041  | 20.19%     | 16.84 | 13.53  | 1.19     | 1.09     | 1.10      | 19.66%          |
| GERMANY        | 1,198,783 | 18,359,597 | 14,518,829 | 24.34%     | 15.32 | 12.11  | 1.06     | 1.07     | 1.00      | 20.92%          |
| HUNGARY        | 74,171    | 797,784    | 592,208    | 29.40%     | 10.76 | 7.98   | 0.78     | 0.90     | 0.87      | 25.77%          |
| NETHERLANDS    | 371,790   | 6,871,365  | 5,619,692  | 19.02%     | 18.48 | 15.12  | 1.30     | 1.11     | 1.17      | 18.22%          |
| SLOVENIA       | 28,738    | 224,206    | 159,261    | 37.31%     | 7.80  | 5.54   | 0.72     | 0.87     | 0.83      | 28.97%          |
| SWEDEN         | 272,022   | 4,934,775  | 4,002,460  | 17.97%     | 18.14 | 14.71  | 1.20     | 1.11     | 1.08      | 18.89%          |

Figure 9 presents a graphical display of the **output and impact** of the Czech Republic and the benchmark countries over the period 1993-2009. We use both the output volume (presented on the x-axis) and the impact score (as indicated by the CPP/FCSm, on the y-axis) for the analysis over the period 1993-2009. Here we clearly observe the large difference in output between Germany and the other eight benchmark countries. On the other hand, we observe the differences in impact levels among the benchmark countries, as mentioned before.

Figure 9: Impact compared to world field average, 1993 - 2009

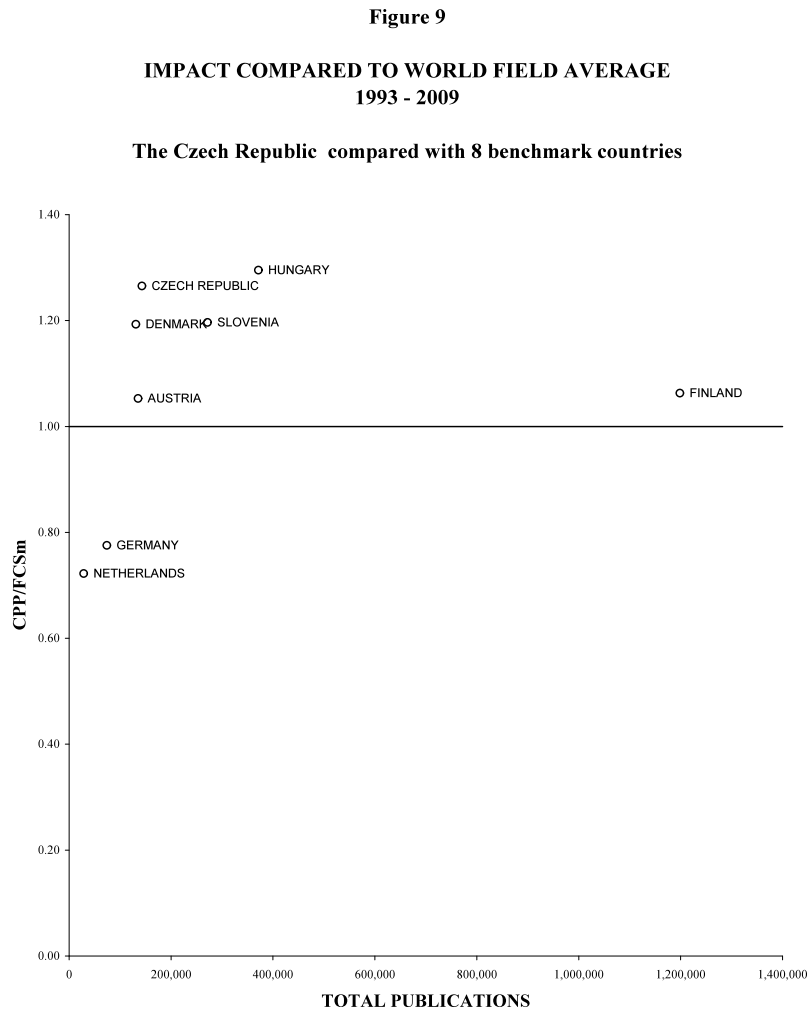


Figure 10 presents a graphical display of the **output development** of the Czech Republic and the 8 benchmark countries. All nine countries show an increase in the output, which is not clearly visible due to the abovementioned difference in output volume between Germany and all other eight countries.

Therefore, we conducted an analysis on the relative development for every country from the first period 1993-1997 onwards. This analysis is presented in Figure 11. This graph clearly shows that the three somewhat smaller countries in terms of output volume (the Czech Republic, Slovenia, and Hungary) display the largest growth in output in the period between 1993 and 2009.<sup>6</sup>

<sup>6</sup> For an overview of the annual output numbers, we refer to Appendix D.

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Figure 10: Output development of the Czech Republic in comparison with the 8 benchmark countries, 1993-2009

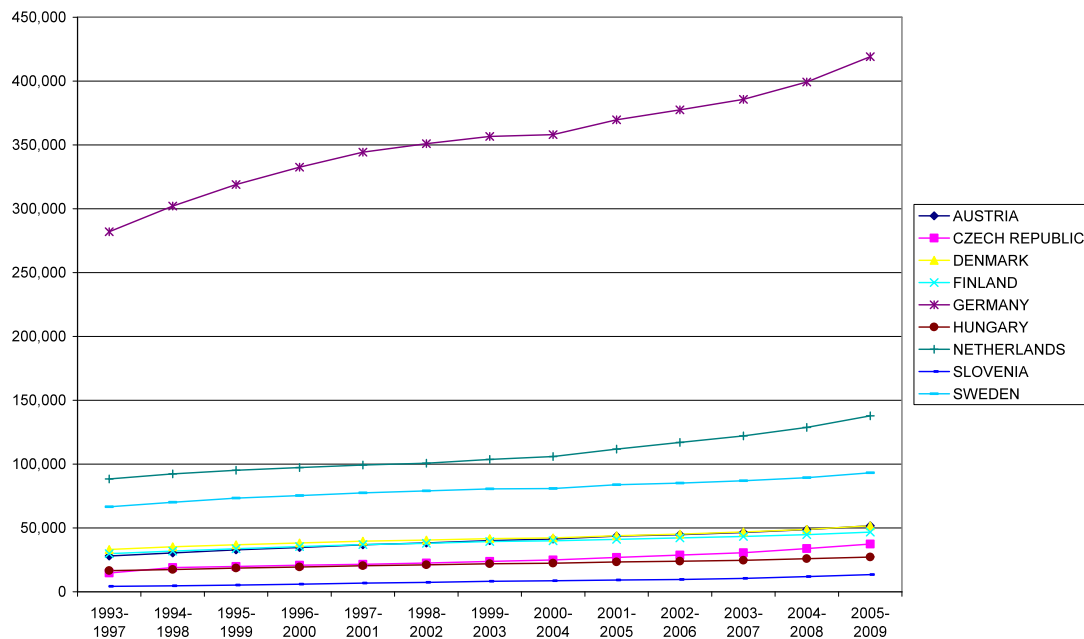
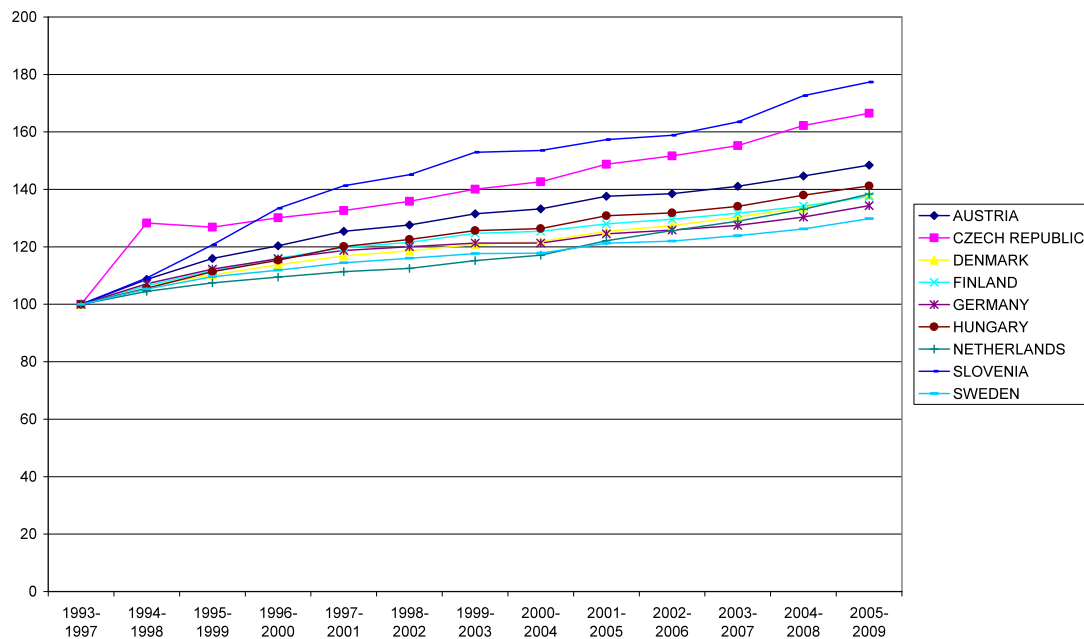


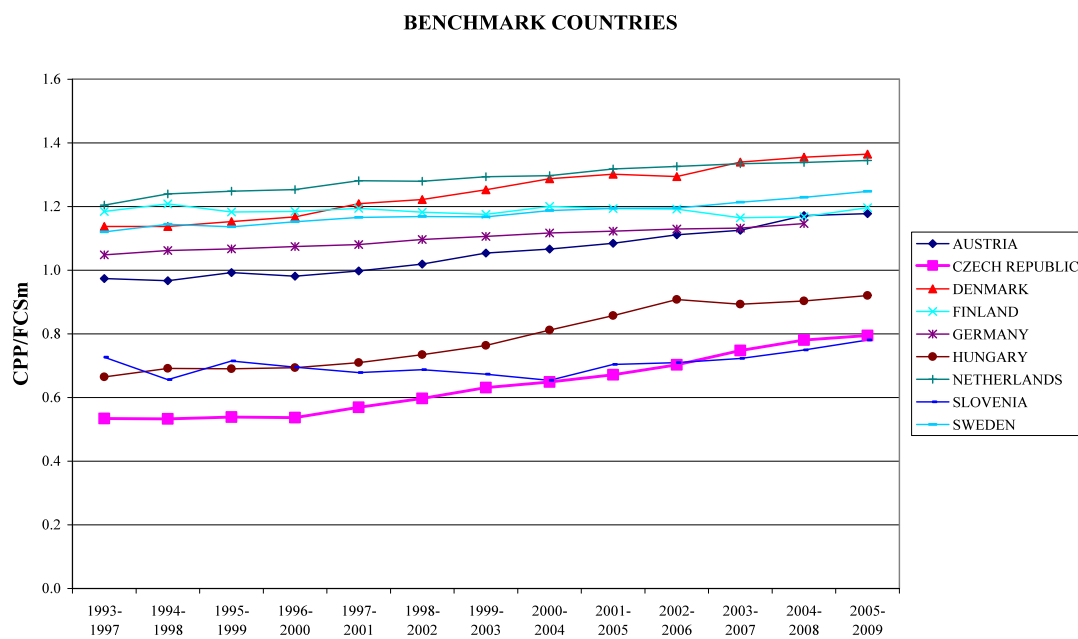
Figure 11: Relative output development of the Czech Republic in comparison with the eight benchmark countries, 1993-2009



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In Figure 12 the development of the **impact** of the nine countries is shown in a **trend analysis**. It becomes clear from the graph that the group of benchmark countries is split up into two sub-sets, with in the one group the Czech Republic, Hungary and Slovenia, and the other countries in the other group. One could observe a slight convergence of the two groups, with the former group increasing its' impact position, towards worldwide average field impact level. On the other hand, the other six countries display this same increasing trend.<sup>7</sup>

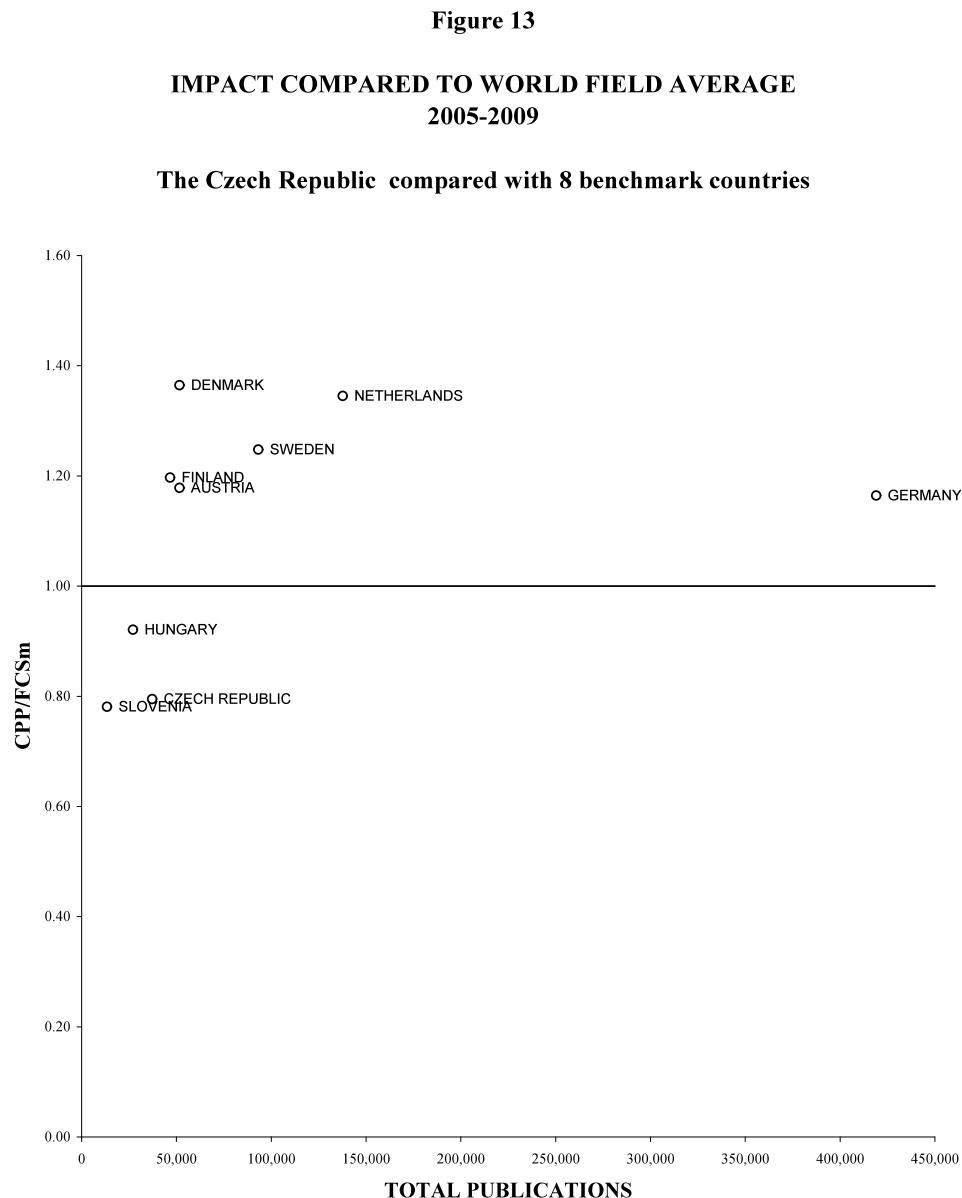
Figure 12: Evolution of the field normalized impact score CPP/FCSm of the Czech Republic in comparison with the 8 benchmark countries, 1993-2009



In **Figure 13**, the most recent five-year period is displayed with respect to both output and impact. From this more recent landscape it becomes clear that the three countries Czech Republic, Hungary and Slovenia have improved their impact position, and moved more closely to the worldwide average field impact level. On the other hand, we notice the (minor) changes in the set of other countries, where Denmark has improved its position, just as Austria did.

<sup>7</sup> For an overview of the complete set of bibliometric indicators per country, for the full period and the trend analysis, we refer to Appendix E.

Figure 13: Impact compared to world field average, 2005 - 2009



In Table 4 we present the results of the **analysis on productivity**. Here we used the population statistics retrieved from the OECD database on population statistics for eight countries. We used the 2010 data, covering population statistics over the period 1003-2008, as 2009 was not yet available). Furthermore, for Slovenia we had to retrieve the data from the Slovenian Statistical Office as this was not included from in the OECD dataset (we had to work with 2007 data, as more recent data were not yet available). The choice was made to use population data rather than researcher data, as this latter type of data is strongly influenced by definition issues, as not in all countries, various types of researchers are equally treated.

Productivity measures are calculated as the mean annual number of publications per inhabitant over the period analyzed. So the productivity scores over 1993-2009 are based on more years, and a relatively lower number of inhabitants, compared to the more recent period (here we have less years, but an increased output, and an increased number of inhabitants). For both periods, we have compared the **productivity scores (Delta P)**. Similarly we have

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compared the **impact scores** over the periods 1993-2009 and 2005-2009, equally long as the productivity measures are based upon.

In terms of productivity change, we notice that the Czech Republic has the third largest increase of the productivity per inhabitant, after Slovenia and Hungary (with increases of 59%, 58%, and 48%, respectively). Furthermore, the analysis of the change of impact shows that the Czech Republic has realized the largest increase in impact (an increase of 25%), followed by Hungary (with an increase of 19%).

Table 4: Bibliometric statistics for Czech Republic and the eight benchmark countries, on productivity based on population statistics, 1993-2009

|                | Productivity<br>93-09 | CPP/FCSm<br>93-09 | Productivity<br>05-09 | CPP/FCSm<br>05-09 | Delta P | Delta I |
|----------------|-----------------------|-------------------|-----------------------|-------------------|---------|---------|
| AUSTRIA        | 0.0010                | 1.05              | 0.0012                | 1.18              | 27.07   | 11.91   |
| CZECH REPUBLIC | 0.0005                | 0.64              | 0.0007                | 0.79              | 47.95   | 24.94   |
| DENMARK        | 0.0016                | 1.27              | 0.0019                | 1.36              | 20.36   | 7.86    |
| FINLAND        | 0.0015                | 1.19              | 0.0018                | 1.20              | 19.03   | 0.32    |
| GERMANY        | 0.0009                | 1.06              | 0.0010                | 1.16              | 18.56   | 9.50    |
| HUNGARY        | 0.0005                | 0.78              | 0.0007                | 0.92              | 58.03   | 18.77   |
| NETHERLANDS    | 0.0014                | 1.30              | 0.0017                | 1.34              | 22.58   | 3.83    |
| SLOVENIA       | 0.0008                | 0.72              | 0.0013                | 0.78              | 58.97   | 8.10    |
| SWEDEN         | 0.0018                | 1.20              | 0.0020                | 1.25              | 14.11   | 4.29    |

In Table 5, below, we present the bibliometric scores while comparing the Czech Republic with other countries across the fields previously introduced. We calculated Activity Index scores. This Activity Index works as a relative/comparative indicator. For the Czech Republic we determined what share of the output was produced in which fields, and calculated average activity scores for the set of countries. *Please note that we did not base the benchmark Activity Index on the sum of absolute numbers of publications, but on the average of shares per country, thereby giving equal weight to every country's specialization.*

Furthermore, Table 5 also contains the comparison of the impact development of the Czech Republic across fields over time. We express the change of the impact over time, comparing the full period 1993-2009 with the last five-year period, in order to indicate whether the Czech Republic has improved its international influence across fields. Particularly in combination with the comparison with activity across fields, this table can be seen as an important marker for the current situation of the science system of the Czech Republic.

It is important to mention a number of fields in which the Czech scientists have a relative strong position. These fields are Chemistry and chemical engineering, physics and materials science, biological sciences, to name few. In clinical medicine, the Czech scientists are under performers compared to their colleagues in the 8 benchmark countries.

With respect to the impact, we notice a strong increase of the research conducted in the Czech Republic related to the social sciences as well as for research in the agricultural and food sciences, and although the impact scores are still at an internationally low level, it is important to note the changes apparently going through the system, as the international visibility improves clearly. Overall this is sign that the Czech science system is improving overall, creating a broader basis for a strong scientific performance.<sup>8</sup>

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<sup>8</sup> For an overview of the annual number of publications per country and field combination, we refer to Appendix F.



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Table 5: Bibliometric statistics for Czech Republic and the 8 benchmark countries, across fields, 1993-2009

|                                                            | CR   | Mean relative activity in 8 benchmark countries | Over/under-activity | CPP/ FCSm 93-09 | CPP/ FCSm 05-09 | Change Impact |
|------------------------------------------------------------|------|-------------------------------------------------|---------------------|-----------------|-----------------|---------------|
| <b>PHYSICS &amp; MATERIALS SCIENCE</b>                     | 17.3 | 12.5                                            | <b>4.8</b>          | 0.73            | 0.86            | 17%           |
| <b>CHEMISTRY &amp; CHEMICAL ENGINEERING</b>                | 15.1 | 9.3                                             | <b>5.8</b>          | 0.59            | 0.67            | 13%           |
| CLINICAL MEDICINE                                          | 12.6 | 20.4                                            | <b>-7.8</b>         | 0.76            | 1.00            | 30%           |
| BASIC LIFE SCIENCES                                        | 8.5  | 9.4                                             | <b>-0.8</b>         | 0.64            | 0.75            | 17%           |
| BIOMEDICAL SCIENCES                                        | 8.0  | 9.4                                             | <b>-1.4</b>         | 0.53            | 0.63            | 19%           |
| <b>BIOLOGICAL SCIENCES</b>                                 | 7.0  | 4.6                                             | <b>2.4</b>          | 0.59            | 0.73            | 23%           |
| MATHEMATICS & STATISTICAL SCIENCES                         | 4.1  | 2.9                                             | 1.1                 | 0.88            | 0.82            | <b>-7%</b>    |
| ENVIRONMENTAL SCIENCES & TECHNOLOGY                        | 3.6  | 4.3                                             | <b>-0.7</b>         | 0.82            | 0.99            | 21%           |
| <b>AGRICULTURE &amp; FOOD SCIENCE</b>                      | 3.5  | 2.9                                             | 0.6                 | 0.43            | 0.73            | <b>72%</b>    |
| EARTH SCIENCES & TECHNOLOGY                                | 3.3  | 3.0                                             | 0.3                 | 0.61            | 0.72            | 19%           |
| COMPUTER SCIENCES                                          | 2.7  | 2.6                                             | 0.1                 | 0.74            | 0.71            | <b>-3%</b>    |
| ASTRONOMY & ASTROPHYSICS                                   | 1.9  | 1.6                                             | 0.3                 | 0.47            | 0.63            | 35%           |
| ENERGY SCIENCE & TECHNOLOGY                                | 1.9  | 1.5                                             | 0.4                 | 0.54            | 0.63            | 17%           |
| ELECTRICAL ENGINEERING & TELECOMMUNICATION                 | 1.4  | 2.1                                             | <b>-0.7</b>         | 0.68            | 0.74            | 8%            |
| <b>ECONOMICS &amp; BUSINESS</b>                            | 1.4  | 1.2                                             | 0.3                 | 0.22            | 0.53            | <b>140%</b>   |
| INSTRUMENTS & INSTRUMENTATION                              | 1.2  | 1.0                                             | 0.2                 | 0.79            | 0.85            | 8%            |
| BASIC MEDICAL SCIENCES                                     | 0.9  | 1.2                                             | <b>-0.3</b>         | 0.58            | 0.67            | 17%           |
| MECHANICAL ENGINEERING & AEROSPACE                         | 0.8  | 0.9                                             | <b>-0.2</b>         | 0.58            | 0.78            | 36%           |
| PSYCHOLOGY                                                 | 0.6  | 1.3                                             | <b>-0.7</b>         | 0.27            | 0.29            | 6%            |
| <b>HISTORY, PHILOSOPHY &amp; RELIGION</b>                  | 0.6  | 0.6                                             | 0.0                 | 0.34            | 0.57            | <b>67%</b>    |
| <b>SOCIOLOGY &amp; ANTHROPOLOGY</b>                        | 0.5  | 0.5                                             | 0.1                 | 0.25            | 0.46            | <b>82%</b>    |
| <b>POLITICAL SCIENCE &amp; PUBLIC ADMINISTRATION</b>       | 0.5  | 0.3                                             | 0.2                 | 0.14            | 0.35            | <b>157%</b>   |
| CIVIL ENGINEERING & CONSTRUCTION                           | 0.4  | 0.5                                             | <b>-0.1</b>         | 0.67            | 0.67            | <b>-1%</b>    |
| GENERAL & INDUSTRIAL ENGINEERING                           | 0.4  | 0.8                                             | <b>-0.4</b>         | 0.65            | 0.73            | 13%           |
| <b>MULTIDISCIPLINARY JOURNALS</b>                          | 0.4  | 0.7                                             | <b>-0.3</b>         | 0.70            | 1.27            | <b>83%</b>    |
| HEALTH SCIENCES                                            | 0.3  | 1.7                                             | <b>-1.4</b>         | 0.52            | 0.69            | 32%           |
| MANAGEMENT & PLANNING                                      | 0.3  | 0.8                                             | <b>-0.5</b>         | 0.88            | 0.64            | <b>-27%</b>   |
| LITERATURE                                                 | 0.3  | 0.2                                             | 0.1                 | 0.86            | 0.60            | <b>-30%</b>   |
| CREATIVE ARTS, CULTURE & MUSIC                             | 0.2  | 0.3                                             | 0.0                 | 0.59            | 0.60            | 1%            |
| <b>SOCIAL &amp; BEHAVIORAL SCIENCES, INTERDISCIPLINARY</b> | 0.1  | 0.5                                             | <b>-0.4</b>         | 0.65            | 1.15            | <b>76%</b>    |
| EDUCATIONAL SCIENCES                                       | 0.1  | 0.4                                             | <b>-0.3</b>         | 0.30            | 0.36            | 22%           |
| LANGUAGE & LINGUISTICS                                     | 0.1  | 0.3                                             | <b>-0.2</b>         | 0.46            | 0.29            | <b>-38%</b>   |
| LAW & CRIMINOLOGY                                          | 0.1  | 0.2                                             | <b>-0.2</b>         | 0.81            | 1.02            | 26%           |
| INFORMATION & COMMUNICATION SCIENCES                       | 0.0  | 0.2                                             | <b>-0.2</b>         | 0.73            | 0.57            | <b>-22%</b>   |



### 3.5 Conclusions

In this section, we have produced a first impression of the current situation of the Czech Republic's science system, in an international context. The focus on the full period 1993-2009 provides a clear view on the situation the Czech Republic came from, and where it stands right now, being part of the EU, partner in European powerhouse Europe. The study so far clearly shows that the Czech Republic's science system has gone through drastic changes, as a new republic coming from a communist era. The opening of the country to Europe and the entrance to the European Union has created large opportunities for the Czech Republic.

In this study we have focused on the research performance of the Czech Republic from a top down perspective, thereby comparing the Czech Republic with a number of benchmark countries such as neighbour countries (Austria, Germany, Hungary) or countries of similar size (such as Slovenia), as well as some smaller European countries with a strong research performance (such as Denmark, Finland, the Netherlands, and Sweden). We analyzed the research performance of this set of countries over a longer period to be able to notice significant trends in the development of the Czech Republic in this international context. It is important to stress that the data used for the analysis were retrieved from the Web of Science, an internationally renowned bibliographic database of a multidisciplinary nature, covering mainly international journals. Therefore, English as a language of publication is the main focus of this study. This does not mean that other scientific output, such as publications in the Czech language or in German, is less valid, but it has another function in the scientific communication process between scientists and users of scientific knowledge.

The output in the journals processed for the Web of Science of the Czech Republic has nearly tripled over the period 1993-2009, while the number of citation received by researchers from the Czech Republic is more than six times more in 2005-2009 compared to 1993-1997. The impact of the publications from the Czech Republic has increased strongly, and although still somewhat below worldwide average impact level, the impact was at such a level that an improvement to a worldwide average level was not to be expected on such a short notice. In general we observe an increasing international visibility of the output of researchers from the Czech Republic, for instance as more and more publications of Czech scientists are cited in the international journal literature.

The composition of the research conducted in the Czech Republic shows a slow change in scope. As one of the former East block countries, with a traditional strong focus on the natural sciences and mathematics, the country's research profile is now slowly changing into a profile in which (bio)medicine and health sciences play a somewhat stronger role. Yet another important observation is, in relation to what we concluded on the overall performance of the Czech science system, namely an improvement of the impact in the most important fields in the national research profile.

The Czech scientists show an increasing trend of international involvement. Over the whole period, some 45% of all publications are the result of international collaborations. This part of the Czech Republic's output has remained relatively stable. The largest change in the Czech science system was the huge shift from publications with no collaboration at all, to many publications resulting from national cooperation, thereby showing that internal cohesion has improved in the Czech science system. In that light it is important to stress that these latter types of scientific activity also show an increase of the impact. This is an important observation, as normally the impact is generated by international cooperation publications, and of course this is partially the case for the Czech Republic, the publications resulting from national cooperation follow at least a similar pattern, thereby contributing to the strength of the system.

The comparison with a number of benchmark countries makes clear that the Czech Republic has still a long way to go. The development of the Czech Republic is comparable with that of Hungary and Slovenia, one also observes a distance, particularly with respect to scientific impact with the smaller countries in the study. Countries as Denmark and the Netherlands, well-known scientific European powerhouses, outperform the Czech Republic. However, that is part of benchmarking exercise, as it has no use of comparing with only weaker actors. It is important to stress that the pace of the development of the Czech Republic in terms of the output development is somewhat faster compared to the benchmark countries, thereby bridging the gap between the leading countries in this comparison and themselves. In terms of

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impact, we also observe an upwards trend for the Czech Republic, although not as clear as the output development.

When we look at the productivity of researchers in the Czech Republic (calculated in terms of output per inhabitant), we clearly observe a positive trend. When we compare the full period 1993-2009 with the most recent period, the researchers in the Czech Republic are catching up strongly, together with their colleagues in Hungary and Slovenia. The improvement in output per inhabitant increases with roughly 50% for the researchers in these three countries. When we compare the impact development over the two periods mentioned, we find an even more important development, namely an increase of the Czech impact of nearly 25%, making this the strongest increase observed among the benchmark countries.

The analysis of the research fields across the set of benchmark countries clearly shows a certain preference of the Czech Republic. The country is more active in number of fields traditionally belonging to their research profile, such as chemistry and chemical engineering, physics and materials science, biological sciences, and to a lesser extent, mathematics and statistics.

A field in which the Czech Republic is underperforming in terms of output is clinical medicine, which is partially due to the fact that the Scandinavian countries and the Netherlands are moving towards an Anglo-Saxon research profile for a longer time, a profile in which biomedicine takes a more prominent position compared to more classical European continental research profile.

In terms of impact improvement, we observe improvement in many fields and strong improvements in fields such as the agricultural and food sciences research. However, most striking observation is the overall strong increase of the impact of social scientists from the Czech republic, a clear sign that these researchers are catching up most strongly, thereby also indicating that the changes of the Czech Republic's science system are not only based in the natural, life and medical sciences, but are across the whole system.

## 4. Analysis at the institutional level

The results obtained for the institutional analysis are presented in four main parts. In the first place, the overall bibliometric indicators for the different institutional sectors and main institutions of the Czech Republic. Secondly the analysis of the evolution of the production and normalized impact of the different sectors and institutions of the country are presented. Thirdly, the collaborative activity of the institutes is studied. Finally, the distribution of the production and impact of Czech institutions among the main research fields selected (described in section 3) is presented.

In general terms, in all the chapters, there is a first part where the bibliometric indicators for the main institutional sectors in the country are presented, thus giving an overall picture of the institutional performance; followed by the analysis of the scientific performance of the main institutions in the country (institutional analysis).

### 4.1 Overall bibliometric results of the Czech Republic scientific organizations

In this chapter the main bibliometric indicators for the different institutional scientific sectors and individual research institutions are presented.

#### 4.1.1 Institutional Sectors

Table 6 shows that Universities and Research organizations are the main players in the research activities of the country, participating in more than 50% of the production of the country<sup>9</sup>. Hospitals also play an important role, but we have to keep in mind that part of their production is also included in the sector of universities. Finally it is also interesting to note the role of private companies that participate in around the 4% of the production of the country.

Table 6: Main bibliometric indicators for Czech institutional sectors

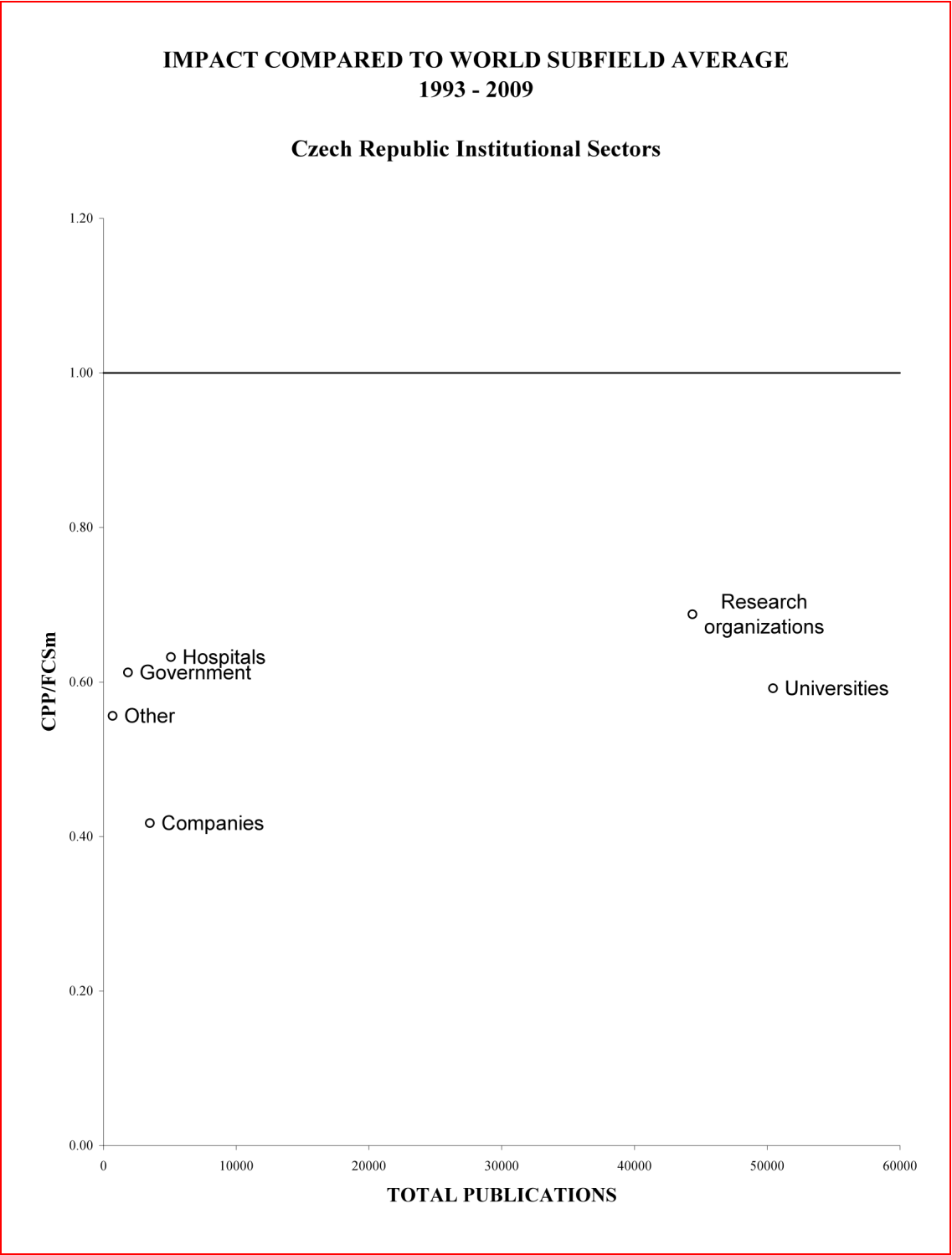
| Sector                 | P     | C-sc   | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc |
|------------------------|-------|--------|------|--------------|--------------|---------------|-----|
| Universities           | 50449 | 243598 | 4.83 | 0.86         | 0.59         | 0.69          | 39% |
| Research organizations | 44383 | 298138 | 6.72 | 0.86         | 0.69         | 0.79          | 31% |
| Hospitals              | 5088  | 32433  | 6.37 | 1.06         | 0.63         | 0.59          | 38% |
| Companies              | 3515  | 11761  | 3.35 | 0.83         | 0.42         | 0.51          | 45% |
| Government             | 1858  | 11049  | 5.95 | 0.95         | 0.61         | 0.64          | 36% |
| Other                  | 698   | 2196   | 3.15 | 1.09         | 0.56         | 0.51          | 52% |

Figure 14 shows the main institutional sectors of the country by production (total publications) and their field-normalized impact (CPP/FCSm). As one can see, none of the sectors have an impact above international level (here determined by the level 1). The sector of Research organizations presents the closer impact to international level, but still far below 1.

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<sup>9</sup> The total production of the Czech Republic recorded for the period 1993-2009 amounts a total of 85575 publications (see report at country level). This is the value we use for the calculation of the percentages.

Figure 14: Main institutional sectors by production and field-normalised impact



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#### 4.1.2 Main Institutions

In this section bibliometric indicators are presented for the main institutions of the country. The 25 first institutions by production (without counting the global values for the Academy of Sciences) are presented in Table 7.<sup>10</sup>

Table 7 Main Czech scientific institutions

| Institute                                                 | P     | C-sc   | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------------|-------|--------|-------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                              | 38948 | 259745 | 6.67  | 0.84         | 0.68         | 0.81          | 30% | 34% |
| Charles University in Prague                              | 21775 | 129579 | 5.95  | 0.87         | 0.65         | 0.75          | 35% | 32% |
| Institute of Physics ASCR                                 | 6502  | 38997  | 6.00  | 0.83         | 0.79         | 0.95          | 34% | 40% |
| Masaryk University                                        | 6101  | 30928  | 5.07  | 0.89         | 0.60         | 0.67          | 36% | 32% |
| Institute of Chemical Technology Prague                   | 4483  | 20013  | 4.46  | 0.78         | 0.43         | 0.54          | 37% | 34% |
| Czech Technical University in Prague                      | 3632  | 10492  | 2.89  | 0.81         | 0.55         | 0.67          | 50% | 37% |
| Palacky University Olomouc                                | 3341  | 16813  | 5.03  | 0.92         | 0.64         | 0.70          | 41% | 29% |
| J. Heyrovsky Institute of Physical Chemistry ASCR         | 2724  | 29758  | 10.92 | 0.97         | 0.96         | 1.00          | 21% | 32% |
| Biology Centre ASCR                                       | 2705  | 17489  | 6.47  | 0.88         | 0.68         | 0.78          | 25% | 33% |
| University of South Bohemia in Ceske Budejovice           | 2698  | 14202  | 5.26  | 0.90         | 0.74         | 0.83          | 34% | 31% |
| Institute of Organic Chemistry and Biochemistry ASCR      | 2652  | 20000  | 7.54  | 0.90         | 0.66         | 0.74          | 25% | 36% |
| Institute of Macromolecular Chemistry ASCR                | 2137  | 15760  | 7.37  | 0.85         | 0.77         | 0.91          | 26% | 32% |
| Institute of Microbiology ASCR                            | 2079  | 15331  | 7.37  | 0.75         | 0.52         | 0.69          | 22% | 30% |
| University of Pardubice                                   | 2061  | 9616   | 4.67  | 0.86         | 0.58         | 0.67          | 36% | 36% |
| Institute of Physiology ASCR                              | 2060  | 17322  | 8.41  | 0.64         | 0.51         | 0.79          | 24% | 32% |
| Nuclear Physics Institute ASCR                            | 1881  | 10408  | 5.53  | 0.94         | 0.74         | 0.79          | 37% | 42% |
| Brno University of Technology                             | 1812  | 4421   | 2.44  | 0.66         | 0.39         | 0.60          | 52% | 36% |
| University of Veterinary and Pharmaceutical Sciences Brno | 1445  | 3466   | 2.40  | 0.92         | 0.49         | 0.53          | 43% | 36% |
| Mendel University in Brno                                 | 1355  | 4080   | 3.01  | 0.90         | 0.46         | 0.51          | 43% | 41% |
| Czech University of Life Sciences Prague                  | 1278  | 3091   | 2.42  | 0.99         | 0.43         | 0.44          | 48% | 34% |
| Institute of Chemical Process Fundamentals ASCR           | 1262  | 6458   | 5.12  | 0.67         | 0.56         | 0.84          | 30% | 39% |
| Institute of Molecular Genetics ASCR                      | 1166  | 13582  | 11.65 | 0.77         | 0.65         | 0.85          | 20% | 28% |
| Institute of Biophysics ASCR                              | 1125  | 13830  | 12.29 | 0.99         | 0.92         | 0.93          | 19% | 36% |
| VSB-Technical University of Ostrava                       | 1041  | 2446   | 2.35  | 0.88         | 0.49         | 0.55          | 56% | 34% |
| Institute of Mathematics ASCR                             | 1038  | 3283   | 3.16  | 1.11         | 0.92         | 0.83          | 45% | 33% |
| Astronomical Institute ASCR                               | 1028  | 5219   | 5.08  | 0.53         | 0.42         | 0.79          | 32% | 38% |

<sup>10</sup> The full list with the 100 first institutions is presented in Appendix J.

Table 7 shows that there are two major actors in the Czech Republic, the Academy of Sciences as a whole (global), participating in more than 45% of all the scientific publications of the country, followed by Charles University in Prague which participates in around ¼ of all the publications.

It is also interesting to see how this Table is strongly dominated by the Institutes of the Academy of Sciences (the Institute of Physics, the Biology Centre, the Institutes of Macromolecular Chemistry, Microbiology, etc.).

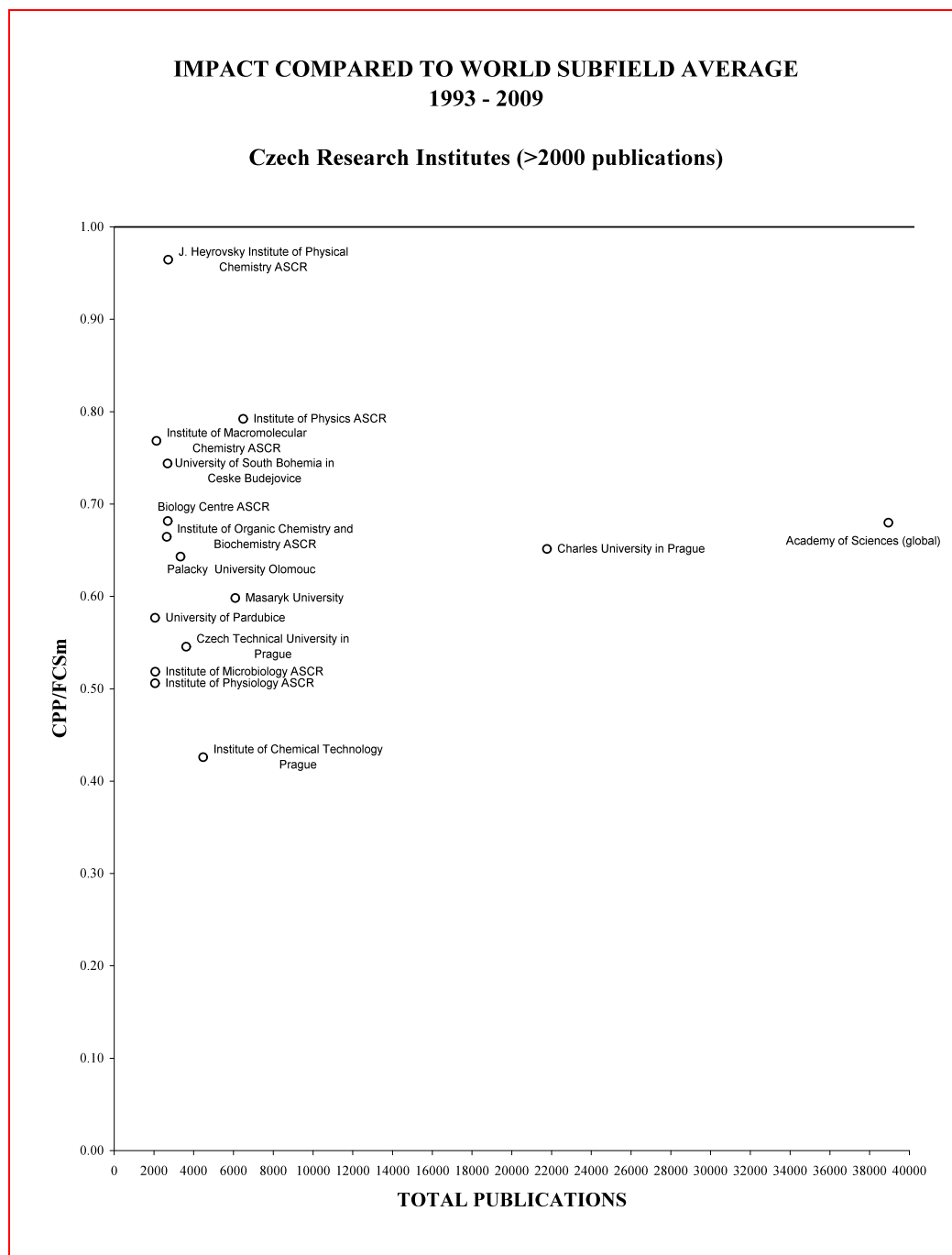
Besides them, other major institutes and universities are the Masaryk University, the Institute of Chemical Technology in Prague, the Czech Technical University in Prague or the Palacky University in Olomouc (all of them with more than 3000 publications during the period 1993-2009) among others. We can also highlight here that two Czech universities appear in the Top500 universities of the 2010 Leiden Ranking<sup>11</sup> by production. These are: the Charles University in Prague (156) and the Masaryk University (476).

Figure 15 presents the distribution of institutes with more than 2000 publications by production and impact.

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<sup>11</sup> See <http://media.leidenuniv.nl/legacy/leidenr-2010-w500-lichtgeel.pdf>

Figure 15: Main national institutions by production and field-normalised impact



Again Figure 15 shows how none of the main scientific institutes in the Czech Republic presents a field-normalized impact (CPP/FCSm) higher than the international level (determined by the level 1). It is remarkable that most of the institutions with the highest CPP/FCSm values are institutes of the Academy of Sciences (the J. Heyrovsky Institute of Physical Chemistry – very close to the international level 1-, the Institute of Physics or the Institute of Macromolecular Chemistry). The University of South Bohemia also presents a relatively high normalized-impact as compared to the other institutions.

## 4.2 Evolution over time of scientific publications

In this chapter the evolution of the production and its impact over time is presented for the different institutional sectors and research institutions in the Czech Republic.

### 4.2.1 Institutional Sectors

In the first place, Table 8 presents the evolution of the research production for the different institutional sectors. This is the production year by year for the different institutional sectors under study.

Table 8: Evolution of the scientific production by institutional sectors – year by year

| Sector             | Universities | Research organisations | Hospitals   | Companies   | Government  | Other      |
|--------------------|--------------|------------------------|-------------|-------------|-------------|------------|
| <b>Total</b>       | <b>50449</b> | <b>44383</b>           | <b>5088</b> | <b>3515</b> | <b>1858</b> | <b>698</b> |
| 1994 <sup>12</sup> | 1445         | 1970                   | 87          | 129         | 78          | 21         |
| 1995               | 1583         | 2016                   | 122         | 127         | 76          | 16         |
| 1996               | 1836         | 2211                   | 152         | 178         | 85          | 21         |
| 1997               | 2003         | 2193                   | 164         | 190         | 92          | 21         |
| 1998               | 2110         | 2364                   | 169         | 172         | 76          | 21         |
| 1999               | 2245         | 2357                   | 178         | 201         | 105         | 27         |
| 2000               | 2401         | 2398                   | 217         | 203         | 90          | 25         |
| 2001               | 2626         | 2571                   | 238         | 200         | 100         | 22         |
| 2002               | 2875         | 2590                   | 240         | 202         | 129         | 20         |
| 2003               | 3314         | 2861                   | 348         | 210         | 117         | 41         |
| 2004               | 3344         | 2789                   | 306         | 161         | 109         | 49         |
| 2005               | 4007         | 3278                   | 428         | 252         | 140         | 46         |
| 2006               | 4113         | 3311                   | 398         | 235         | 144         | 49         |
| 2007               | 4557         | 3359                   | 537         | 280         | 166         | 70         |
| 2008               | 5814         | 4061                   | 744         | 398         | 177         | 113        |
| 2009               | 6170         | 4045                   | 760         | 377         | 174         | 136        |

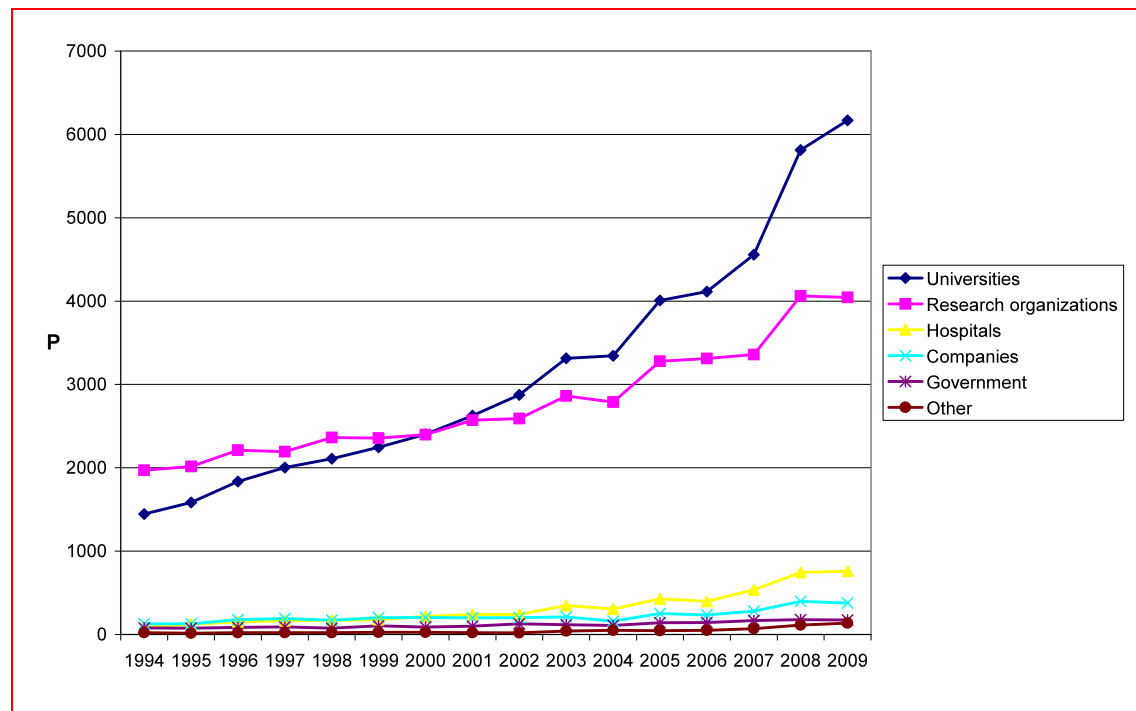
As can be seen in both Table 8 and Figure 16, the evolution of the scientific production in all the institutional sectors of the Czech Republic is positive over time, presenting a steady increase during the whole period of analysis.

Figure 16, below, also suggests that the increment of production among universities has been relatively larger than for general Research organizations, outperforming their production from the year 2000 onwards.

<sup>12</sup> The year 1993 has been excluded from this presentation due to its low number of publications.

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Figure 16: Evolution of the number of publications by institutional sectors – year by year



### *Evolution by blocks*

In this sub-paragraph, as in the previous one, we present the evolution of production but this time using the block analysis approach. This allows us to observe the evolution of the research production (Table 9 and Figure 17) and the normalized impact –CPP/FCSm – (Table 10 and Figure 18) in a smoother way.

These data show a clear increasing pattern both in production and in impact over time for all the main institutional sectors in the Czech Republic. Regarding the normalized impact (Figure 18), a remarkable increment is detected although this impact is still below the international level (here noted by the value 1).

Table 9: Evolution of the scientific production by institutional sectors – block analysis

| Sector    | Universities | Research organisations | Hospitals | Companies | Government | Other |
|-----------|--------------|------------------------|-----------|-----------|------------|-------|
| 1993-1996 | 4870         | 6206                   | 361       | 434       | 239        | 58    |
| 1994-1997 | 6867         | 8390                   | 525       | 624       | 331        | 79    |
| 1995-1998 | 7532         | 8784                   | 607       | 667       | 329        | 79    |
| 1996-1999 | 8194         | 9125                   | 663       | 741       | 358        | 90    |
| 1997-2000 | 8759         | 9312                   | 728       | 766       | 363        | 94    |
| 1998-2001 | 9382         | 9690                   | 802       | 776       | 371        | 95    |
| 1999-2002 | 10147        | 9916                   | 873       | 806       | 424        | 94    |
| 2000-2003 | 11216        | 10420                  | 1043      | 815       | 436        | 108   |
| 2001-2004 | 12159        | 10811                  | 1132      | 773       | 455        | 132   |
| 2002-2005 | 13540        | 11518                  | 1322      | 825       | 495        | 156   |
| 2003-2006 | 14778        | 12239                  | 1480      | 858       | 510        | 185   |
| 2004-2007 | 16021        | 12737                  | 1669      | 928       | 559        | 214   |
| 2005-2008 | 18491        | 14009                  | 2107      | 1165      | 627        | 278   |
| 2006-2009 | 20654        | 14776                  | 2439      | 1290      | 661        | 368   |

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Figure 17: Evolution of the number of publications by institutional sectors – block analysis

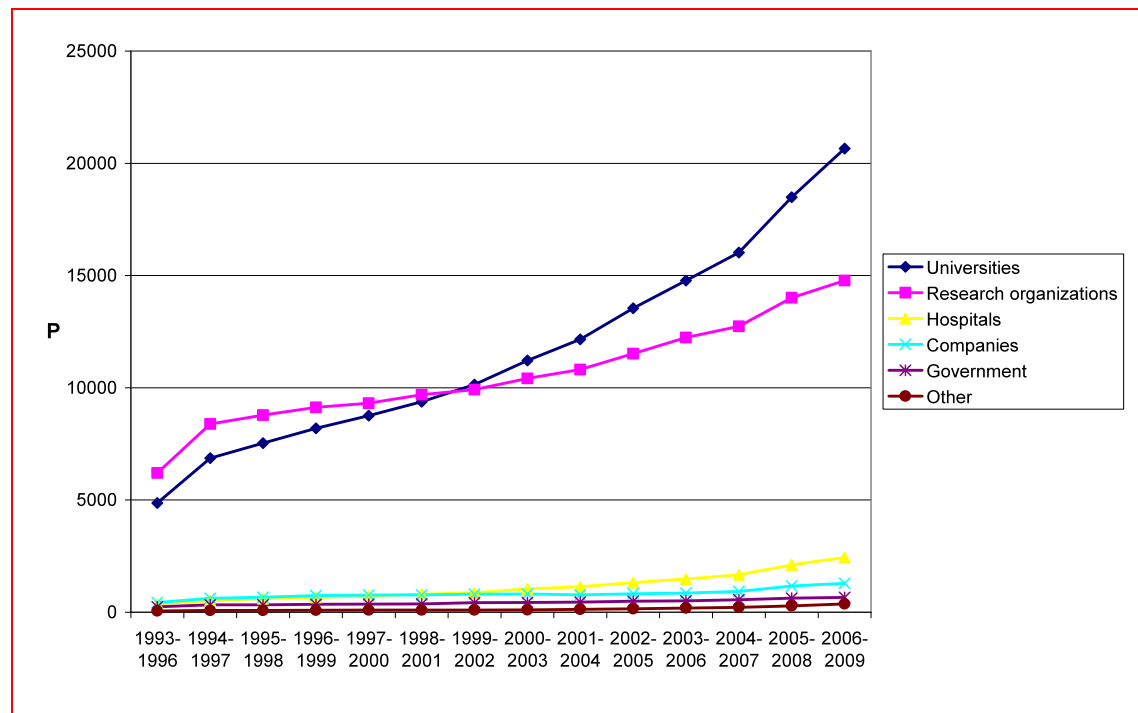
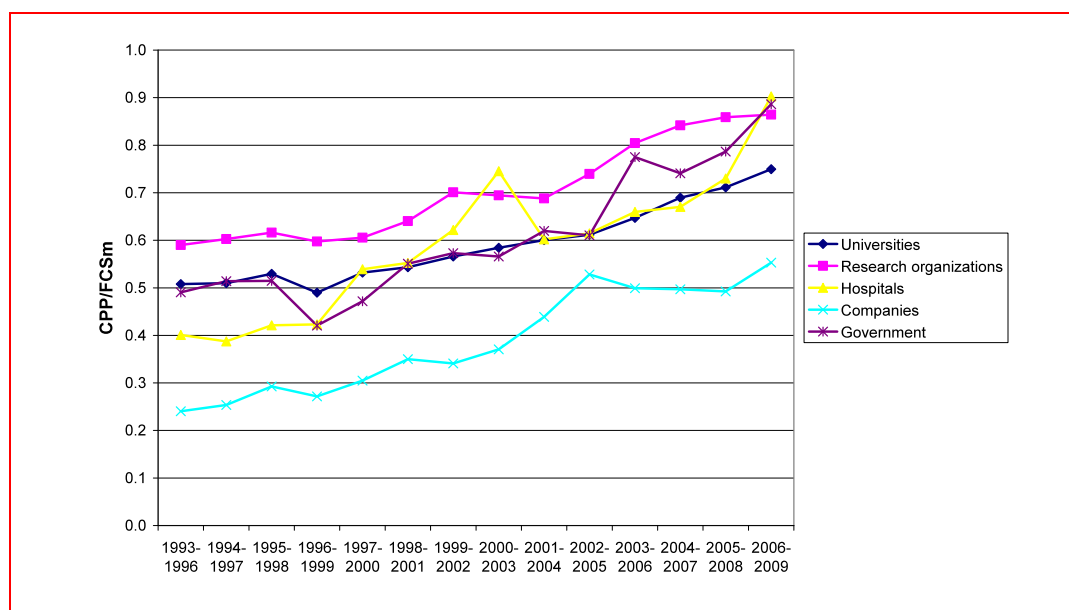


Table 10: Evolution of CPP/FCSm by institutional sectors – block analysis

| Sector    | Universities | Research organisations | Hospitals | Companies | Government | Other |
|-----------|--------------|------------------------|-----------|-----------|------------|-------|
| 1993-1996 | 0.51         | 0.59                   | 0.4       | 0.24      | 0.49       | 0.29  |
| 1994-1997 | 0.51         | 0.6                    | 0.39      | 0.25      | 0.51       | 0.25  |
| 1995-1998 | 0.53         | 0.62                   | 0.42      | 0.29      | 0.51       | 0.31  |
| 1996-1999 | 0.49         | 0.6                    | 0.42      | 0.27      | 0.42       | 0.27  |
| 1997-2000 | 0.53         | 0.61                   | 0.54      | 0.3       | 0.47       | 0.31  |
| 1998-2001 | 0.54         | 0.64                   | 0.55      | 0.35      | 0.55       | 0.29  |
| 1999-2002 | 0.57         | 0.7                    | 0.62      | 0.34      | 0.57       | 0.14  |
| 2000-2003 | 0.58         | 0.69                   | 0.75      | 0.37      | 0.57       | 0.11  |
| 2001-2004 | 0.6          | 0.69                   | 0.6       | 0.44      | 0.62       | 0.3   |
| 2002-2005 | 0.61         | 0.74                   | 0.61      | 0.53      | 0.61       | 0.43  |
| 2003-2006 | 0.65         | 0.8                    | 0.66      | 0.5       | 0.78       | 0.86  |
| 2004-2007 | 0.69         | 0.84                   | 0.67      | 0.5       | 0.74       | 1.64  |
| 2005-2008 | 0.71         | 0.86                   | 0.73      | 0.49      | 0.79       | 2.2   |
| 2006-2009 | 0.75         | 0.86                   | 0.9       | 0.55      | 0.89       | 0.56  |

Figure 18: Evolution of CPP/FCSm by institutional sectors – block analysis



#### 4.2.2 Main Institutions

In this paragraph the evolution of the production and impact of the main research institutions in the Czech Republic is presented. The 25 first institutions by production are in the following tables.

In Table 11 the evolution of the number of publications for the 25 main Czech institutions (apart from the Academy of Sciences –global) is presented in a year by year basis. The year 1993 has been excluded from this presentation<sup>13</sup>.

The main institutions show a clear increasing pattern in their production over time. This can be clearly observed also in Figure 19 where the 5 main Czech scientific institutions (plus the Academy of Sciences as a whole) present an increasing pattern in their production. This is especially the case for the Charles University.

In Table 12 and Figure 20 the evolution of the production for the main Czech scientific institutions is presented using the block approach<sup>14</sup>. Again, as previously observed, the trend in production is clearly increasing for the main scientific institutions in the Czech Republic.

The study of the evolution of the normalized-impact (i.e. CPP/FCSm indicator) over time is presented in Table 13 and Figure 21. Again there is an increasing pattern for the main institutions in the country.<sup>15</sup> However, only the Institute of Physics of the Academy has occasionally surpassed the international level (again denoted by the value 1). The rest of the institutions (at least among the 5 first – Figure 21) present the abovementioned increased in impact but still below the international level.

<sup>13</sup> For a broader perspective, in Appendix K the first 100 institutions of the country are presented.

<sup>14</sup> Appendix L presents the whole list for the 100 first Czech institutions

<sup>15</sup> Appendix M presents the whole list of the 100 first institutions.



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Table 11: Evolution of the scientific production by main institutions – year by year

| Institute                                                 | P     | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-----------------------------------------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Academy of Sciences (global)                              | 38948 | 1730 | 1781 | 1978 | 1964 | 2096 | 2077 | 2157 | 2259 | 2322 | 2524 | 2449 | 2856 | 2926 | 2940 | 3393 | 3487 |
| Charles University in Prague                              | 21775 | 644  | 688  | 811  | 900  | 922  | 992  | 1067 | 1123 | 1233 | 1414 | 1444 | 1761 | 1762 | 2031 | 2427 | 2552 |
| Institute of Physics ASCR                                 | 6502  | 238  | 303  | 303  | 322  | 367  | 381  | 418  | 386  | 457  | 437  | 428  | 480  | 487  | 434  | 517  | 541  |
| Masaryk University                                        | 6101  | 134  | 170  | 203  | 224  | 252  | 263  | 297  | 347  | 354  | 424  | 437  | 487  | 520  | 582  | 688  | 718  |
| Institute of Chemical Technology Prague                   | 4483  | 170  | 199  | 231  | 232  | 227  | 250  | 196  | 254  | 284  | 295  | 306  | 329  | 333  | 360  | 405  | 412  |
| Czech Technical University in Prague                      | 3632  | 98   | 93   | 111  | 113  | 137  | 137  | 154  | 161  | 213  | 251  | 252  | 335  | 336  | 317  | 437  | 486  |
| Palacky University Olomouc                                | 3341  | 60   | 78   | 106  | 106  | 114  | 128  | 137  | 175  | 198  | 202  | 225  | 249  | 288  | 320  | 448  | 507  |
| J. Heyrovsky Institute of Physical Chemistry ASCR         | 2724  | 131  | 147  | 163  | 154  | 197  | 154  | 166  | 184  | 177  | 224  | 165  | 169  | 173  | 137  | 184  | 199  |
| Biology Centre ASCR                                       | 2705  | 143  | 116  | 121  | 138  | 132  | 142  | 173  | 148  | 152  | 155  | 168  | 209  | 210  | 196  | 244  | 258  |
| University of South Bohemia in Ceske Budejovice           | 2698  | 36   | 38   | 40   | 59   | 79   | 97   | 118  | 112  | 145  | 176  | 171  | 237  | 251  | 301  | 381  | 457  |
| Institute of Organic Chemistry and Biochemistry ASCR      | 2652  | 121  | 92   | 136  | 120  | 125  | 115  | 108  | 137  | 139  | 149  | 163  | 212  | 221  | 238  | 299  | 277  |
| Institute of Macromolecular Chemistry ASCR                | 2137  | 102  | 91   | 143  | 97   | 116  | 111  | 133  | 142  | 146  | 124  | 139  | 149  | 163  | 149  | 166  | 166  |
| Institute of Microbiology ASCR                            | 2079  | 114  | 85   | 130  | 114  | 135  | 103  | 109  | 125  | 124  | 148  | 135  | 125  | 139  | 140  | 169  | 184  |
| University of Pardubice                                   | 2061  | 92   | 85   | 73   | 101  | 93   | 85   | 113  | 99   | 111  | 121  | 129  | 146  | 161  | 202  | 215  | 235  |
| Institute of Physiology ASCR                              | 2060  | 102  | 99   | 131  | 144  | 134  | 110  | 113  | 129  | 105  | 142  | 143  | 118  | 128  | 130  | 159  | 173  |
| Nuclear Physics Institute ASCR                            | 1881  | 76   | 100  | 95   | 95   | 113  | 103  | 119  | 118  | 101  | 127  | 120  | 148  | 140  | 142  | 137  | 147  |
| Brno University of Technology                             | 1812  | 47   | 60   | 76   | 72   | 82   | 94   | 109  | 89   | 90   | 101  | 99   | 147  | 148  | 148  | 215  | 235  |
| University of Veterinary and Pharmaceutical Sciences Brno | 1445  | 35   | 40   | 29   | 35   | 57   | 36   | 41   | 67   | 86   | 94   | 89   | 118  | 147  | 188  | 201  | 182  |
| Mendel University in Brno                                 | 1355  | 45   | 22   | 54   | 42   | 46   | 57   | 70   | 73   | 81   | 97   | 93   | 101  | 98   | 118  | 181  | 177  |
| Czech University of Life Sciences Prague                  | 1278  | 24   | 55   | 44   | 56   | 57   | 44   | 46   | 57   | 55   | 65   | 66   | 99   | 64   | 95   | 250  | 201  |
| Institute of Chemical Process Fundamentals ASCR           | 1262  | 75   | 66   | 63   | 65   | 59   | 69   | 73   | 82   | 68   | 77   | 67   | 98   | 96   | 99   | 98   | 106  |
| Institute of Molecular Genetics ASCR                      | 1166  | 57   | 43   | 54   | 68   | 69   | 69   | 57   | 82   | 82   | 82   | 87   | 100  | 72   | 82   | 96   | 66   |
| Institute of Biophysics ASCR                              | 1125  | 31   | 33   | 48   | 46   | 52   | 37   | 65   | 63   | 75   | 85   | 79   | 75   | 88   | 109  | 125  | 114  |
| VSB-Technical University of Ostrava                       | 1041  | 9    | 18   | 37   | 41   | 37   | 46   | 44   | 54   | 48   | 66   | 72   | 64   | 77   | 90   | 153  | 185  |

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| Institute                     | P    | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Institute of Mathematics ASCR | 1038 | 36   | 46   | 38   | 45   | 46   | 68   | 63   | 68   | 58   | 79   | 58   | 72   | 69   | 89   | 88   | 115  |
| Astronomical Institute ASCR   | 1028 | 32   | 51   | 66   | 54   | 48   | 62   | 55   | 53   | 49   | 53   | 61   | 65   | 104  | 88   | 98   | 89   |

Table 12: Evolution of publications by main institutions – block analysis

| Institute                                                 | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|-----------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Academy of Sciences (global)                              | 5498      | 7453      | 7819      | 8115      | 8294      | 8589      | 8815      | 9262      | 9554      | 10151     | 10755     | 11171     | 12115     | 12746     |
| Charles University in Prague                              | 2147      | 3043      | 3321      | 3625      | 3881      | 4104      | 4415      | 4837      | 5214      | 5852      | 6381      | 6998      | 7981      | 8772      |
| Institute of Physics ASCR                                 | 847       | 1166      | 1295      | 1373      | 1488      | 1552      | 1642      | 1698      | 1708      | 1802      | 1832      | 1829      | 1918      | 1979      |
| Masaryk University                                        | 508       | 731       | 849       | 942       | 1036      | 1159      | 1261      | 1422      | 1562      | 1702      | 1868      | 2026      | 2277      | 2508      |
| Institute of Chemical Technology Prague                   | 600       | 832       | 889       | 940       | 905       | 927       | 984       | 1029      | 1139      | 1214      | 1263      | 1328      | 1427      | 1510      |
| Czech Technical University in Prague                      | 303       | 415       | 454       | 498       | 541       | 589       | 665       | 779       | 877       | 1051      | 1174      | 1240      | 1425      | 1576      |
| Palacky University Olomouc                                | 244       | 350       | 404       | 454       | 485       | 554       | 638       | 712       | 800       | 874       | 964       | 1082      | 1305      | 1563      |
| J. Heyrovsky Institute of Physical Chemistry ASCR         | 441       | 595       | 661       | 668       | 671       | 701       | 681       | 751       | 750       | 735       | 731       | 644       | 663       | 693       |
| Biology Centre ASCR                                       | 380       | 518       | 507       | 533       | 585       | 595       | 615       | 628       | 623       | 684       | 742       | 783       | 859       | 908       |
| University of South Bohemia in Ceske Budejovice           | 114       | 173       | 216       | 275       | 353       | 406       | 472       | 551       | 604       | 729       | 835       | 960       | 1170      | 1390      |
| Institute of Organic Chemistry and Biochemistry ASCR      | 349       | 469       | 473       | 496       | 468       | 485       | 499       | 533       | 588       | 663       | 745       | 834       | 970       | 1035      |
| Institute of Macromolecular Chemistry ASCR                | 336       | 433       | 447       | 467       | 457       | 502       | 532       | 545       | 551       | 558       | 575       | 600       | 627       | 644       |
| Institute of Microbiology ASCR                            | 329       | 443       | 464       | 482       | 461       | 472       | 461       | 506       | 532       | 532       | 547       | 539       | 573       | 632       |
| University of Pardubice                                   | 250       | 351       | 352       | 352       | 392       | 390       | 408       | 444       | 460       | 507       | 557       | 638       | 724       | 813       |
| Institute of Physiology ASCR                              | 332       | 476       | 508       | 519       | 501       | 486       | 457       | 489       | 519       | 508       | 531       | 519       | 535       | 590       |
| Nuclear Physics Institute ASCR                            | 271       | 366       | 403       | 406       | 430       | 453       | 441       | 465       | 466       | 496       | 535       | 550       | 567       | 566       |
| Brno University of Technology                             | 183       | 255       | 290       | 324       | 357       | 374       | 382       | 389       | 379       | 437       | 495       | 542       | 658       | 746       |
| University of Veterinary and Pharmaceutical Sciences Brno | 104       | 139       | 161       | 157       | 169       | 201       | 230       | 288       | 336       | 387       | 448       | 542       | 654       | 718       |
| Mendel University in Brno                                 | 121       | 163       | 164       | 199       | 215       | 246       | 281       | 321       | 344       | 372       | 389       | 410       | 498       | 574       |

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| Institute                                       | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|-------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Czech University of Life Sciences Prague        | 123       | 179       | 212       | 201       | 203       | 204       | 202       | 223       | 243       | 285       | 294       | 324       | 508       | 610       |
| Institute of Chemical Process Fundamentals ASCR | 205       | 269       | 253       | 256       | 266       | 283       | 292       | 300       | 294       | 310       | 338       | 360       | 391       | 399       |
| Institute of Molecular Genetics ASCR            | 154       | 222       | 234       | 260       | 263       | 277       | 290       | 303       | 333       | 351       | 341       | 341       | 350       | 316       |
| Institute of Biophysics ASCR                    | 112       | 158       | 179       | 183       | 200       | 217       | 240       | 288       | 302       | 314       | 327       | 351       | 397       | 436       |
| VSB-Technical University of Ostrava             | 64        | 105       | 133       | 161       | 168       | 181       | 192       | 212       | 240       | 250       | 279       | 303       | 384       | 505       |
| Institute of Mathematics ASCR                   | 120       | 165       | 175       | 197       | 222       | 245       | 257       | 268       | 263       | 267       | 278       | 288       | 318       | 361       |
| Astronomical Institute ASCR                     | 149       | 203       | 219       | 230       | 219       | 218       | 219       | 210       | 216       | 228       | 283       | 318       | 355       | 379       |

Table 13 Evolution of CPP/FCSm by main institutions – block analysis

| Institute                                            | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Academy of Sciences (global)                         | 0.59      | 0.61      | 0.63      | 0.61      | 0.61      | 0.64      | 0.70      | 0.69      | 0.69      | 0.72      | 0.78      | 0.83      | 0.84      | 0.83      |
| Charles University in Prague                         | 0.65      | 0.65      | 0.69      | 0.60      | 0.61      | 0.61      | 0.62      | 0.64      | 0.65      | 0.66      | 0.70      | 0.77      | 0.81      | 0.85      |
| Institute of Physics ASCR                            | 0.96      | 0.98      | 1.11      | 1.03      | 0.91      | 0.90      | 0.91      | 0.93      | 0.86      | 0.77      | 0.95      | 1.14      | 1.08      | 1.00      |
| Masaryk University                                   | 0.51      | 0.44      | 0.40      | 0.41      | 0.55      | 0.57      | 0.62      | 0.66      | 0.74      | 0.61      | 0.62      | 0.68      | 0.71      | 0.72      |
| Institute of Chemical Technology Prague              | 0.28      | 0.30      | 0.31      | 0.34      | 0.39      | 0.39      | 0.45      | 0.40      | 0.44      | 0.50      | 0.53      | 0.51      | 0.47      | 0.48      |
| Czech Technical University in Prague                 | 0.30      | 0.32      | 0.35      | 0.40      | 0.35      | 0.34      | 0.38      | 0.44      | 0.46      | 0.44      | 0.54      | 0.62      | 0.82      | 0.93      |
| Palacky University Olomouc                           | 0.48      | 0.53      | 0.49      | 0.48      | 0.62      | 0.41      | 0.55      | 0.55      | 0.61      | 0.64      | 0.68      | 0.71      | 0.73      | 0.82      |
| J. Heyrovsky Institute of Physical Chemistry ASCR    | 1.17      | 1.08      | 0.95      | 0.93      | 0.87      | 0.96      | 1.19      | 1.08      | 0.99      | 0.99      | 0.89      | 0.87      | 0.77      | 0.74      |
| Biology Centre ASCR                                  | 0.48      | 0.49      | 0.60      | 0.66      | 0.69      | 0.65      | 0.62      | 0.57      | 0.69      | 0.75      | 0.76      | 0.74      | 0.70      | 0.80      |
| University of South Bohemia in Ceske Budejovice      | 0.37      | 0.39      | 0.40      | 0.60      | 0.63      | 0.64      | 0.65      | 0.64      | 0.72      | 0.71      | 0.75      | 0.75      | 0.74      | 0.74      |
| Institute of Organic Chemistry and Biochemistry ASCR | 0.37      | 0.38      | 0.39      | 0.39      | 0.37      | 0.48      | 0.62      | 0.71      | 0.76      | 0.82      | 0.87      | 0.92      | 1.00      | 1.09      |
| Institute of Macromolecular Chemistry ASCR           | 0.54      | 0.59      | 0.66      | 0.66      | 0.74      | 0.77      | 0.90      | 0.88      | 0.71      | 0.77      | 0.76      | 0.81      | 0.83      | 0.90      |
| Institute of Microbiology ASCR                       | 0.41      | 0.42      | 0.33      | 0.36      | 0.41      | 0.47      | 0.56      | 0.57      | 0.60      | 0.54      | 0.55      | 0.56      | 0.67      | 0.78      |
| University of Pardubice                              | 0.30      | 0.38      | 0.51      | 0.36      | 0.33      | 0.40      | 0.42      | 0.47      | 0.51      | 0.62      | 0.66      | 0.63      | 0.63      | 0.64      |

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| Institute                                                 | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|-----------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Institute of Physiology ASCR                              | 0.46      | 0.53      | 0.62      | 0.50      | 0.48      | 0.55      | 0.55      | 0.47      | 0.50      | 0.50      | 0.57      | 0.71      | 0.68      | 0.64      |
| Nuclear Physics Institute ASCR                            | 0.38      | 0.41      | 0.45      | 0.54      | 0.52      | 0.53      | 0.69      | 0.75      | 0.85      | 1.03      | 1.22      | 1.30      | 1.27      | 0.90      |
| Brno University of Technology                             | 0.25      | 0.23      | 0.17      | 0.21      | 0.29      | 0.40      | 0.36      | 0.39      | 0.35      | 0.29      | 0.35      | 0.43      | 0.45      | 0.58      |
| University of Veterinary and Pharmaceutical Sciences Brno | 0.07      | 0.11      | 0.19      | 0.29      | 0.48      | 0.54      | 0.43      | 0.50      | 0.52      | 0.47      | 0.41      | 0.42      | 0.55      | 0.56      |
| Mendel University in Brno                                 | 0.23      | 0.23      | 0.37      | 0.34      | 0.42      | 0.39      | 0.44      | 0.37      | 0.33      | 0.46      | 0.58      | 0.67      | 0.64      | 0.69      |
| Czech University of Life Sciences Prague                  | 0.46      | 0.43      | 0.39      | 0.29      | 0.30      | 0.38      | 0.33      | 0.32      | 0.36      | 0.48      | 0.44      | 0.44      | 0.56      | 0.73      |
| Institute of Chemical Process Fundamentals ASCR           | 0.43      | 0.48      | 0.45      | 0.54      | 0.59      | 0.42      | 0.45      | 0.41      | 0.48      | 0.59      | 0.61      | 0.69      | 0.63      | 0.56      |
| Institute of Molecular Genetics ASCR                      | 0.66      | 0.66      | 0.58      | 0.47      | 0.51      | 0.61      | 0.81      | 0.74      | 0.72      | 0.81      | 0.75      | 0.82      | 0.86      | 0.76      |
| Institute of Biophysics ASCR                              | 0.57      | 0.59      | 0.69      | 0.82      | 0.81      | 0.68      | 0.80      | 0.84      | 0.94      | 0.90      | 0.83      | 0.88      | 0.90      | 0.89      |
| VSB-Technical University of Ostrava                       | 0.09      | 0.13      | 0.23      | 0.25      | 0.39      | 0.51      | 0.39      | 0.49      | 0.45      | 0.44      | 0.58      | 0.61      | 0.53      | 0.49      |
| Institute of Mathematics ASCR                             | 0.45      | 0.66      | 0.61      | 0.76      | 0.75      | 0.65      | 0.67      | 0.67      | 0.97      | 1.01      | 1.15      | 1.10      | 0.91      | 0.84      |
| Astronomical Institute ASCR                               | 0.24      | 0.28      | 0.35      | 0.37      | 0.41      | 0.42      | 0.48      | 0.48      | 0.40      | 0.39      | 0.44      | 0.42      | 0.46      | 0.48      |

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Figure 19: Evolution of the number of publications of the 5 main institutions (plus Academy of Sciences – global), year by year

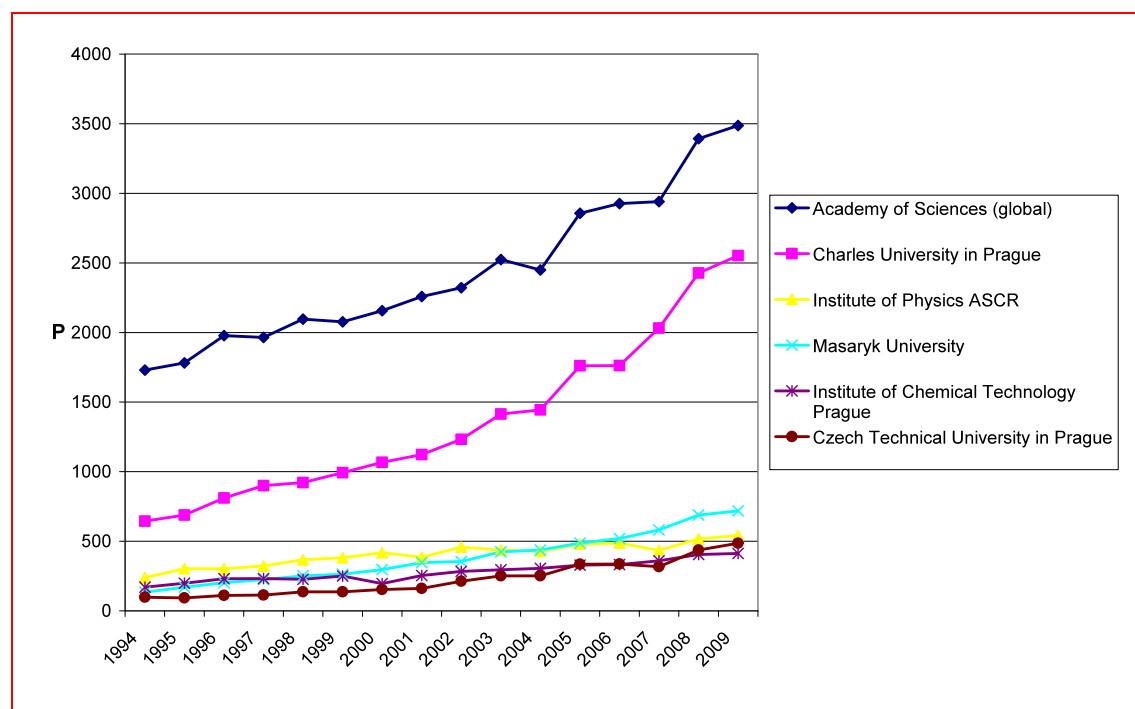
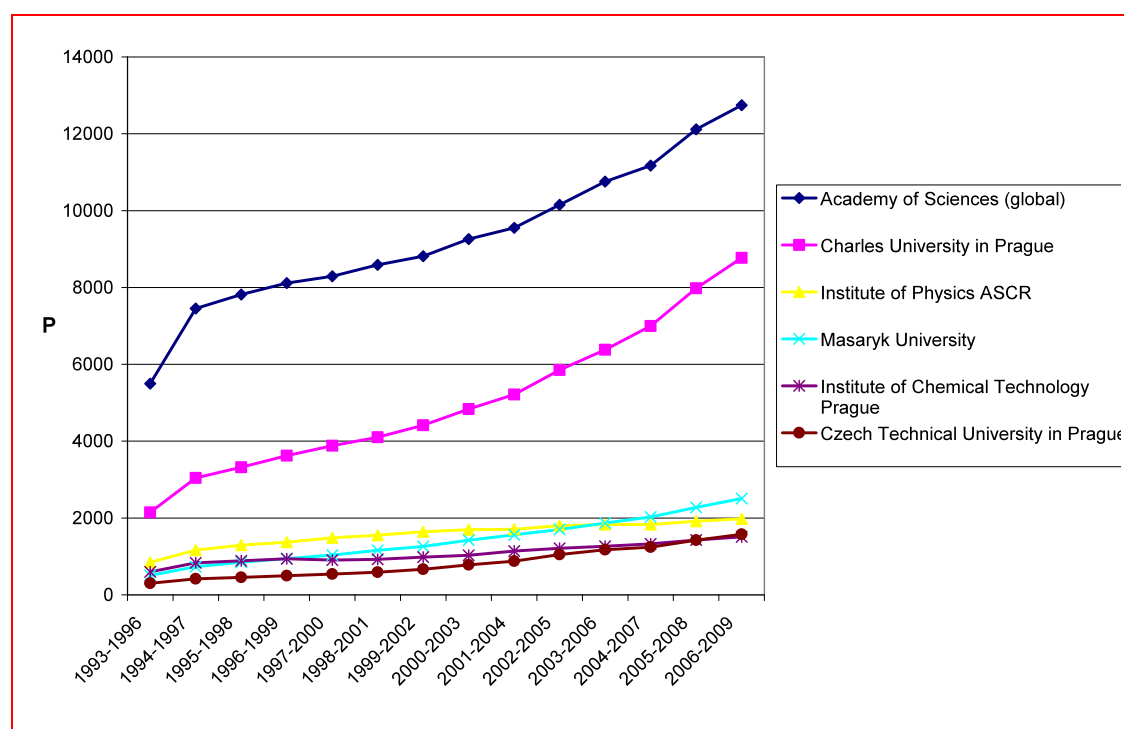
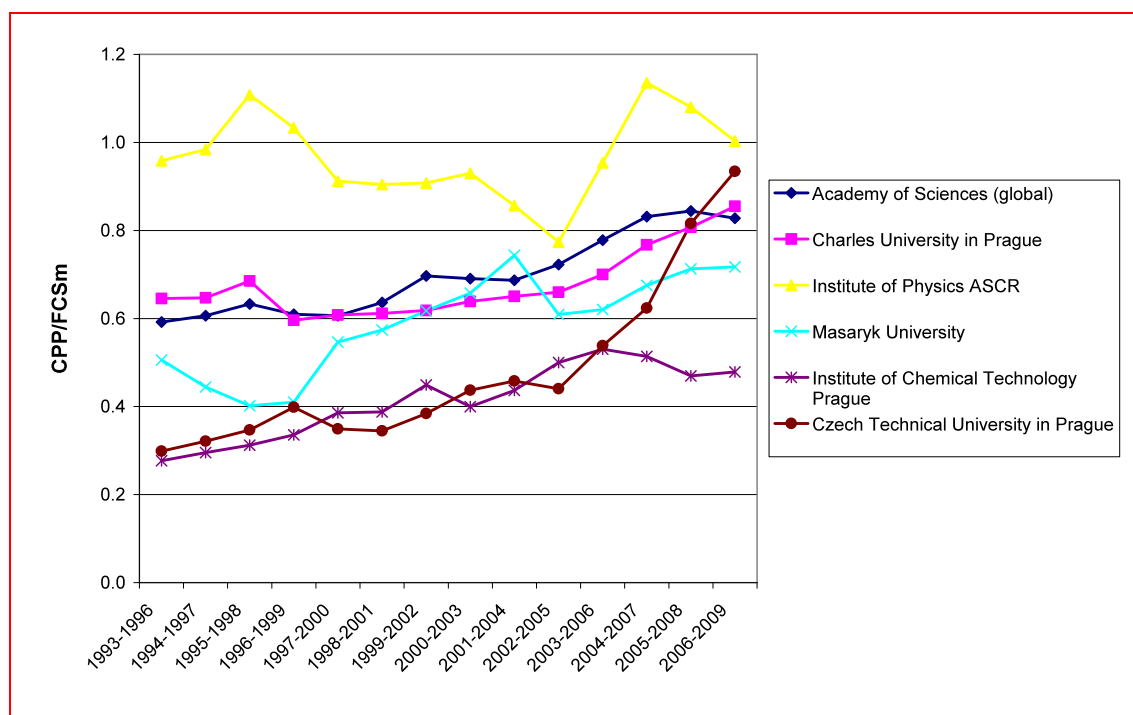


Figure 20: Evolution of the number of publications of the 5 main institutions (plus Academy of Sciences – global) – block analysis



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Figure 21: Evolution of CPP/FCS of the 5 main institutions (plus Academy of Sciences – global) – block analysis



### 4.3 International cooperation

In this chapter the collaborative patterns of the different institutional sectors and institutions in the Czech Republic are studied. In this sense we describe three main types of cooperation: International cooperation, National cooperation (where only Czech institutions are involved) and Single institutes (when the publication is authored by one or more researchers from just one single institution).

#### 4.3.1 Institutional sectors

Table 14 shows the main bibliometric indicators for the Czech institutional sectors considering the three cooperation types. As it can be seen, the CPP/FCSm of all sectors is higher for the publications in international collaboration, while the lowest scores are found for the production without collaboration.

Table 14: Main bibliometric indicators for Czech institutional sectors and cooperation type

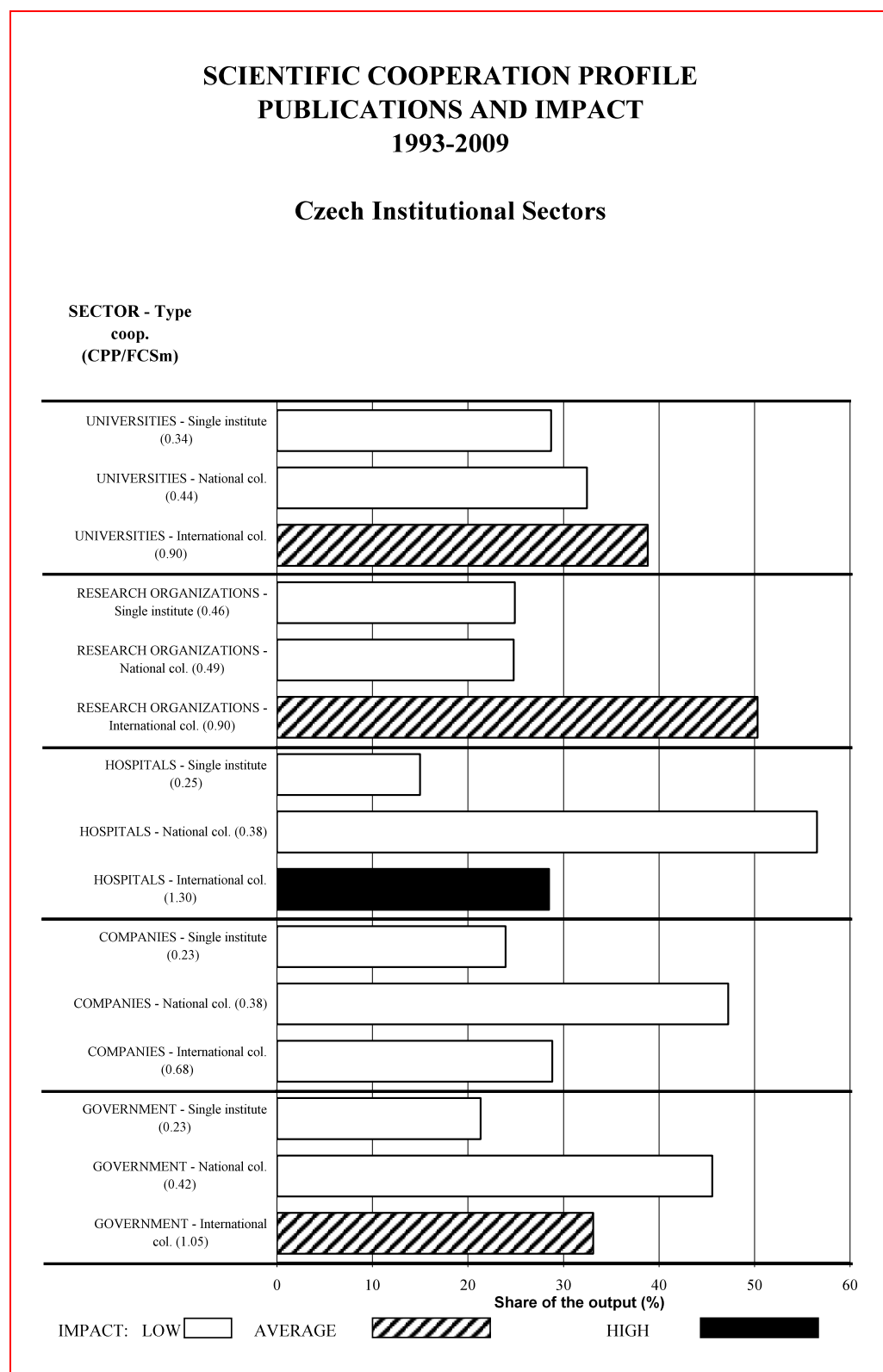
| Sector                 | Type coop.         | %  | P     | C-sc   | CPP   | CPP/JCSm | CPP/FCSm | CPP/FCSm | JCSm/FCSm | %nc | %sc |
|------------------------|--------------------|----|-------|--------|-------|----------|----------|----------|-----------|-----|-----|
| Universities           | Single institute   | 29 | 14487 | 40179  | 2.77  | 0.75     | 0.34     | 0.34     | 0.46      | 50% | 31% |
|                        | National col.      | 32 | 16371 | 59836  | 3.65  | 0.77     | 0.44     | 0.44     | 0.57      | 40% | 33% |
|                        | International col. | 39 | 19591 | 143583 | 7.33  | 0.95     | 0.90     | 0.90     | 0.95      | 31% | 32% |
| Research organizations | Single institute   | 25 | 11050 | 54729  | 4.95  | 0.75     | 0.46     | 0.46     | 0.62      | 36% | 30% |
|                        | National col.      | 25 | 10995 | 47938  | 4.36  | 0.77     | 0.49     | 0.49     | 0.63      | 35% | 34% |
|                        | International col. | 50 | 22338 | 195471 | 8.75  | 0.93     | 0.90     | 0.90     | 0.97      | 26% | 33% |
| Hospitals              | Single institute   | 15 | 762   | 2291   | 3.01  | 0.88     | 0.25     | 0.25     | 0.29      | 50% | 13% |
|                        | National col.      | 57 | 2877  | 10236  | 3.56  | 0.87     | 0.38     | 0.38     | 0.44      | 43% | 19% |
|                        | International col. | 28 | 1449  | 19906  | 13.74 | 1.24     | 1.30     | 1.30     | 1.05      | 22% | 18% |
| Companies              | Single institute   | 24 | 841   | 1831   | 2.18  | 0.80     | 0.23     | 0.23     | 0.29      | 56% | 22% |

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| Sector       | Type coop.         | %  | P     | C-sc   | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------|--------------------|----|-------|--------|-------|--------------|--------------|--------------|---------------|-----|-----|
|              | National col.      | 47 | 1661  | 4835   | 2.91  | 0.74         | 0.38         | 0.38         | 0.51          | 45% | 32% |
|              | International col. | 29 | 1013  | 5095   | 5.03  | 0.94         | 0.68         | 0.68         | 0.72          | 36% | 36% |
| Government   | Single institute   | 21 | 396   | 921    | 2.33  | 0.72         | 0.23         | 0.23         | 0.31          | 52% | 20% |
|              | National col.      | 46 | 847   | 3050   | 3.60  | 0.80         | 0.42         | 0.42         | 0.53          | 39% | 31% |
|              | International col. | 33 | 615   | 7078   | 11.51 | 1.09         | 1.05         | 1.05         | 0.96          | 20% | 27% |
| Other        | Single institute   | 25 | 172   | 141    | 0.82  | 0.46         | 0.14         | 0.14         | 0.31          | 69% | 34% |
|              | National col.      | 33 | 227   | 396    | 1.74  | 0.70         | 0.42         | 0.42         | 0.60          | 50% | 36% |
|              | International col. | 43 | 299   | 1659   | 5.55  | 1.45         | 0.82         | 0.82         | 0.56          | 44% | 39% |
| Universities | Single institute   | 29 | 14487 | 40179  | 2.77  | 0.75         | 0.34         | 0.34         | 0.46          | 50% | 31% |
|              | National col.      | 32 | 16371 | 59836  | 3.65  | 0.77         | 0.44         | 0.44         | 0.57          | 40% | 33% |
|              | International col. | 39 | 19591 | 143583 | 7.33  | 0.95         | 0.90         | 0.90         | 0.95          | 31% | 32% |

Figure 22 presents the percentage of publications for the three types of collaboration together with the normalized-impact (CPP/FCSm). It can be seen how the production in international collaboration is normally close or above 1 (being thus classified as “Average” or “High”). It is remarkable that the production in international collaboration of the Hospitals is the only sector with a normalized impact well above (“High”) international level. Another important aspect is that in almost all the institutional sectors the production in international collaboration represents the largest share of publications (more than 30%), while this share is higher for Universities and Research organizations, and lower for Hospitals and Companies. These results suggest that the research activities among universities and research organizations (mainly the Academy of Sciences) have a clear international orientation, while the production of Hospitals, Governmental institutions and especially companies, has a more national or local focus.

Figure 22 :Main institutional sectors by type of collaboration



### ***Evolution of production by collaboration***

The evolution over time of production and impact for the different types of cooperation has been also studied for the main Czech institutional sectors. Figure 23 to Figure 28 and Table 15 present the block analysis for the percentage of publications of the different institutional sectors.

As it can be seen, there is a generalized decreasing pattern in the share of single publications for all the institutional sectors. Both national and international collaboration have remarkably increased for all the sectors. However, the increase of international collaboration is higher for Universities and Research organizations, while national collaboration has a major importance for Hospitals, Governmental institutions and Companies.

An interesting conclusion of these figures is that we observe a development in which the ties of Czech scientific organizations, both internally in the Czech Republic and internationally has grown over time, while the most “isolated” research (expressed by single address papers) is left.

Figure 23: Evolution of the percentage of production by collaboration by Universities – block analysis

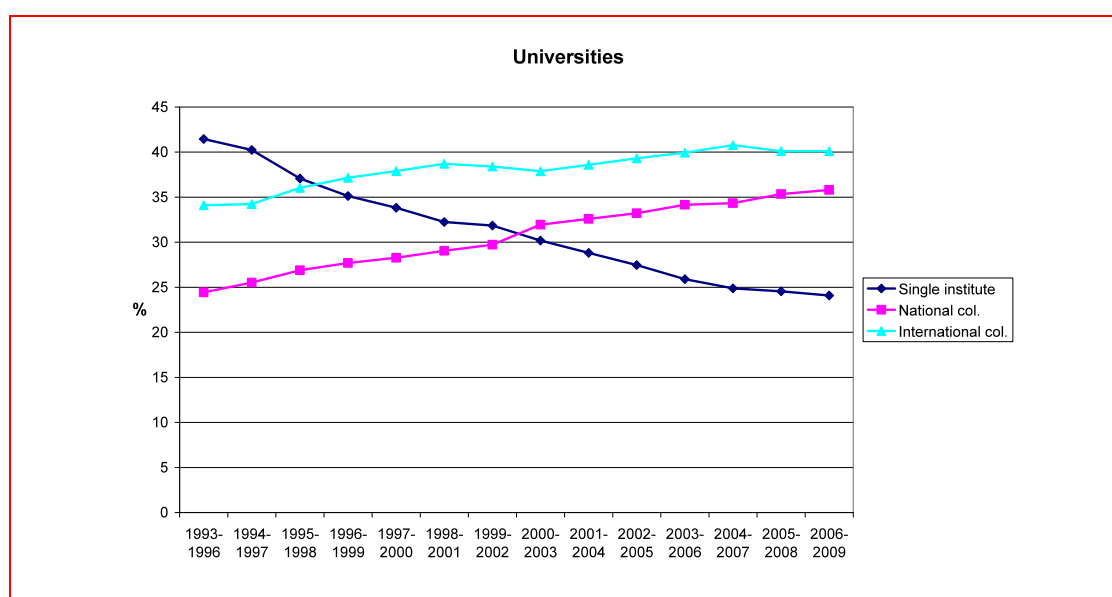


Figure 24 Evolution of the percentage of production by collaboration by Research organizations – block analysis

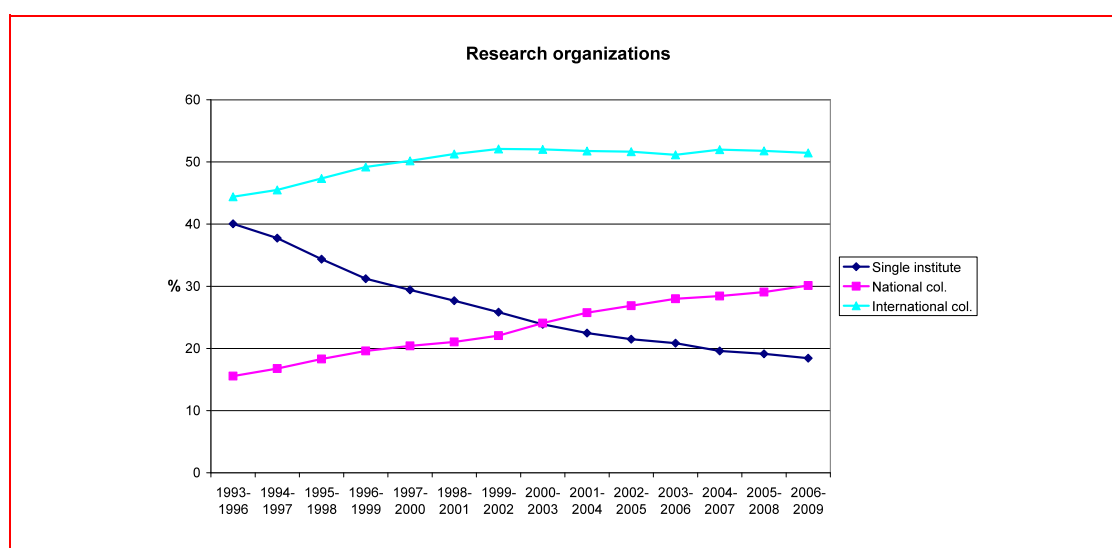


Figure 25 Evolution of the percentage of production by collaboration by Hospitals – block analysis

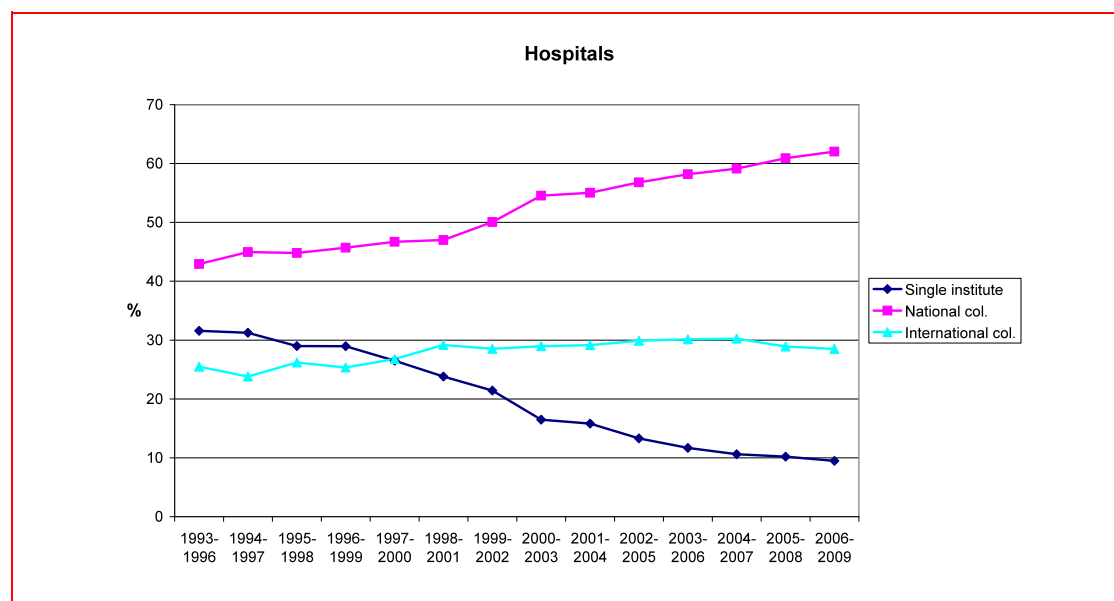


Figure 26 Evolution of the percentage of production by collaboration by Government – block analysis

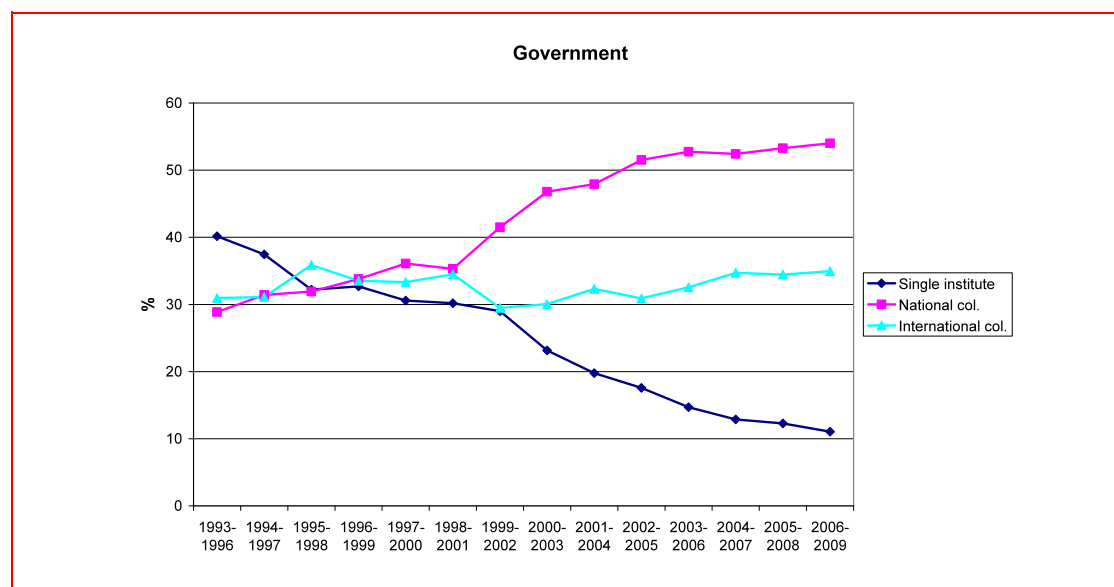


Figure 27 Evolution of the percentage of production by collaboration by Companies – block analysis

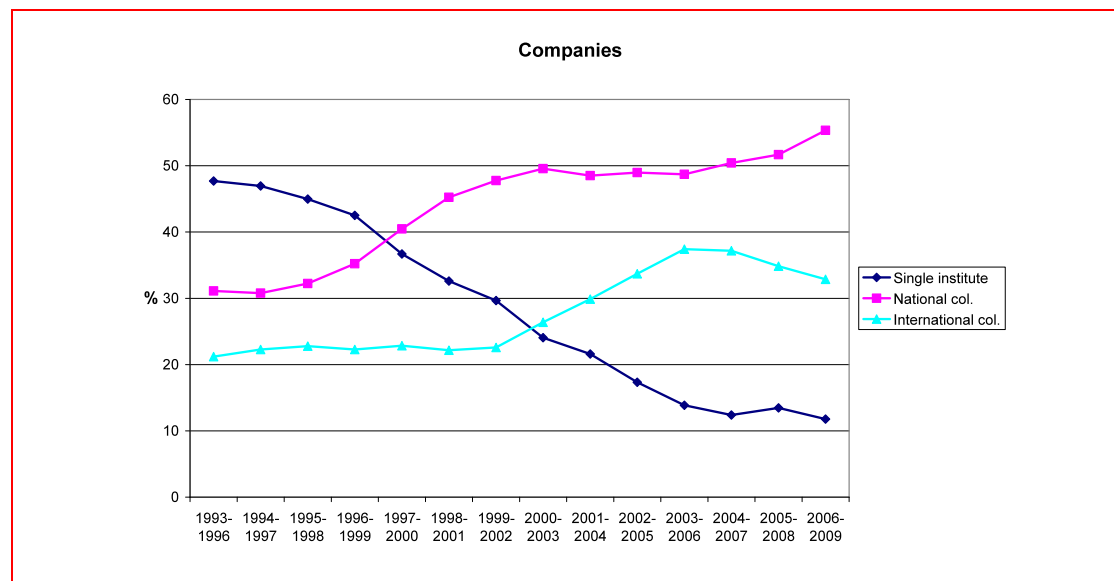
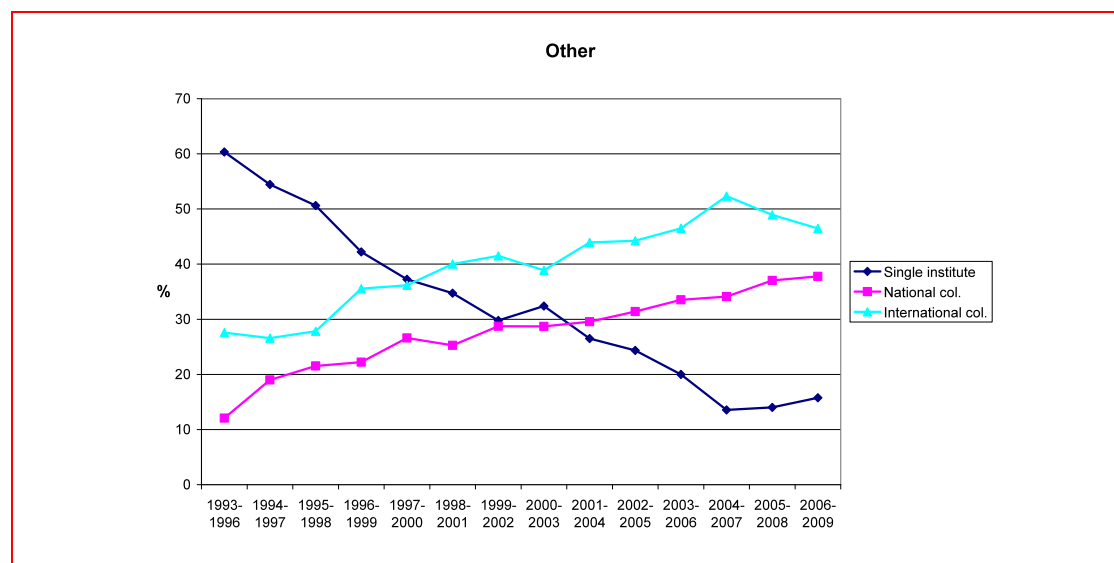


Figure 28 Evolution of the percentage of production by collaboration by Other – block analysis



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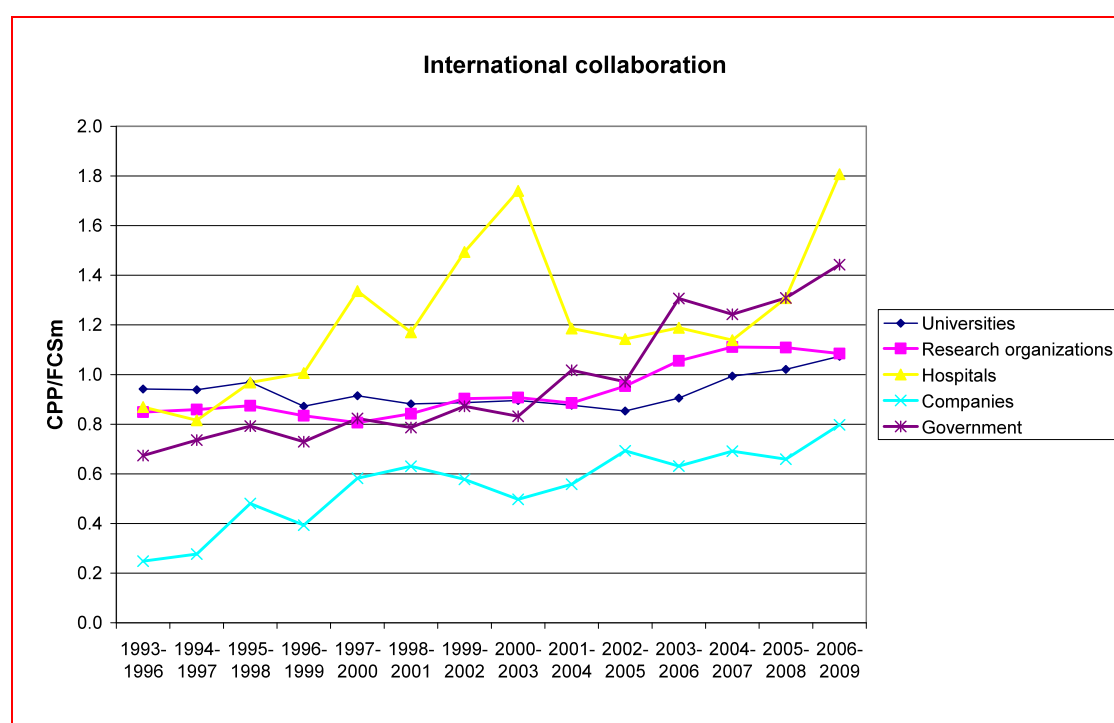
Table 15: Evolution of percentage of production by institutional sector and cooperation type – block analysis

| Sector                 | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Universities           | Single institute   | 41%       | 40%       | 37%       | 35%       | 34%       | 32%       | 32%       | 30%       | 29%       | 27%       | 26%       | 25%       | 25%       | 24%       |
|                        | National col.      | 24%       | 26%       | 27%       | 28%       | 28%       | 29%       | 30%       | 32%       | 33%       | 33%       | 34%       | 34%       | 35%       | 36%       |
|                        | International col. | 34%       | 34%       | 36%       | 37%       | 38%       | 39%       | 38%       | 38%       | 39%       | 39%       | 40%       | 41%       | 40%       | 40%       |
| Research organizations | Single institute   | 40%       | 38%       | 34%       | 31%       | 29%       | 28%       | 26%       | 24%       | 22%       | 21%       | 21%       | 20%       | 19%       | 18%       |
|                        | National col.      | 16%       | 17%       | 18%       | 20%       | 20%       | 21%       | 22%       | 24%       | 26%       | 27%       | 28%       | 28%       | 29%       | 30%       |
|                        | International col. | 44%       | 45%       | 47%       | 49%       | 50%       | 51%       | 52%       | 52%       | 52%       | 52%       | 51%       | 52%       | 52%       | 51%       |
| Hospitals              | Single institute   | 32%       | 31%       | 29%       | 29%       | 27%       | 24%       | 21%       | 16%       | 16%       | 13%       | 12%       | 11%       | 10%       | 9%        |
|                        | National col.      | 43%       | 45%       | 45%       | 46%       | 47%       | 47%       | 50%       | 55%       | 55%       | 57%       | 58%       | 59%       | 61%       | 62%       |
|                        | International col. | 25%       | 24%       | 26%       | 25%       | 27%       | 29%       | 29%       | 29%       | 29%       | 30%       | 30%       | 30%       | 29%       | 28%       |
| Government             | Single institute   | 40%       | 37%       | 32%       | 33%       | 31%       | 30%       | 29%       | 23%       | 20%       | 18%       | 15%       | 13%       | 12%       | 11%       |
|                        | National col.      | 29%       | 31%       | 32%       | 34%       | 36%       | 35%       | 42%       | 47%       | 48%       | 52%       | 53%       | 52%       | 53%       | 54%       |
|                        | International col. | 31%       | 31%       | 36%       | 34%       | 33%       | 35%       | 29%       | 30%       | 32%       | 31%       | 33%       | 35%       | 34%       | 35%       |
| Companies              | Single institute   | 48%       | 47%       | 45%       | 43%       | 37%       | 33%       | 30%       | 24%       | 22%       | 17%       | 14%       | 12%       | 13%       | 12%       |
|                        | National col.      | 31%       | 31%       | 32%       | 35%       | 40%       | 45%       | 48%       | 50%       | 49%       | 49%       | 49%       | 50%       | 52%       | 55%       |
|                        | International col. | 21%       | 22%       | 23%       | 22%       | 23%       | 22%       | 23%       | 26%       | 30%       | 34%       | 37%       | 37%       | 35%       | 33%       |
| Other                  | Single institute   | 60%       | 54%       | 51%       | 42%       | 37%       | 35%       | 30%       | 32%       | 27%       | 24%       | 20%       | 14%       | 14%       | 16%       |
|                        | National col.      | 12%       | 19%       | 22%       | 22%       | 27%       | 25%       | 29%       | 29%       | 30%       | 31%       | 34%       | 34%       | 37%       | 38%       |
|                        | International col. | 28%       | 27%       | 28%       | 36%       | 36%       | 40%       | 41%       | 39%       | 44%       | 44%       | 46%       | 52%       | 49%       | 46%       |
| Universities           | Single institute   | 41%       | 40%       | 37%       | 35%       | 34%       | 32%       | 32%       | 30%       | 29%       | 27%       | 26%       | 25%       | 25%       | 24%       |
|                        | National col.      | 24%       | 26%       | 27%       | 28%       | 28%       | 29%       | 30%       | 32%       | 33%       | 33%       | 34%       | 34%       | 35%       | 36%       |
|                        | International col. | 34%       | 34%       | 36%       | 37%       | 38%       | 39%       | 38%       | 38%       | 39%       | 39%       | 40%       | 41%       | 40%       | 40%       |

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In Figure 29 and Table 16 the evolution of the field-normalized impact (CPP/FCSm) of the different Czech institutional sectors by cooperation type is presented. The highest impact is normally found for the international collaboration, presenting an increasing pattern during the period of analysis.

Figure 29: Evolution of CPP/FCSm of institutional sectors by International collaboration – block analysis



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Table 16: Evolution of CPP/FCSm by institutional sectors and cooperation type – block analysis

| Sector                 | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Universities           | Single institute   | 0.25      | 0.25      | 0.25      | 0.23      | 0.25      | 0.27      | 0.31      | 0.35      | 0.39      | 0.43      | 0.43      | 0.41      | 0.43      | 0.46      |
|                        | National col.      | 0.25      | 0.25      | 0.25      | 0.28      | 0.32      | 0.36      | 0.38      | 0.41      | 0.43      | 0.46      | 0.48      | 0.49      | 0.51      | 0.54      |
|                        | International col. | 0.94      | 0.94      | 0.97      | 0.87      | 0.91      | 0.88      | 0.89      | 0.90      | 0.88      | 0.85      | 0.91      | 0.99      | 1.02      | 1.07      |
| Research organizations | Single institute   | 0.38      | 0.39      | 0.37      | 0.35      | 0.40      | 0.44      | 0.50      | 0.46      | 0.47      | 0.54      | 0.56      | 0.57      | 0.61      | 0.63      |
|                        | National col.      | 0.24      | 0.27      | 0.30      | 0.32      | 0.36      | 0.39      | 0.44      | 0.47      | 0.47      | 0.51      | 0.54      | 0.55      | 0.56      | 0.61      |
|                        | International col. | 0.85      | 0.86      | 0.87      | 0.83      | 0.81      | 0.84      | 0.90      | 0.91      | 0.89      | 0.95      | 1.06      | 1.11      | 1.11      | 1.08      |
| Hospitals              | Single institute   | 0.31      | 0.23      | 0.10      | 0.14      | 0.18      | 0.24      | 0.22      | 0.26      | 0.27      | 0.29      | 0.42      | 0.39      | 0.33      | 0.46      |
|                        | National col.      | 0.18      | 0.21      | 0.21      | 0.20      | 0.25      | 0.30      | 0.28      | 0.34      | 0.38      | 0.41      | 0.41      | 0.42      | 0.45      | 0.50      |
|                        | International col. | 0.87      | 0.82      | 0.97      | 1.01      | 1.34      | 1.17      | 1.49      | 1.74      | 1.19      | 1.14      | 1.19      | 1.14      | 1.31      | 1.81      |
| Government             | Single institute   | 0.30      | 0.27      | 0.21      | 0.19      | 0.18      | 0.24      | 0.24      | 0.25      | 0.38      | 0.44      | 0.35      | 0.25      | 0.25      | 0.32      |
|                        | National col.      | 0.18      | 0.22      | 0.24      | 0.26      | 0.22      | 0.28      | 0.29      | 0.36      | 0.40      | 0.46      | 0.46      | 0.43      | 0.44      | 0.44      |
|                        | International col. | 0.25      | 0.28      | 0.48      | 0.39      | 0.58      | 0.63      | 0.58      | 0.50      | 0.56      | 0.69      | 0.63      | 0.69      | 0.66      | 0.80      |
| Companies              | Single institute   | 0.38      | 0.37      | 0.37      | 0.15      | 0.19      | 0.29      | 0.36      | 0.23      | 0.29      | 0.32      | 0.37      | 0.15      | 0.11      | 0.20      |
|                        | National col.      | 0.37      | 0.36      | 0.24      | 0.27      | 0.30      | 0.48      | 0.45      | 0.50      | 0.42      | 0.45      | 0.44      | 0.43      | 0.47      | 0.50      |
|                        | International col. | 0.67      | 0.74      | 0.79      | 0.73      | 0.82      | 0.79      | 0.87      | 0.83      | 1.02      | 0.97      | 1.31      | 1.24      | 1.31      | 1.44      |
| Other                  | Single institute   | 0.00      | 0.02      | 0.10      | 0.12      | 0.17      | 0.14      | 0.10      | 0.13      | 0.31      | 0.23      | 0.10      | 0.17      | 0.28      | 0.18      |
|                        | National col.      | 0.69      | 0.55      | 0.37      | 0.24      | 0.30      | 0.33      | 0.11      | 0.22      | 0.28      | 0.40      | 0.49      | 0.59      | 0.51      | 0.55      |
|                        | International col. | 0.67      | 0.55      | 0.59      | 0.45      | 0.42      | 0.34      | 0.16      | 0.07      | 0.30      | 0.55      | 1.43      | 2.53      | 3.76      | 0.62      |
| Universities           | Single institute   | 0.25      | 0.25      | 0.25      | 0.23      | 0.25      | 0.27      | 0.31      | 0.35      | 0.39      | 0.43      | 0.43      | 0.41      | 0.43      | 0.46      |
|                        | National col.      | 0.25      | 0.25      | 0.25      | 0.28      | 0.32      | 0.36      | 0.38      | 0.41      | 0.43      | 0.46      | 0.48      | 0.49      | 0.51      | 0.54      |
|                        | International col. | 0.94      | 0.94      | 0.97      | 0.87      | 0.91      | 0.88      | 0.89      | 0.90      | 0.88      | 0.85      | 0.91      | 0.99      | 1.02      | 1.07      |

#### 4.3.2 Main institutions

The collaboration patterns of the main research institutions in the Czech Republic have also been studied. Table 17 and Figure 25 present the bibliometric indicators for the main Czech institutions (in Appendix F the whole list for the first 100 institutions is presented). International collaboration gathers the highest share of publications for most of the institutions. However, several exceptions can be mentioned such as the Palacky University in Olomouc, the University of South Bohemia in Ceske Budejovice, or the University of Pardubice among others, where the percentage of publications in national collaboration is higher than for the other cooperation types.

Table 17 also shows how in all the cases presented, the normalized impact (CPP/FCSm) of production international collaboration is higher than the other types of cooperation.

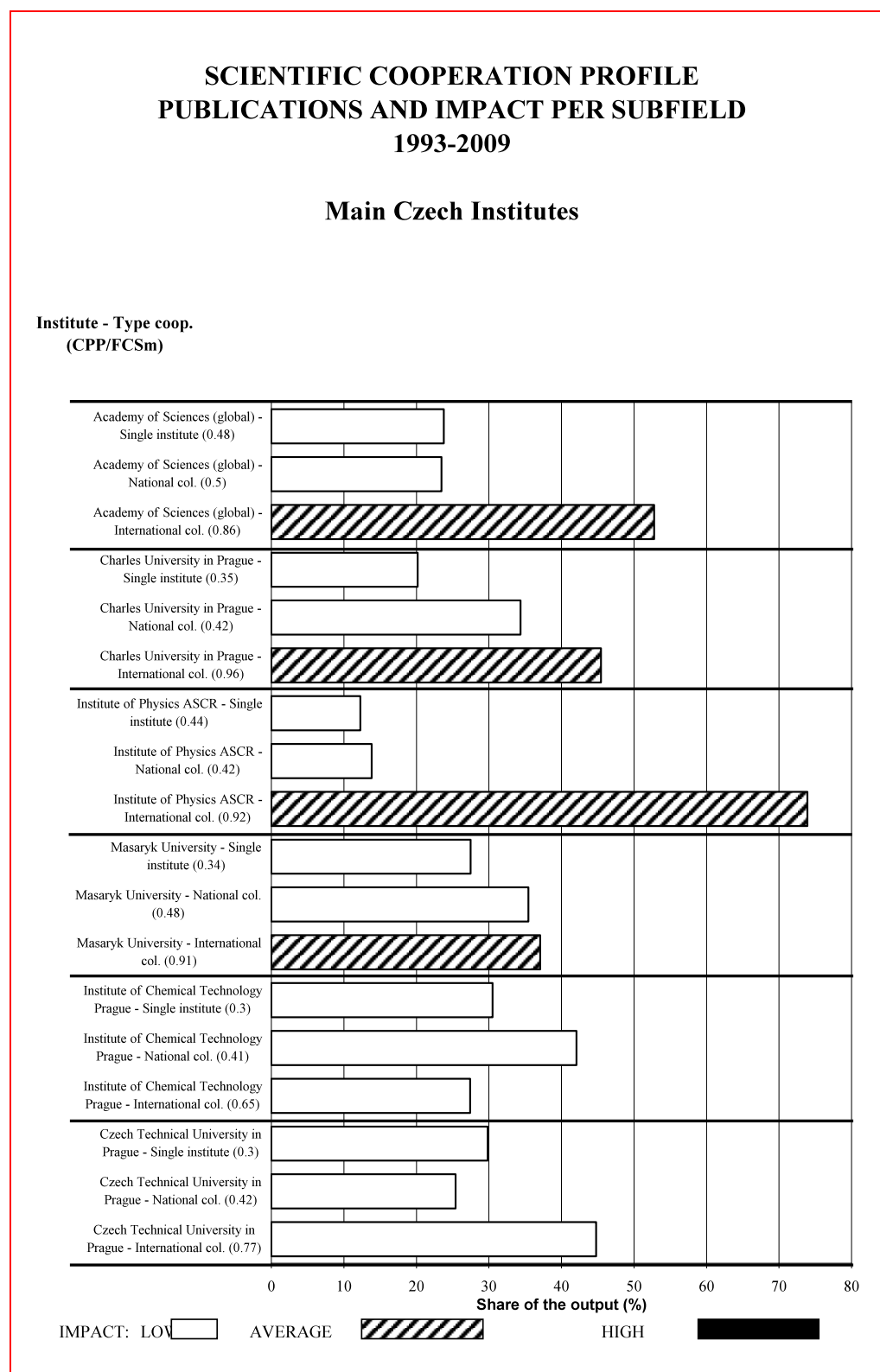
Table 17: Main Czech scientific institutions by cooperation types

| Institute                                            | Type coop.         | %  | P     | C-sc   | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------------------|--------------------|----|-------|--------|-------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                         | Single institute   | 24 | 9255  | 48836  | 5.28  | 0.74         | 0.48         | 0.65          | 35% | 31% |
|                                                      | National col.      | 23 | 9136  | 41343  | 4.53  | 0.76         | 0.50         | 0.65          | 35% | 35% |
|                                                      | International col. | 53 | 20557 | 169566 | 8.25  | 0.89         | 0.86         | 0.96          | 26% | 35% |
| Charles University in Prague                         | Single institute   | 20 | 4396  | 13703  | 3.12  | 0.70         | 0.35         | 0.50          | 46% | 30% |
|                                                      | National col.      | 34 | 7483  | 29405  | 3.93  | 0.75         | 0.42         | 0.56          | 37% | 32% |
|                                                      | International col. | 45 | 9896  | 86471  | 8.74  | 0.96         | 0.96         | 1.00          | 28% | 32% |
| Institute of Physics ASCR                            | Single institute   | 12 | 798   | 2968   | 3.72  | 0.62         | 0.44         | 0.71          | 42% | 39% |
|                                                      | National col.      | 14 | 899   | 2509   | 2.79  | 0.59         | 0.42         | 0.70          | 46% | 42% |
|                                                      | International col. | 74 | 4805  | 33520  | 6.98  | 0.89         | 0.92         | 1.04          | 30% | 40% |
| Masaryk University                                   | Single institute   | 27 | 1676  | 5183   | 3.09  | 0.75         | 0.34         | 0.46          | 47% | 28% |
|                                                      | National col.      | 35 | 2163  | 8533   | 3.94  | 0.80         | 0.48         | 0.60          | 35% | 36% |
|                                                      | International col. | 37 | 2262  | 17212  | 7.61  | 0.99         | 0.91         | 0.92          | 30% | 30% |
| Institute of Chemical Technology Prague              | Single institute   | 31 | 1368  | 5347   | 3.91  | 0.78         | 0.30         | 0.38          | 40% | 29% |
|                                                      | National col.      | 42 | 1886  | 7294   | 3.87  | 0.77         | 0.41         | 0.53          | 39% | 38% |
|                                                      | International col. | 27 | 1229  | 7372   | 6.00  | 0.79         | 0.65         | 0.82          | 29% | 32% |
| Czech Technical University in Prague                 | Single institute   | 30 | 1083  | 1588   | 1.47  | 0.55         | 0.30         | 0.55          | 63% | 33% |
|                                                      | National col.      | 25 | 923   | 2162   | 2.34  | 0.70         | 0.42         | 0.60          | 52% | 33% |
|                                                      | International col. | 45 | 1626  | 6742   | 4.15  | 0.97         | 0.77         | 0.79          | 41% | 38% |
| Palacky University Olomouc                           | Single institute   | 27 | 916   | 3204   | 3.50  | 0.83         | 0.45         | 0.54          | 51% | 29% |
|                                                      | National col.      | 38 | 1258  | 4688   | 3.73  | 0.92         | 0.47         | 0.51          | 41% | 29% |
|                                                      | International col. | 35 | 1167  | 8921   | 7.64  | 0.96         | 0.98         | 1.02          | 33% | 28% |
| J. Heyrovsky Institute of Physical Chemistry ASCR    | Single institute   | 19 | 519   | 5095   | 9.82  | 0.82         | 0.65         | 0.79          | 23% | 26% |
|                                                      | National col.      | 21 | 567   | 4774   | 8.42  | 1.02         | 0.83         | 0.81          | 27% | 31% |
|                                                      | International col. | 60 | 1638  | 19889  | 12.14 | 1.00         | 1.16         | 1.16          | 19% | 33% |
| Biology Centre ASCR                                  | Single institute   | 22 | 587   | 3108   | 5.29  | 0.83         | 0.49         | 0.59          | 26% | 34% |
|                                                      | National col.      | 30 | 824   | 4493   | 5.45  | 0.84         | 0.62         | 0.75          | 27% | 31% |
|                                                      | International col. | 48 | 1294  | 9888   | 7.64  | 0.91         | 0.81         | 0.89          | 24% | 34% |
| University of South Bohemia in Ceske Budejovice      | Single institute   | 15 | 397   | 1429   | 3.60  | 0.84         | 0.51         | 0.61          | 49% | 25% |
|                                                      | National col.      | 45 | 1213  | 5893   | 4.86  | 0.87         | 0.68         | 0.78          | 33% | 29% |
|                                                      | International col. | 40 | 1088  | 6880   | 6.32  | 0.93         | 0.91         | 0.97          | 29% | 33% |
| Institute of Organic Chemistry and Biochemistry ASCR | Single institute   | 21 | 551   | 2829   | 5.13  | 0.82         | 0.37         | 0.45          | 24% | 40% |
|                                                      | National col.      | 37 | 969   | 7033   | 7.26  | 0.98         | 0.70         | 0.71          | 28% | 35% |
|                                                      | International col. | 43 | 1132  | 10138  | 8.96  | 0.88         | 0.83         | 0.94          | 22% | 36% |

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| Institute                                                 | Type coop.         | %  | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------------|--------------------|----|------|-------|-------|--------------|--------------|---------------|-----|-----|
| Institute of Macromolecular Chemistry ASCR                | Single institute   | 25 | 540  | 3638  | 6.74  | 0.75         | 0.60         | 0.80          | 26% | 28% |
|                                                           | National col.      | 29 | 628  | 3025  | 4.82  | 0.70         | 0.53         | 0.77          | 32% | 39% |
|                                                           | International col. | 45 | 969  | 9097  | 9.39  | 0.97         | 1.04         | 1.07          | 22% | 31% |
| Institute of Microbiology ASCR                            | Single institute   | 22 | 451  | 2797  | 6.20  | 0.70         | 0.39         | 0.56          | 24% | 24% |
|                                                           | National col.      | 32 | 672  | 3314  | 4.93  | 0.66         | 0.40         | 0.60          | 29% | 33% |
|                                                           | International col. | 46 | 956  | 9220  | 9.64  | 0.81         | 0.66         | 0.81          | 17% | 31% |
| University of Pardubice                                   | Single institute   | 29 | 602  | 2210  | 3.67  | 0.77         | 0.39         | 0.51          | 41% | 35% |
|                                                           | National col.      | 38 | 789  | 2848  | 3.61  | 0.75         | 0.48         | 0.64          | 40% | 41% |
|                                                           | International col. | 33 | 670  | 4558  | 6.80  | 1.02         | 0.90         | 0.88          | 27% | 34% |
| Institute of Physiology ASCR                              | Single institute   | 22 | 455  | 3672  | 8.07  | 0.54         | 0.41         | 0.76          | 22% | 29% |
|                                                           | National col.      | 31 | 646  | 2670  | 4.13  | 0.55         | 0.33         | 0.59          | 32% | 39% |
|                                                           | International col. | 47 | 959  | 10980 | 11.45 | 0.71         | 0.64         | 0.91          | 19% | 31% |
| Nuclear Physics Institute ASCR                            | Single institute   | 14 | 258  | 921   | 3.57  | 0.90         | 0.42         | 0.46          | 43% | 41% |
|                                                           | National col.      | 19 | 363  | 1069  | 2.94  | 0.63         | 0.38         | 0.61          | 42% | 43% |
|                                                           | International col. | 67 | 1260 | 8418  | 6.68  | 1.01         | 0.92         | 0.92          | 34% | 41% |
| Brno University of Technology                             | Single institute   | 40 | 720  | 1046  | 1.45  | 0.54         | 0.25         | 0.46          | 61% | 37% |
|                                                           | National col.      | 31 | 569  | 1304  | 2.29  | 0.58         | 0.33         | 0.57          | 48% | 38% |
|                                                           | International col. | 29 | 523  | 2071  | 3.96  | 0.82         | 0.65         | 0.80          | 43% | 34% |
| University of Veterinary and Pharmaceutical Sciences Brno | Single institute   | 26 | 371  | 715   | 1.93  | 0.88         | 0.35         | 0.40          | 42% | 33% |
|                                                           | National col.      | 54 | 776  | 1818  | 2.34  | 0.97         | 0.54         | 0.56          | 44% | 37% |
|                                                           | International col. | 21 | 298  | 933   | 3.13  | 0.86         | 0.55         | 0.64          | 44% | 36% |
| Mendel University in Brno                                 | Single institute   | 40 | 539  | 1155  | 2.14  | 0.91         | 0.29         | 0.32          | 47% | 27% |
|                                                           | National col.      | 41 | 553  | 1355  | 2.45  | 0.76         | 0.42         | 0.56          | 44% | 52% |
|                                                           | International col. | 19 | 263  | 1570  | 5.97  | 1.07         | 0.88         | 0.83          | 31% | 37% |
| Czech University of Life Sciences Prague                  | Single institute   | 47 | 606  | 1016  | 1.68  | 1.12         | 0.29         | 0.26          | 52% | 37% |
|                                                           | National col.      | 38 | 486  | 1320  | 2.72  | 0.97         | 0.50         | 0.52          | 47% | 32% |
|                                                           | International col. | 15 | 186  | 755   | 4.06  | 0.90         | 0.73         | 0.81          | 38% | 34% |
| Institute of Chemical Process Fundamentals ASCR           | Single institute   | 31 | 387  | 2085  | 5.39  | 0.73         | 0.48         | 0.66          | 32% | 33% |
|                                                           | National col.      | 26 | 324  | 1343  | 4.15  | 0.65         | 0.52         | 0.80          | 31% | 40% |
|                                                           | International col. | 44 | 551  | 3030  | 5.50  | 0.65         | 0.66         | 1.03          | 27% | 41% |
| Institute of Molecular Genetics ASCR                      | Single institute   | 18 | 215  | 1444  | 6.72  | 0.58         | 0.32         | 0.55          | 31% | 30% |
|                                                           | National col.      | 30 | 349  | 2029  | 5.81  | 0.62         | 0.38         | 0.61          | 24% | 35% |
|                                                           | International col. | 52 | 602  | 10109 | 16.79 | 0.85         | 0.92         | 1.08          | 14% | 26% |
| Institute of Biophysics ASCR                              | Single institute   | 22 | 252  | 3210  | 12.74 | 0.98         | 0.84         | 0.85          | 21% | 31% |
|                                                           | National col.      | 33 | 369  | 2763  | 7.49  | 0.84         | 0.64         | 0.76          | 24% | 41% |
|                                                           | International col. | 45 | 504  | 7857  | 15.59 | 1.07         | 1.15         | 1.07          | 15% | 35% |
| VSB-Technical University of Ostrava                       | Single institute   | 36 | 376  | 527   | 1.40  | 0.72         | 0.29         | 0.40          | 64% | 39% |
|                                                           | National col.      | 32 | 331  | 741   | 2.24  | 0.87         | 0.42         | 0.48          | 54% | 34% |
|                                                           | International col. | 32 | 334  | 1178  | 3.53  | 0.99         | 0.82         | 0.83          | 50% | 32% |
| Institute of Mathematics ASCR                             | Single institute   | 29 | 305  | 912   | 2.99  | 1.05         | 0.79         | 0.76          | 47% | 29% |
|                                                           | National col.      | 13 | 137  | 326   | 2.38  | 0.88         | 0.64         | 0.73          | 51% | 32% |
|                                                           | International col. | 57 | 596  | 2045  | 3.43  | 1.20         | 1.08         | 0.90          | 42% | 35% |

Figure 30 Main Czech scientific institutions by type of collaboration



### ***Evolution of production by collaboration***

The evolution of the production has been studied in Table 18 with the evolution of the percentages of publications by types of cooperation for the main Czech scientific institutions<sup>16</sup> and Figure 31 to Figure 36 (with the graphical evolution for the 5 main institutions and the Academy of Sciences –global-).

The pattern of decreasing the share of single institute publications is the rule for all the institutions presented. The publications in international and national collaboration present a clear increasing pattern during the whole period, although the role of international collaborative publications is more important in the Academy of Sciences and its institutes as well as for some of the main universities (Charles University in Prague or the Czech Technical University in Prague). Some other institutions show a higher share of publications with national collaboration. This is the case for example of Masaryk University, and the above mentioned universities of Palacky University in Olomouc, the University of South Bohemia in Ceske Budejovice or the University of Pardubice.

The analysis of these figures (Figure 31 to Figure 36) also shows that some universities and institutes were already well linked into the international R&D networks as their share of international collaboration does not evolve very much over time while since the beginning of the period was already very high (these are the cases of the Academy of Sciences –global-, the Charles University in Prague or the Institute of Physics of the Academy of Sciences). On the other hand, other institutions show a remarkable growth in the share of international collaboration during the period of analysis, like for example the Czech Technical University in Prague.

Table 18: Evolution of the percentage of production by main Czech scientific institutions and cooperation type – block analysis

| Institute                               | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|-----------------------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Academy of Sciences (global)            | Single institute   | 38%       | 36%       | 32%       | 29%       | 28%       | 26%       | 25%       | 23%       | 21%       | 21%       | 20%       | 19%       | 18%       | 18%       |
|                                         | National col.      | 15%       | 16%       | 18%       | 19%       | 20%       | 20%       | 21%       | 23%       | 24%       | 25%       | 26%       | 27%       | 27%       | 28%       |
|                                         | International col. | 47%       | 48%       | 50%       | 52%       | 53%       | 54%       | 54%       | 54%       | 54%       | 54%       | 53%       | 54%       | 54%       | 54%       |
| Charles University in Prague            | Single institute   | 30%       | 29%       | 27%       | 26%       | 25%       | 24%       | 23%       | 21%       | 20%       | 19%       | 18%       | 18%       | 17%       | 16%       |
|                                         | National col.      | 27%       | 28%       | 28%       | 29%       | 29%       | 30%       | 31%       | 34%       | 35%       | 36%       | 36%       | 36%       | 38%       | 38%       |
|                                         | International col. | 43%       | 43%       | 45%       | 45%       | 46%       | 46%       | 46%       | 45%       | 45%       | 46%       | 46%       | 46%       | 46%       | 46%       |
| Institute of Physics ASCR               | Single institute   | 21%       | 19%       | 16%       | 13%       | 12%       | 11%       | 12%       | 12%       | 12%       | 12%       | 12%       | 11%       | 9%        | 9%        |
|                                         | National col.      | 11%       | 12%       | 13%       | 13%       | 13%       | 12%       | 11%       | 13%       | 13%       | 14%       | 15%       | 14%       | 16%       | 16%       |
|                                         | International col. | 68%       | 69%       | 72%       | 74%       | 76%       | 77%       | 77%       | 75%       | 75%       | 74%       | 73%       | 75%       | 75%       | 74%       |
| Masaryk University                      | Single institute   | 40%       | 39%       | 38%       | 36%       | 36%       | 33%       | 31%       | 29%       | 27%       | 27%       | 26%       | 25%       | 24%       | 22%       |
|                                         | National col.      | 23%       | 25%       | 27%       | 27%       | 28%       | 29%       | 32%       | 35%       | 37%       | 37%       | 37%       | 38%       | 39%       | 41%       |
|                                         | International col. | 37%       | 35%       | 35%       | 37%       | 36%       | 39%       | 37%       | 37%       | 37%       | 36%       | 37%       | 37%       | 37%       | 37%       |
| Institute of Chemical Technology Prague | Single institute   | 39%       | 39%       | 37%       | 37%       | 37%       | 36%       | 34%       | 31%       | 30%       | 29%       | 29%       | 28%       | 25%       | 24%       |
|                                         | National col.      | 35%       | 36%       | 38%       | 39%       | 40%       | 41%       | 41%       | 44%       | 42%       | 41%       | 43%       | 43%       | 46%       | 47%       |
|                                         | International col. | 27%       | 26%       | 25%       | 24%       | 24%       | 23%       | 26%       | 26%       | 28%       | 30%       | 28%       | 30%       | 29%       | 29%       |

<sup>16</sup> Full list in Appendix N

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| Institute                                                 | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|-----------------------------------------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Czech Technical University in Prague                      | Single institute   | 41%       | 39%       | 33%       | 30%       | 28%       | 28%       | 31%       | 35%       | 34%       | 32%       | 31%       | 28%       | 27%       | 27%       |
|                                                           | National col.      | 27%       | 29%       | 30%       | 29%       | 27%       | 24%       | 24%       | 23%       | 24%       | 23%       | 24%       | 24%       | 25%       | 26%       |
|                                                           | International col. | 32%       | 32%       | 38%       | 42%       | 45%       | 48%       | 45%       | 42%       | 42%       | 44%       | 46%       | 48%       | 48%       | 47%       |
| Palacky University Olomouc                                | Single institute   | 48%       | 43%       | 41%       | 39%       | 38%       | 35%       | 34%       | 31%       | 27%       | 26%       | 24%       | 22%       | 22%       | 22%       |
|                                                           | National col.      | 26%       | 28%       | 31%       | 31%       | 30%       | 32%       | 30%       | 35%       | 37%       | 39%       | 41%       | 41%       | 42%       | 41%       |
|                                                           | International col. | 26%       | 29%       | 27%       | 30%       | 32%       | 32%       | 36%       | 34%       | 35%       | 35%       | 35%       | 37%       | 37%       | 37%       |
| J. Heyrovsky Institute of Physical Chemistry ASCR         | Single institute   | 28%       | 27%       | 26%       | 25%       | 24%       | 22%       | 19%       | 18%       | 16%       | 14%       | 16%       | 13%       | 13%       | 14%       |
|                                                           | National col.      | 14%       | 15%       | 16%       | 15%       | 17%       | 18%       | 19%       | 23%       | 26%       | 26%       | 26%       | 24%       | 23%       | 24%       |
|                                                           | International col. | 58%       | 57%       | 58%       | 60%       | 59%       | 60%       | 62%       | 59%       | 58%       | 60%       | 59%       | 63%       | 64%       | 63%       |
| Biology Centre ASCR                                       | Single institute   | 46%       | 41%       | 35%       | 32%       | 30%       | 28%       | 26%       | 23%       | 19%       | 17%       | 14%       | 11%       | 10%       | 10%       |
|                                                           | National col.      | 14%       | 16%       | 19%       | 22%       | 25%       | 29%       | 29%       | 31%       | 34%       | 35%       | 39%       | 40%       | 40%       | 36%       |
|                                                           | International col. | 40%       | 42%       | 46%       | 46%       | 44%       | 44%       | 45%       | 46%       | 47%       | 48%       | 48%       | 49%       | 50%       | 54%       |
| University of South Bohemia in Ceske Budejovice           | Single institute   | 50%       | 42%       | 33%       | 29%       | 22%       | 20%       | 18%       | 15%       | 12%       | 10%       | 9%        | 9%        | 10%       | 12%       |
|                                                           | National col.      | 31%       | 36%       | 38%       | 41%       | 43%       | 44%       | 46%       | 48%       | 49%       | 49%       | 51%       | 49%       | 48%       | 44%       |
|                                                           | International col. | 19%       | 22%       | 29%       | 30%       | 34%       | 35%       | 36%       | 38%       | 39%       | 40%       | 39%       | 42%       | 43%       | 44%       |
| Institute of Organic Chemistry and Biochemistry ASCR      | Single institute   | 37%       | 35%       | 33%       | 31%       | 28%       | 26%       | 21%       | 19%       | 16%       | 16%       | 18%       | 17%       | 16%       | 15%       |
|                                                           | National col.      | 23%       | 26%       | 29%       | 33%       | 37%       | 39%       | 39%       | 40%       | 42%       | 40%       | 41%       | 39%       | 38%       | 38%       |
|                                                           | International col. | 40%       | 39%       | 38%       | 36%       | 34%       | 35%       | 40%       | 41%       | 42%       | 44%       | 41%       | 44%       | 46%       | 47%       |
| Institute of Macromolecular Chemistry ASCR                | Single institute   | 43%       | 41%       | 36%       | 33%       | 30%       | 25%       | 22%       | 20%       | 21%       | 22%       | 22%       | 22%       | 20%       | 18%       |
|                                                           | National col.      | 16%       | 16%       | 19%       | 21%       | 23%       | 27%       | 28%       | 29%       | 32%       | 31%       | 34%       | 35%       | 37%       | 39%       |
|                                                           | International col. | 42%       | 43%       | 44%       | 45%       | 48%       | 49%       | 50%       | 50%       | 48%       | 47%       | 44%       | 43%       | 44%       | 43%       |
| Institute of Microbiology ASCR                            | Single institute   | 33%       | 30%       | 28%       | 23%       | 20%       | 21%       | 20%       | 20%       | 20%       | 17%       | 18%       | 19%       | 19%       | 20%       |
|                                                           | National col.      | 22%       | 25%       | 27%       | 29%       | 31%       | 29%       | 31%       | 32%       | 31%       | 34%       | 34%       | 33%       | 36%       | 38%       |
|                                                           | International col. | 45%       | 45%       | 46%       | 48%       | 48%       | 50%       | 49%       | 47%       | 48%       | 48%       | 48%       | 47%       | 45%       | 42%       |
| University of Pardubice                                   | Single institute   | 44%       | 45%       | 39%       | 35%       | 34%       | 28%       | 28%       | 29%       | 26%       | 24%       | 23%       | 22%       | 24%       | 26%       |
|                                                           | National col.      | 29%       | 30%       | 31%       | 29%       | 31%       | 34%       | 36%       | 37%       | 39%       | 39%       | 41%       | 44%       | 43%       | 43%       |
|                                                           | International col. | 27%       | 25%       | 31%       | 36%       | 34%       | 38%       | 36%       | 34%       | 35%       | 37%       | 36%       | 34%       | 33%       | 31%       |
| Institute of Physiology ASCR                              | Single institute   | 31%       | 30%       | 29%       | 27%       | 30%       | 26%       | 23%       | 20%       | 16%       | 18%       | 18%       | 20%       | 17%       | 16%       |
|                                                           | National col.      | 22%       | 23%       | 23%       | 24%       | 22%       | 21%       | 27%       | 31%       | 35%       | 40%       | 38%       | 38%       | 39%       | 39%       |
|                                                           | International col. | 48%       | 46%       | 47%       | 49%       | 48%       | 53%       | 51%       | 50%       | 49%       | 42%       | 44%       | 43%       | 44%       | 45%       |
| Nuclear Physics Institute ASCR                            | Single institute   | 18%       | 19%       | 17%       | 16%       | 16%       | 14%       | 12%       | 12%       | 12%       | 12%       | 13%       | 12%       | 12%       | 12%       |
|                                                           | National col.      | 21%       | 21%       | 22%       | 19%       | 17%       | 15%       | 15%       | 16%       | 15%       | 14%       | 17%       | 20%       | 22%       | 26%       |
|                                                           | International col. | 62%       | 60%       | 61%       | 65%       | 68%       | 70%       | 73%       | 72%       | 73%       | 74%       | 69%       | 68%       | 66%       | 63%       |
| Brno University of Technology                             | Single institute   | 48%       | 47%       | 42%       | 42%       | 39%       | 36%       | 37%       | 37%       | 39%       | 42%       | 40%       | 39%       | 40%       | 38%       |
|                                                           | National col.      | 25%       | 29%       | 33%       | 33%       | 33%       | 33%       | 34%       | 33%       | 32%       | 31%       | 28%       | 30%       | 30%       | 32%       |
|                                                           | International col. | 27%       | 25%       | 26%       | 25%       | 28%       | 31%       | 29%       | 31%       | 28%       | 27%       | 32%       | 30%       | 31%       | 30%       |
| University of Veterinary and Pharmaceutical Sciences Brno | Single institute   | 61%       | 54%       | 40%       | 29%       | 29%       | 31%       | 35%       | 31%       | 31%       | 27%       | 22%       | 21%       | 19%       | 18%       |
|                                                           | National col.      | 27%       | 33%       | 43%       | 50%       | 51%       | 49%       | 47%       | 55%       | 57%       | 58%       | 60%       | 57%       | 56%       | 57%       |
|                                                           | International col. | 13%       | 13%       | 16%       | 21%       | 20%       | 20%       | 17%       | 14%       | 12%       | 16%       | 18%       | 22%       | 25%       | 25%       |

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| Institute                                       | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|-------------------------------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Mendel University in Brno                       | Single institute   | 76%       | 72%       | 63%       | 58%       | 50%       | 53%       | 50%       | 48%       | 44%       | 36%       | 31%       | 26%       | 28%       | 27%       |
|                                                 | National col.      | 11%       | 13%       | 20%       | 27%       | 34%       | 35%       | 35%       | 36%       | 37%       | 42%       | 46%       | 50%       | 50%       | 51%       |
|                                                 | International col. | 13%       | 15%       | 16%       | 16%       | 16%       | 13%       | 15%       | 17%       | 19%       | 22%       | 23%       | 24%       | 22%       | 22%       |
| Czech University of Life Sciences Prague        | Single institute   | 70%       | 69%       | 66%       | 65%       | 62%       | 60%       | 60%       | 57%       | 52%       | 48%       | 40%       | 34%       | 38%       | 36%       |
|                                                 | National col.      | 15%       | 17%       | 20%       | 22%       | 25%       | 27%       | 28%       | 31%       | 35%       | 39%       | 43%       | 49%       | 47%       | 48%       |
|                                                 | International col. | 15%       | 14%       | 14%       | 13%       | 13%       | 13%       | 11%       | 12%       | 13%       | 13%       | 17%       | 17%       | 14%       | 16%       |
| Nuclear Physics Institute ASCR                  | Single institute   | 18%       | 19%       | 17%       | 16%       | 16%       | 14%       | 12%       | 12%       | 12%       | 12%       | 13%       | 12%       | 12%       | 12%       |
|                                                 | National col.      | 21%       | 21%       | 22%       | 19%       | 17%       | 15%       | 15%       | 16%       | 15%       | 14%       | 17%       | 20%       | 22%       | 26%       |
|                                                 | International col. | 62%       | 60%       | 61%       | 65%       | 68%       | 70%       | 73%       | 72%       | 73%       | 74%       | 69%       | 68%       | 66%       | 63%       |
| Institute of Chemical Process Fundamentals ASCR | Single institute   | 51%       | 47%       | 38%       | 34%       | 32%       | 30%       | 29%       | 28%       | 29%       | 29%       | 27%       | 25%       | 24%       | 22%       |
|                                                 | National col.      | 16%       | 17%       | 21%       | 23%       | 23%       | 24%       | 24%       | 27%       | 28%       | 28%       | 28%       | 27%       | 28%       | 31%       |
|                                                 | International col. | 33%       | 36%       | 41%       | 44%       | 45%       | 46%       | 47%       | 46%       | 43%       | 43%       | 45%       | 48%       | 48%       | 48%       |
| Institute of Molecular Genetics ASCR            | Single institute   | 24%       | 24%       | 25%       | 24%       | 22%       | 21%       | 21%       | 19%       | 19%       | 18%       | 17%       | 15%       | 14%       | 13%       |
|                                                 | National col.      | 23%       | 23%       | 26%       | 27%       | 29%       | 31%       | 30%       | 30%       | 31%       | 32%       | 33%       | 35%       | 32%       | 32%       |
|                                                 | International col. | 53%       | 53%       | 49%       | 48%       | 48%       | 48%       | 49%       | 51%       | 50%       | 50%       | 50%       | 50%       | 54%       | 55%       |
| Institute of Biophysics ASCR                    | Single institute   | 35%       | 32%       | 31%       | 28%       | 24%       | 24%       | 23%       | 20%       | 21%       | 18%       | 18%       | 19%       | 21%       | 21%       |
|                                                 | National col.      | 18%       | 20%       | 25%       | 28%       | 34%       | 35%       | 37%       | 34%       | 34%       | 32%       | 34%       | 34%       | 35%       | 36%       |
|                                                 | International col. | 47%       | 47%       | 44%       | 43%       | 42%       | 40%       | 40%       | 45%       | 46%       | 50%       | 49%       | 46%       | 45%       | 42%       |
| VSB-Technical University of Ostrava             | Single institute   | 48%       | 47%       | 41%       | 40%       | 39%       | 42%       | 44%       | 40%       | 40%       | 36%       | 33%       | 33%       | 32%       | 32%       |
|                                                 | National col.      | 25%       | 27%       | 26%       | 27%       | 28%       | 27%       | 28%       | 32%       | 33%       | 34%       | 35%       | 32%       | 32%       | 34%       |
|                                                 | International col. | 27%       | 27%       | 32%       | 34%       | 33%       | 31%       | 28%       | 28%       | 28%       | 30%       | 33%       | 35%       | 36%       | 34%       |
| Institute of Mathematics ASCR                   | Single institute   | 39%       | 37%       | 37%       | 37%       | 40%       | 40%       | 39%       | 33%       | 28%       | 21%       | 21%       | 21%       | 20%       | 25%       |
|                                                 | National col.      | 11%       | 13%       | 13%       | 16%       | 14%       | 13%       | 11%       | 9%        | 12%       | 12%       | 14%       | 14%       | 15%       | 14%       |
|                                                 | International col. | 50%       | 50%       | 50%       | 48%       | 46%       | 47%       | 50%       | 57%       | 60%       | 67%       | 65%       | 65%       | 65%       | 61%       |
| Astronomical Institute ASCR                     | Single institute   | 39%       | 39%       | 32%       | 32%       | 28%       | 24%       | 26%       | 23%       | 21%       | 21%       | 18%       | 17%       | 18%       | 17%       |
|                                                 | National col.      | 8%        | 7%        | 7%        | 5%        | 5%        | 6%        | 6%        | 7%        | 6%        | 6%        | 6%        | 6%        | 8%        | 9%        |
|                                                 | International col. | 53%       | 53%       | 61%       | 63%       | 66%       | 70%       | 68%       | 70%       | 74%       | 74%       | 76%       | 77%       | 74%       | 73%       |

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Figure 31: Evolution of the percentage of production by collaboration by Academy of Sciences (global) – block analysis

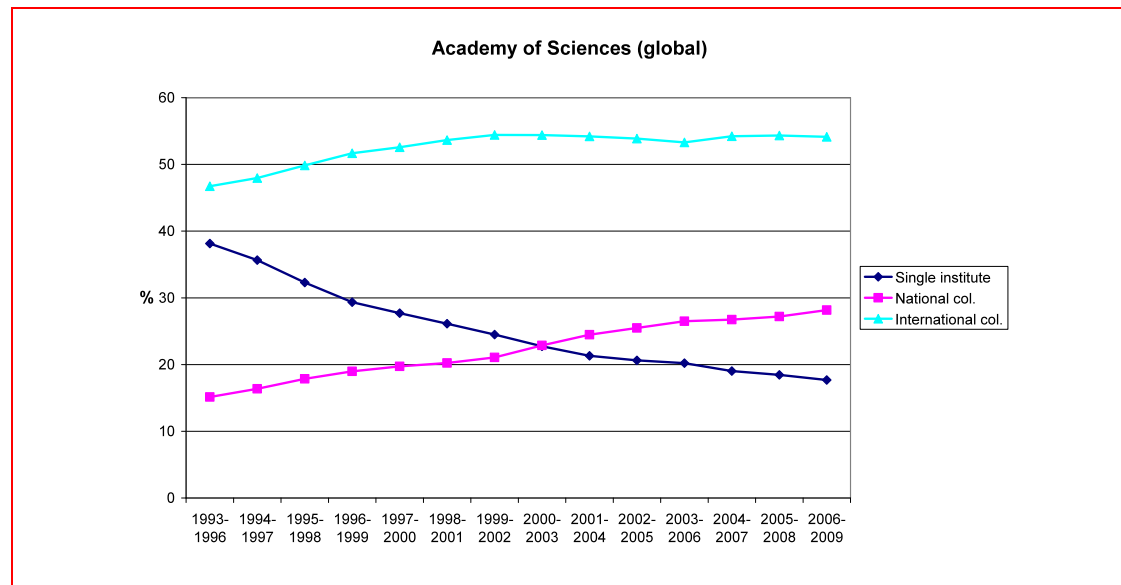
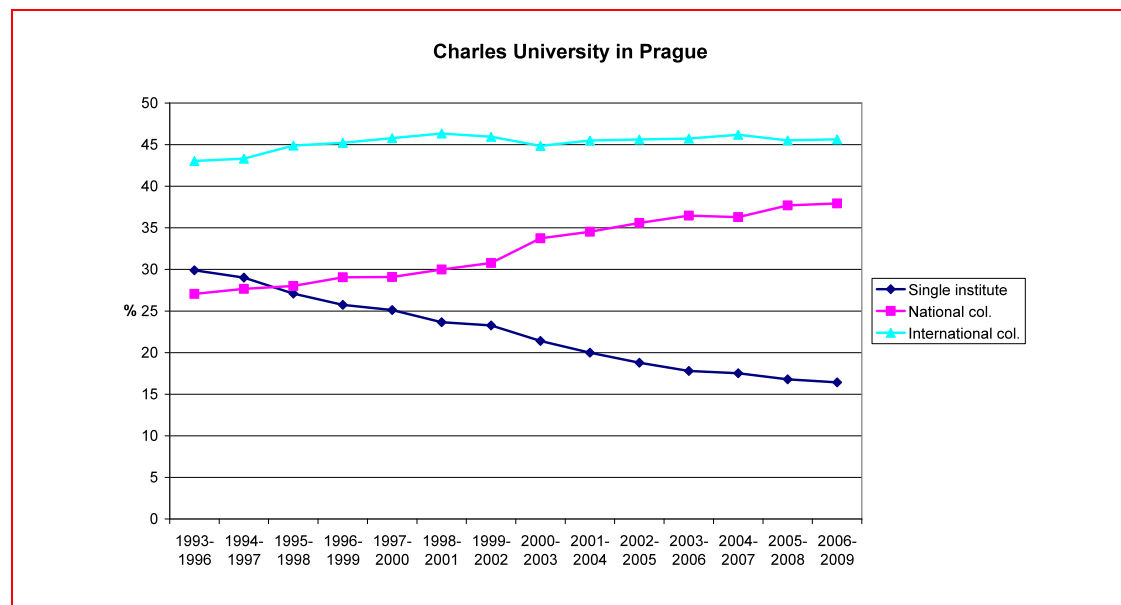


Figure 32: Evolution of the percentage of production by collaboration by Charles University in Prague – block analysis



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Figure 33: Evolution of the percentage of production by collaboration by Institute of Physics ASCR – block analysis

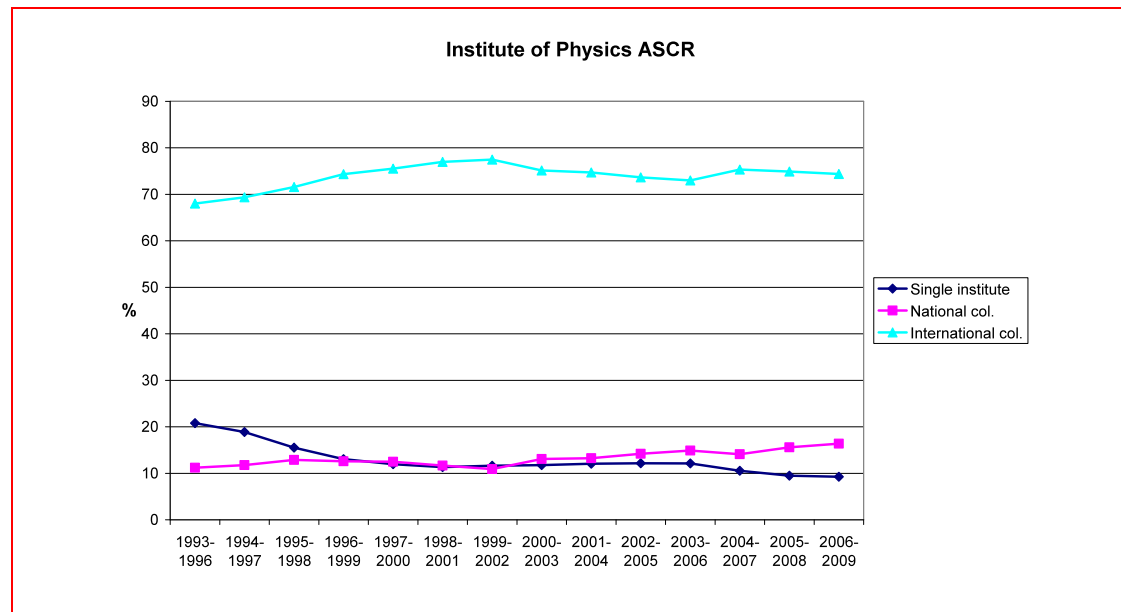
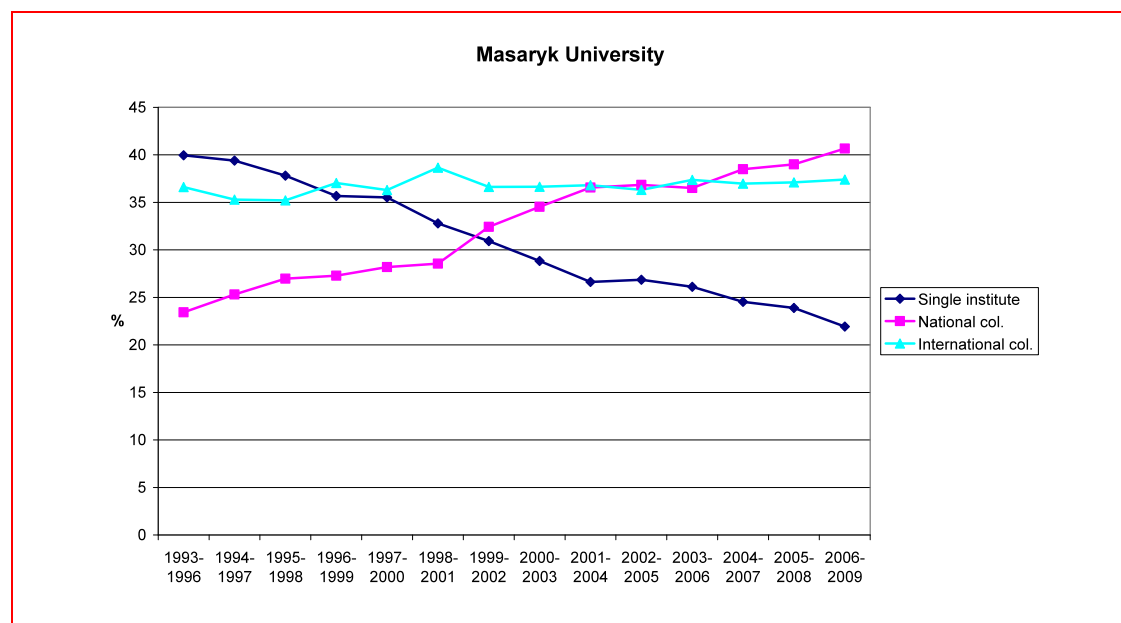


Figure 34: Evolution of the percentage of production by collaboration by Masaryk University– block analysis



## International Audit of Research, Development & Innovation in the CR Final Report - 8: Bibliometric Analysis

Figure 35: Evolution of the percentage of production by collaboration by Institute of Chemical Technology Prague– block analysis

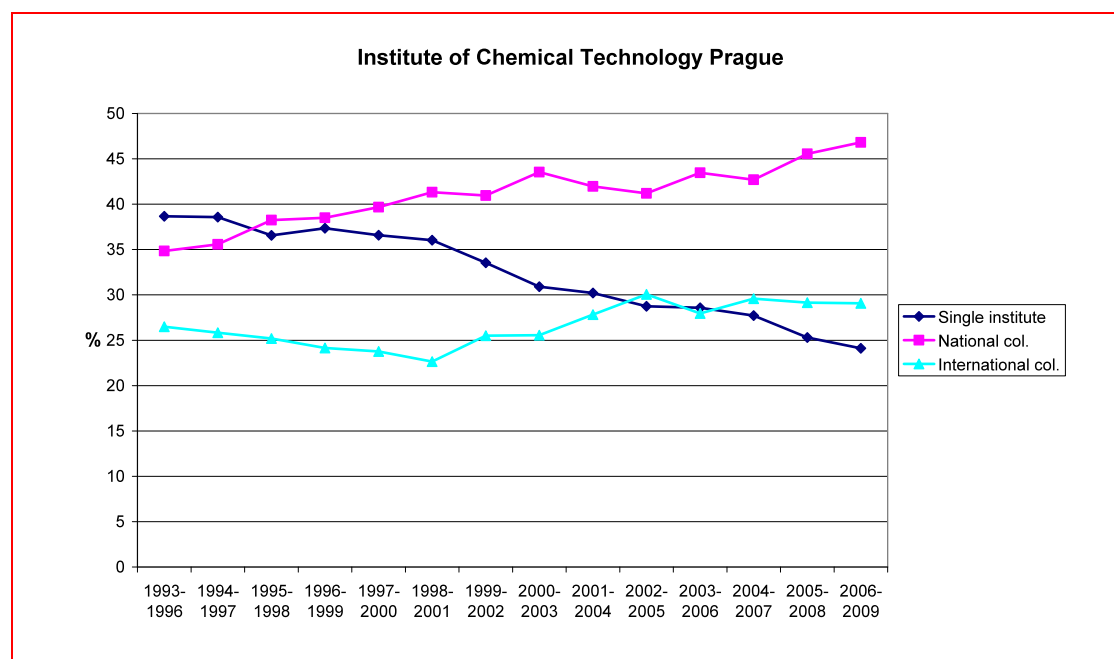
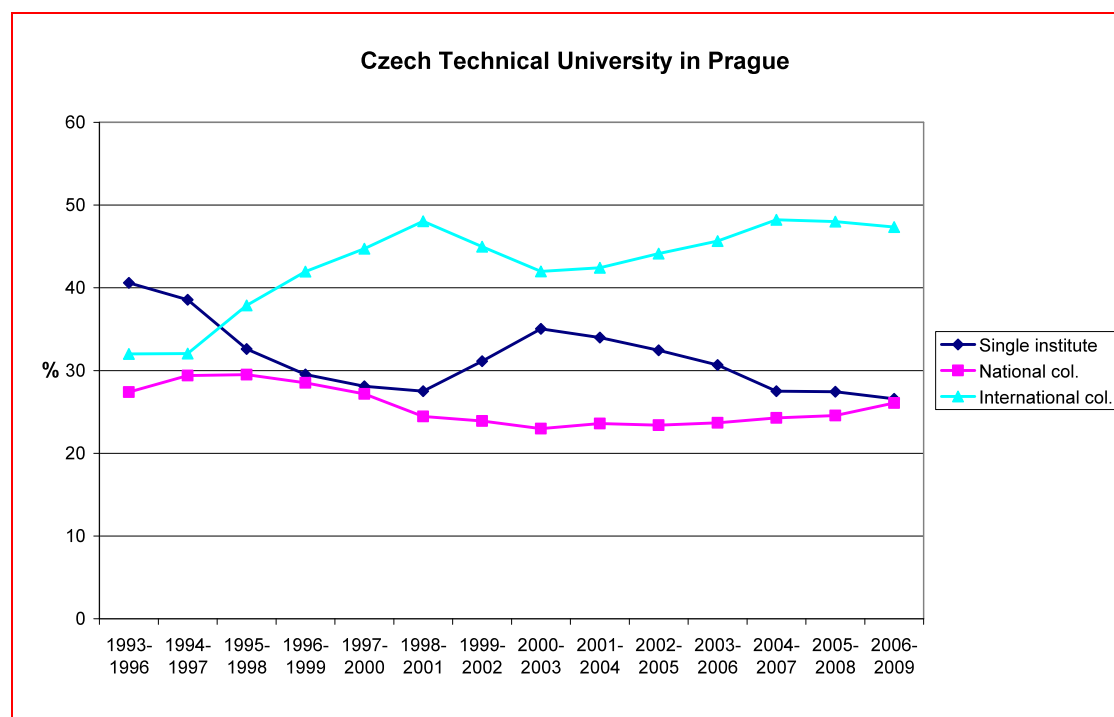


Figure 36: Evolution of the percentage of production by collaboration by Czech Technical University in Prague– block analysis



### ***Evolution of impact by collaboration***

Table 19 presents the evolution of the CPP/FCSm values for the main Czech research institutions considering the different types of collaboration studied (full list in Appendix H). It can be observed how the relative impact of publications in international collaboration is higher than the impact for the other cooperation types, being the lowest impact for publications without collaboration.

Figure 37 presents the evolution of the CPP/FCSm for the publications in international collaboration of the five main institutions (plus the Academy of Sciences –global-). In general terms all the institutions have an increasing pattern in the evolution of the impact of their publications in international collaboration. It is worth mentioning the Institute of Physics of the Academy of Sciences with a somehow variable evolution of the impact over time, and the Czech Technical University in Prague with a very strong increase in the impact of papers in international collaboration during the last years of the period.

Table 19: Evolution of CPP/FCSm by main scientific institutions and cooperation type – block analysis

| Institute                                         | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|---------------------------------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Academy of Sciences (global)                      | Single institute   | 0.38      | 0.39      | 0.38      | 0.36      | 0.43      | 0.46      | 0.52      | 0.49      | 0.49      | 0.56      | 0.57      | 0.58      | 0.63      | 0.66      |
|                                                   | National col.      | 0.26      | 0.28      | 0.31      | 0.32      | 0.35      | 0.40      | 0.47      | 0.49      | 0.49      | 0.52      | 0.55      | 0.56      | 0.58      | 0.61      |
|                                                   | International col. | 0.83      | 0.85      | 0.88      | 0.84      | 0.78      | 0.81      | 0.86      | 0.87      | 0.85      | 0.89      | 0.98      | 1.06      | 1.05      | 0.99      |
| Charles University in Prague                      | Single institute   | 0.27      | 0.29      | 0.27      | 0.25      | 0.26      | 0.27      | 0.33      | 0.38      | 0.41      | 0.43      | 0.43      | 0.39      | 0.45      | 0.51      |
|                                                   | National col.      | 0.24      | 0.24      | 0.23      | 0.25      | 0.28      | 0.32      | 0.35      | 0.38      | 0.41      | 0.45      | 0.46      | 0.50      | 0.53      | 0.56      |
|                                                   | International col. | 1.12      | 1.12      | 1.20      | 1.02      | 0.98      | 0.94      | 0.92      | 0.94      | 0.93      | 0.92      | 0.99      | 1.10      | 1.14      | 1.21      |
| Institute of Physics ASCR                         | Single institute   | 0.45      | 0.38      | 0.40      | 0.35      | 0.36      | 0.41      | 0.52      | 0.55      | 0.50      | 0.48      | 0.45      | 0.55      | 0.51      | 0.57      |
|                                                   | National col.      | 0.52      | 0.45      | 0.40      | 0.34      | 0.35      | 0.32      | 0.36      | 0.45      | 0.47      | 0.38      | 0.43      | 0.35      | 0.39      | 0.35      |
|                                                   | International col. | 1.16      | 1.23      | 1.37      | 1.27      | 1.08      | 1.06      | 1.03      | 1.05      | 0.96      | 0.89      | 1.15      | 1.37      | 1.29      | 1.18      |
| Masaryk University                                | Single institute   | 0.36      | 0.31      | 0.30      | 0.25      | 0.32      | 0.30      | 0.37      | 0.36      | 0.47      | 0.39      | 0.47      | 0.42      | 0.46      | 0.45      |
|                                                   | National col.      | 0.33      | 0.32      | 0.34      | 0.42      | 0.47      | 0.40      | 0.41      | 0.43      | 0.44      | 0.47      | 0.49      | 0.53      | 0.58      | 0.61      |
|                                                   | International col. | 0.72      | 0.63      | 0.54      | 0.56      | 0.85      | 0.97      | 0.99      | 1.12      | 1.22      | 0.95      | 0.84      | 0.97      | 0.99      | 0.97      |
| Institute of Chemical Technology Prague           | Single institute   | 0.22      | 0.22      | 0.21      | 0.19      | 0.22      | 0.23      | 0.22      | 0.21      | 0.28      | 0.39      | 0.42      | 0.44      | 0.36      | 0.33      |
|                                                   | National col.      | 0.17      | 0.21      | 0.27      | 0.31      | 0.31      | 0.30      | 0.42      | 0.46      | 0.48      | 0.51      | 0.58      | 0.46      | 0.41      | 0.45      |
|                                                   | International col. | 0.51      | 0.52      | 0.51      | 0.63      | 0.81      | 0.90      | 0.98      | 0.65      | 0.62      | 0.60      | 0.57      | 0.67      | 0.69      | 0.69      |
| Czech Technical University in Prague              | Single institute   | 0.28      | 0.24      | 0.16      | 0.17      | 0.23      | 0.15      | 0.20      | 0.27      | 0.37      | 0.39      | 0.35      | 0.22      | 0.22      | 0.32      |
|                                                   | National col.      | 0.17      | 0.22      | 0.26      | 0.36      | 0.32      | 0.32      | 0.38      | 0.43      | 0.45      | 0.40      | 0.42      | 0.37      | 0.42      | 0.36      |
|                                                   | International col. | 0.47      | 0.53      | 0.59      | 0.59      | 0.43      | 0.43      | 0.47      | 0.53      | 0.51      | 0.50      | 0.70      | 0.91      | 1.21      | 1.44      |
| Palacky University Olomouc                        | Single institute   | 0.26      | 0.26      | 0.23      | 0.29      | 0.29      | 0.24      | 0.31      | 0.45      | 0.65      | 0.73      | 0.47      | 0.53      | 0.49      | 0.48      |
|                                                   | National col.      | 0.45      | 0.35      | 0.27      | 0.16      | 0.24      | 0.31      | 0.34      | 0.39      | 0.44      | 0.44      | 0.50      | 0.49      | 0.56      | 0.67      |
|                                                   | International col. | 0.75      | 0.97      | 0.98      | 1.05      | 1.36      | 0.78      | 0.97      | 0.77      | 0.76      | 0.80      | 1.03      | 1.05      | 1.04      | 1.14      |
| J. Heyrovsky Institute of Physical Chemistry ASCR | Single institute   | 0.63      | 0.72      | 0.72      | 0.46      | 0.53      | 0.69      | 0.91      | 0.63      | 0.53      | 0.69      | 0.64      | 0.56      | 0.62      | 0.63      |
|                                                   | National col.      | 0.72      | 0.72      | 0.91      | 0.83      | 0.70      | 0.63      | 0.92      | 1.05      | 0.86      | 1.01      | 0.82      | 0.74      | 0.48      | 0.55      |
|                                                   | International col. | 1.60      | 1.38      | 1.08      | 1.17      | 1.08      | 1.19      | 1.39      | 1.27      | 1.21      | 1.08      | 1.01      | 1.01      | 0.91      | 0.84      |
|                                                   | Single institute   | 0.40      | 0.37      | 0.44      | 0.44      | 0.59      | 0.47      | 0.51      | 0.39      | 0.36      | 0.45      | 0.46      | 0.56      | 0.65      | 0.91      |

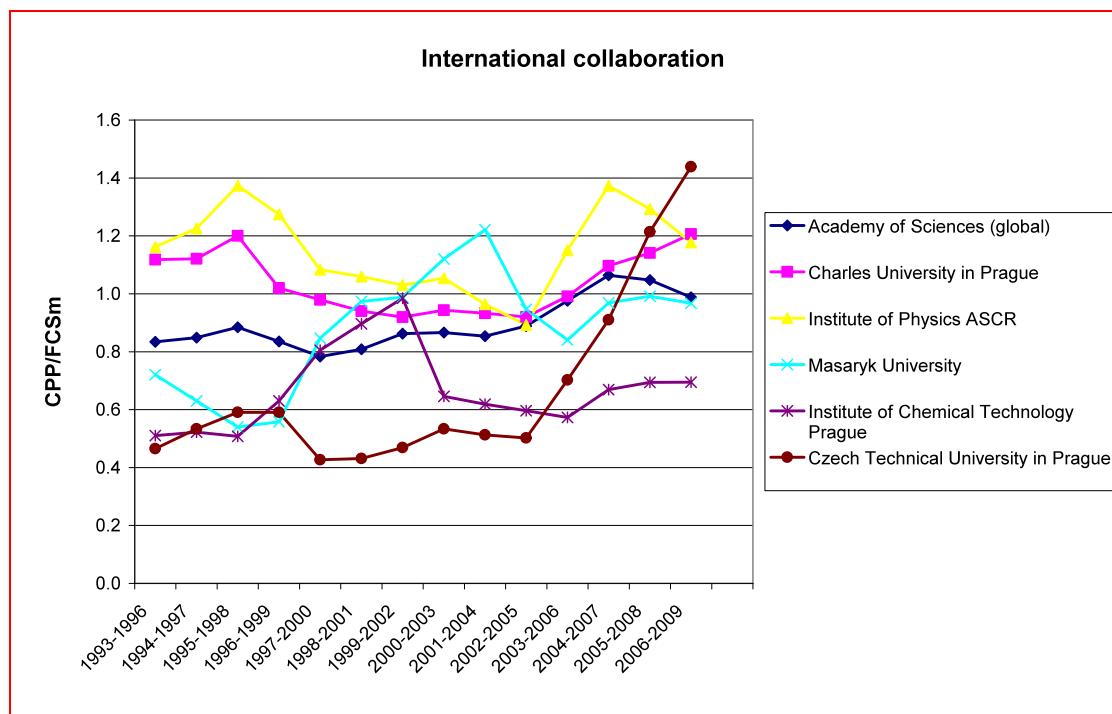
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| Institute                                                 | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|-----------------------------------------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Biology Centre ASCR                                       | Single institute   | 0.40      | 0.37      | 0.44      | 0.44      | 0.59      | 0.47      | 0.51      | 0.39      | 0.36      | 0.45      | 0.46      | 0.56      | 0.65      | 0.91      |
|                                                           | National col.      | 0.44      | 0.46      | 0.32      | 0.38      | 0.46      | 0.59      | 0.48      | 0.47      | 0.66      | 0.72      | 0.69      | 0.57      | 0.56      | 0.59      |
|                                                           | International col. | 0.60      | 0.62      | 0.81      | 0.85      | 0.85      | 0.77      | 0.76      | 0.71      | 0.83      | 0.88      | 0.92      | 0.90      | 0.82      | 0.93      |
| University of South Bohemia in Ceske Budejovice           | Single institute   | 0.37      | 0.37      | 0.28      | 0.34      | 0.32      | 0.34      | 0.31      | 0.51      | 0.59      | 0.73      | 0.57      | 0.59      | 0.51      | 0.44      |
|                                                           | National col.      | 0.43      | 0.40      | 0.35      | 0.56      | 0.64      | 0.69      | 0.56      | 0.47      | 0.66      | 0.63      | 0.68      | 0.56      | 0.60      | 0.66      |
|                                                           | International col. | 0.22      | 0.41      | 0.64      | 0.79      | 0.73      | 0.71      | 0.88      | 0.85      | 0.82      | 0.79      | 0.87      | 0.98      | 0.93      | 0.89      |
| Institute of Organic Chemistry and Biochemistry ASCR      | Single institute   | 0.33      | 0.28      | 0.23      | 0.19      | 0.30      | 0.42      | 0.42      | 0.39      | 0.35      | 0.54      | 0.58      | 0.66      | 0.70      | 0.87      |
|                                                           | National col.      | 0.21      | 0.29      | 0.33      | 0.40      | 0.38      | 0.44      | 0.71      | 0.83      | 0.66      | 0.78      | 0.86      | 0.82      | 0.85      | 1.04      |
|                                                           | International col. | 0.47      | 0.50      | 0.54      | 0.55      | 0.43      | 0.58      | 0.67      | 0.82      | 1.07      | 0.97      | 1.02      | 1.11      | 1.23      | 1.22      |
| Institute of Macromolecular Chemistry ASCR                | Single institute   | 0.34      | 0.40      | 0.44      | 0.40      | 0.68      | 0.64      | 0.78      | 0.77      | 0.52      | 0.68      | 0.77      | 1.03      | 1.03      | 0.88      |
|                                                           | National col.      | 0.07      | 0.16      | 0.31      | 0.38      | 0.30      | 0.35      | 0.61      | 0.59      | 0.49      | 0.49      | 0.51      | 0.56      | 0.58      | 0.55      |
|                                                           | International col. | 0.95      | 0.98      | 1.05      | 1.09      | 1.08      | 1.12      | 1.10      | 1.11      | 0.94      | 1.02      | 0.99      | 0.90      | 0.94      | 1.27      |
| Institute of Microbiology ASCR                            | Single institute   | 0.16      | 0.19      | 0.19      | 0.18      | 0.35      | 0.32      | 0.37      | 0.39      | 0.44      | 0.46      | 0.41      | 0.47      | 0.71      | 0.85      |
|                                                           | National col.      | 0.14      | 0.20      | 0.23      | 0.21      | 0.23      | 0.23      | 0.39      | 0.47      | 0.37      | 0.42      | 0.47      | 0.49      | 0.53      | 0.61      |
|                                                           | International col. | 0.67      | 0.66      | 0.48      | 0.54      | 0.54      | 0.67      | 0.72      | 0.71      | 0.79      | 0.66      | 0.65      | 0.64      | 0.75      | 0.87      |
| University of Pardubice                                   | Single institute   | 0.12      | 0.22      | 0.27      | 0.26      | 0.23      | 0.34      | 0.34      | 0.26      | 0.34      | 0.44      | 0.45      | 0.45      | 0.47      | 0.53      |
|                                                           | National col.      | 0.28      | 0.25      | 0.27      | 0.18      | 0.25      | 0.39      | 0.46      | 0.48      | 0.43      | 0.59      | 0.62      | 0.54      | 0.52      | 0.50      |
|                                                           | International col. | 0.87      | 0.96      | 1.15      | 0.67      | 0.57      | 0.46      | 0.44      | 0.70      | 0.78      | 0.82      | 0.87      | 0.86      | 0.89      | 0.96      |
| Institute of Physiology ASCR                              | Single institute   | 0.34      | 0.34      | 0.38      | 0.33      | 0.36      | 0.40      | 0.38      | 0.41      | 0.45      | 0.63      | 0.61      | 0.68      | 0.56      | 0.45      |
|                                                           | National col.      | 0.15      | 0.19      | 0.20      | 0.28      | 0.26      | 0.25      | 0.26      | 0.32      | 0.33      | 0.37      | 0.44      | 0.41      | 0.39      | 0.45      |
|                                                           | International col. | 0.63      | 0.76      | 0.89      | 0.66      | 0.63      | 0.71      | 0.73      | 0.56      | 0.61      | 0.58      | 0.64      | 0.97      | 0.96      | 0.84      |
| Nuclear Physics Institute ASCR                            | Single institute   | 0.15      | 0.20      | 0.20      | 0.21      | 0.25      | 0.55      | 0.99      | 0.81      | 0.69      | 0.65      | 0.61      | 0.68      | 0.43      | 0.38      |
|                                                           | National col.      | 0.15      | 0.20      | 0.27      | 0.40      | 0.35      | 0.25      | 0.33      | 0.35      | 0.47      | 0.34      | 0.29      | 0.38      | 0.37      | 0.41      |
|                                                           | International col. | 0.51      | 0.54      | 0.60      | 0.68      | 0.66      | 0.60      | 0.70      | 0.84      | 0.96      | 1.21      | 1.53      | 1.60      | 1.71      | 1.24      |
| Brno University of Technology                             | Single institute   | 0.10      | 0.12      | 0.15      | 0.13      | 0.18      | 0.25      | 0.17      | 0.14      | 0.22      | 0.30      | 0.32      | 0.32      | 0.31      | 0.37      |
|                                                           | National col.      | 0.04      | 0.11      | 0.14      | 0.23      | 0.31      | 0.44      | 0.43      | 0.36      | 0.24      | 0.23      | 0.29      | 0.42      | 0.45      | 0.52      |
|                                                           | International col. | 0.68      | 0.54      | 0.23      | 0.31      | 0.46      | 0.56      | 0.56      | 0.71      | 0.64      | 0.37      | 0.44      | 0.54      | 0.56      | 0.84      |
| University of Veterinary and Pharmaceutical Sciences Brno | Single institute   | 0.08      | 0.12      | 0.20      | 0.32      | 0.40      | 0.47      | 0.37      | 0.42      | 0.40      | 0.29      | 0.25      | 0.24      | 0.39      | 0.38      |
|                                                           | National col.      | 0.00      | 0.09      | 0.23      | 0.35      | 0.47      | 0.56      | 0.35      | 0.42      | 0.53      | 0.55      | 0.45      | 0.46      | 0.58      | 0.55      |
|                                                           | International col. | 0.08      | 0.13      | 0.15      | 0.19      | 0.58      | 0.54      | 0.55      | 0.71      | 0.63      | 0.53      | 0.51      | 0.54      | 0.61      | 0.69      |
| Mendel University in Brno                                 | Single institute   | 0.13      | 0.13      | 0.18      | 0.12      | 0.19      | 0.32      | 0.38      | 0.26      | 0.24      | 0.25      | 0.36      | 0.54      | 0.58      | 0.97      |
|                                                           | National col.      | 0.00      | 0.00      | 0.10      | 0.37      | 0.27      | 0.28      | 0.46      | 0.38      | 0.27      | 0.29      | 0.48      | 0.61      | 0.61      | 0.47      |
|                                                           | International col. | 0.89      | 0.76      | 0.88      | 0.72      | 1.11      | 0.77      | 0.58      | 0.69      | 0.76      | 1.06      | 1.02      | 0.92      | 0.77      | 0.95      |
| Czech University of Life Sciences Prague                  | Single institute   | 0.18      | 0.33      | 0.32      | 0.23      | 0.22      | 0.25      | 0.40      | 0.31      | 0.28      | 0.34      | 0.26      | 0.28      | 0.43      | 0.65      |
|                                                           | National col.      | 0.61      | 0.36      | 0.47      | 0.22      | 0.23      | 0.31      | 0.25      | 0.31      | 0.35      | 0.55      | 0.49      | 0.50      | 0.61      | 0.69      |
|                                                           | International col. | 1.07      | 0.80      | 0.49      | 0.80      | 0.81      | 0.92      | 0.33      | 0.45      | 0.63      | 0.69      | 0.71      | 0.53      | 0.66      | 0.93      |
| Institute of Chemical Process Fundamentals ASCR           | Single institute   | 0.47      | 0.57      | 0.40      | 0.42      | 0.47      | 0.24      | 0.21      | 0.22      | 0.29      | 0.28      | 0.35      | 0.41      | 0.41      | 0.35      |
|                                                           | National col.      | 0.24      | 0.25      | 0.32      | 0.48      | 0.59      | 0.49      | 0.46      | 0.48      | 0.56      | 0.73      | 0.54      | 0.50      | 0.60      | 0.54      |
|                                                           | International col. | 0.43      | 0.44      | 0.57      | 0.67      | 0.70      | 0.55      | 0.68      | 0.51      | 0.55      | 0.70      | 0.89      | 1.01      | 0.76      | 0.69      |
|                                                           | Single institute   | 0.56      | 0.52      | 0.34      | 0.34      | 0.24      | 0.21      | 0.27      | 0.20      | 0.29      | 0.38      | 0.48      | 0.45      | 0.39      | 0.49      |

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| Institute                            | Type coop.         | 1993-1996 | 1994-1997 | 1995-1998 | 1996-1999 | 1997-2000 | 1998-2001 | 1999-2002 | 2000-2003 | 2001-2004 | 2002-2005 | 2003-2006 | 2004-2007 | 2005-2008 | 2006-2009 |
|--------------------------------------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Institute of Molecular Genetics ASCR | Single institute   | 0.56      | 0.52      | 0.34      | 0.34      | 0.24      | 0.21      | 0.27      | 0.20      | 0.29      | 0.38      | 0.48      | 0.45      | 0.39      | 0.49      |
|                                      | National col.      | 0.07      | 0.13      | 0.20      | 0.29      | 0.34      | 0.45      | 0.33      | 0.39      | 0.44      | 0.34      | 0.30      | 0.33      | 0.39      | 0.55      |
|                                      | International col. | 0.84      | 0.86      | 0.82      | 0.61      | 0.70      | 0.85      | 1.28      | 1.15      | 1.00      | 1.21      | 1.13      | 1.33      | 1.27      | 0.94      |
| Institute of Biophysics ASCR         | Single institute   | 0.56      | 0.58      | 0.57      | 0.63      | 0.47      | 0.35      | 0.70      | 1.14      | 1.29      | 1.03      | 0.51      | 0.67      | 0.86      | 0.77      |
|                                      | National col.      | 0.49      | 0.52      | 0.57      | 0.43      | 0.55      | 0.54      | 0.49      | 0.47      | 0.56      | 0.61      | 0.70      | 0.94      | 0.89      | 0.91      |
|                                      | International col. | 0.60      | 0.62      | 0.81      | 1.11      | 1.18      | 1.02      | 1.16      | 1.04      | 1.02      | 1.04      | 0.99      | 0.93      | 0.91      | 0.93      |
| VSB-Technical University of Ostrava  | Single institute   | 0.08      | 0.06      | 0.11      | 0.04      | 0.09      | 0.14      | 0.26      | 0.37      | 0.38      | 0.33      | 0.54      | 0.62      | 0.55      | 0.30      |
|                                      | National col.      | 0.17      | 0.13      | 0.11      | 0.22      | 0.19      | 0.44      | 0.33      | 0.30      | 0.37      | 0.43      | 0.64      | 0.65      | 0.47      | 0.53      |
|                                      | International col. | 0.00      | 0.27      | 0.47      | 0.50      | 0.92      | 0.89      | 0.66      | 1.11      | 0.76      | 0.59      | 0.54      | 0.55      | 0.58      | 0.61      |
| Institute of Mathematics ASCR        | Single institute   | 0.64      | 0.79      | 0.68      | 0.95      | 1.22      | 0.79      | 0.77      | 0.52      | 0.33      | 0.82      | 1.06      | 1.61      | 1.21      | 0.82      |
|                                      | National col.      | 0.00      | 0.00      | 0.00      | 0.06      | 0.32      | 0.32      | 0.51      | 1.11      | 1.14      | 0.79      | 0.97      | 0.93      | 0.64      | 0.63      |
|                                      | International col. | 0.45      | 0.82      | 0.80      | 0.93      | 0.63      | 0.69      | 0.66      | 0.74      | 1.37      | 1.13      | 1.20      | 1.01      | 0.89      | 0.90      |
| Astronomical Institute ASCR          | Single institute   | 0.15      | 0.21      | 0.32      | 0.35      | 0.22      | 0.28      | 0.31      | 0.25      | 0.25      | 0.21      | 0.11      | 0.20      | 0.28      | 0.22      |
|                                      | National col.      | 0.26      | 0.29      | 0.27      | 0.16      | 0.52      | 0.56      | 0.74      | 0.68      | 0.49      | 0.26      | 0.25      | 0.12      | 0.11      | 0.14      |
|                                      | International col. | 0.30      | 0.34      | 0.37      | 0.40      | 0.50      | 0.46      | 0.52      | 0.54      | 0.45      | 0.46      | 0.54      | 0.48      | 0.54      | 0.57      |

Figure 37 Evolution of CPP/FCSm of main institutions by International collaboration – block analysis



#### 4.4 Research profile (main fields)

In the following sections and tables (Table 20 to Table 87) bibliometric indicators are presented for the main institutional sectors and individual scientific institutions of the Czech Republic considering the major fields that have been defined and explained in section 3 and Appendix A.

For each of the main fields (a total of 34) a first table with the bibliometric scores of all main institutional sectors with at least 5 publications in the field are presented. A second table includes the main institutions that present at least 50 publications or (when the number of institutions is too short) the 10 first institutions (without counting the Academy of Sciences – global-) with at least 5 publications. A more complete list of institutions per scientific field can be found in Appendix I.

A general observation based on the analysis of the following tables is that normally the Academy of Sciences (as -global- or its institutes) together with the Charles University in Prague are the leading institutions in terms of production in almost all the fields. Some of the exceptions to this pattern that are worth mentioning are the fields of ‘Economics and Business’ and ‘Political Science and Public Administration’ where the leading institution in terms of production is the University of Economics in Prague - although with a very low field-normalized impact; and the fields of ‘Energy Science and Technology’, ‘Instruments and Instrumentation’ and ‘Mechanical Engineering and Aerospace’ where the Czech Technical University in Prague presents a leading role in the number of publications.

#### ***Agriculture and Food Science***

Table 20: Main bibliometric indicators for Czech institutional sectors – Agriculture and Food Science

| Sector                 | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 2439 | 6219 | 2.55 | 0.82         | 0.46         | 0.55          | 46% | 30% |
| Research organizations | 1678 | 5493 | 3.27 | 0.80         | 0.51         | 0.64          | 38% | 32% |
| Companies              | 628  | 897  | 1.43 | 0.87         | 0.23         | 0.26          | 58% | 36% |
| Government             | 136  | 324  | 2.38 | 0.77         | 0.43         | 0.56          | 42% | 34% |
| Hospitals              | 51   | 178  | 3.49 | 0.66         | 0.48         | 0.73          | 43% | 24% |
| Other                  | 38   | 43   | 1.13 | 0.87         | 0.28         | 0.32          | 58% | 55% |

Table 21 Main bibliometric indicators for Czech scientific institutions – Agriculture and Food Science

| Institute                                       | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                    | 697 | 2943 | 4.22 | 0.72         | 0.60         | 0.84          | 32% | 34% |
| Czech University of Life Sciences Prague        | 663 | 1067 | 1.61 | 1.08         | 0.34         | 0.32          | 52% | 36% |
| Mendel University in Brno                       | 509 | 976  | 1.92 | 0.80         | 0.33         | 0.41          | 45% | 33% |
| Institute of Chemical Technology Prague         | 397 | 1289 | 3.25 | 0.87         | 0.61         | 0.70          | 47% | 24% |
| Institute of Animal Science                     | 391 | 1028 | 2.63 | 0.90         | 0.48         | 0.53          | 37% | 33% |
| Crop Research Institute                         | 346 | 876  | 2.53 | 0.96         | 0.41         | 0.42          | 46% | 31% |
| University of South Bohemia in Ceske Budejovice | 298 | 1000 | 3.36 | 0.90         | 0.59         | 0.66          | 41% | 30% |
| Charles University in Prague                    | 250 | 1046 | 4.18 | 0.68         | 0.52         | 0.76          | 39% | 30% |
| Biology Centre ASCR                             | 168 | 702  | 4.18 | 0.59         | 0.50         | 0.84          | 26% | 35% |
| University of Veterinary and Pharmaceutical     | 145 | 265  | 1.83 | 1.05         | 0.47         | 0.45          | 41% | 39% |

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| Institute                                                  | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Sciences Brno                                              |     |      |      |              |              |               |     |     |
| Crop Research Institute                                    | 346 | 876  | 2.53 | 0.96         | 0.41         | 0.42          | 46% | 31% |
| Institute of Animal Physiology and Genetics ASCR           | 140 | 590  | 4.21 | 0.74         | 0.47         | 0.63          | 26% | 30% |
| VUC Praha                                                  | 135 | 34   | 0.25 | 0.84         | 0.03         | 0.04          | 82% | 61% |
| Research Institute for Cattle Breeding                     | 125 | 209  | 1.67 | 1.10         | 0.26         | 0.24          | 46% | 37% |
| Masaryk University                                         | 114 | 363  | 3.18 | 0.85         | 0.67         | 0.79          | 46% | 28% |
| Palacky University Olomouc                                 | 90  | 259  | 2.88 | 0.61         | 0.52         | 0.85          | 32% | 43% |
| Agricultural Research Institute Kromeriz                   | 73  | 97   | 1.33 | 0.69         | 0.27         | 0.39          | 52% | 42% |
| Institute of Microbiology ASCR                             | 65  | 307  | 4.72 | 0.82         | 0.84         | 1.03          | 35% | 27% |
| Veterinary Research Institute                              | 63  | 231  | 3.67 | 0.91         | 0.62         | 0.68          | 49% | 24% |
| Central Institute for Supervising & Testing in Agriculture | 60  | 98   | 1.63 | 0.61         | 0.26         | 0.43          | 52% | 37% |
| Food Research Institute Prague                             | 60  | 207  | 3.45 | 0.93         | 0.77         | 0.83          | 45% | 24% |
| Research Institute of Soil and Water Conservation          | 57  | 71   | 1.25 | 1.04         | 0.17         | 0.16          | 49% | 38% |
| Institute of Experimental Botany ASCR                      | 52  | 274  | 5.27 | 0.83         | 1.03         | 1.23          | 35% | 39% |
| Institute of Systems Biology and Ecology ASCR              | 51  | 166  | 3.25 | 0.83         | 0.71         | 0.86          | 55% | 33% |

### ***Astronomy and Astrophysics***

Table 22 Main bibliometric indicators for Czech institutional sectors – Astronomy and Astrophysics

| Sector                 | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Research organisations | 1294 | 6155 | 4.76 | 0.57         | 0.41         | 0.72          | 30% | 41% |
| Companies              | 908  | 5191 | 5.72 | 0.69         | 0.57         | 0.83          | 30% | 42% |
| Government             | 8    | 26   | 3.25 | 0.25         | 0.24         | 0.96          | 75% | 37% |

Table 23 Main bibliometric indicators for Czech scientific institutions – Astronomy and Astrophysics

| Institute                                       | P    | C-sc | CP<br>P | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-------------------------------------------------|------|------|---------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                    | 1247 | 5907 | 4.74    | 0.57         | 0.41         | 0.72          | 30% | 41% |
| Astronomical Institute ASCR                     | 888  | 4519 | 5.09    | 0.55         | 0.41         | 0.75          | 29% | 38% |
| Charles University in Prague                    | 734  | 4559 | 6.21    | 0.73         | 0.60         | 0.82          | 26% | 42% |
| Institute of Atmospheric Physics ASCR           | 191  | 544  | 2.85    | 0.85         | 0.30         | 0.36          | 36% | 49% |
| Masaryk University                              | 94   | 367  | 3.90    | 0.55         | 0.45         | 0.83          | 49% | 39% |
| Institute of Physics ASCR                       | 90   | 497  | 5.52    | 0.52         | 0.64         | 1.21          | 24% | 45% |
| Czech Technical University in Prague            | 63   | 289  | 4.59    | 0.65         | 0.60         | 0.92          | 32% | 42% |
| Silesian University in Opava                    | 50   | 132  | 2.64    | 0.34         | 0.33         | 0.99          | 36% | 53% |
| Nuclear Physics Institute ASCR                  | 30   | 73   | 2.43    | 0.32         | 0.33         | 1.05          | 43% | 60% |
| Observatory and Planetarium Nicolaus Copernicus | 28   | 179  | 6.39    | 0.79         | 0.51         | 0.64          | 25% | 42% |
| Institute of Geophysics ASCR                    | 28   | 57   | 2.04    | 0.48         | 0.16         | 0.35          | 43% | 42% |

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**Basic Life Sciences**

Table 24 Main bibliometric indicators for Czech institutional sectors – Basic Life Sciences

| Sector                 | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|-------|-------|--------------|--------------|---------------|-----|-----|
| Research organizations | 6296 | 63099 | 10.02 | 0.85         | 0.64         | 0.75          | 18% | 30% |
| Universities           | 5165 | 42951 | 8.32  | 0.83         | 0.64         | 0.77          | 22% | 28% |
| Hospitals              | 645  | 4797  | 7.44  | 0.83         | 0.58         | 0.69          | 26% | 23% |
| Government             | 364  | 3145  | 8.64  | 0.97         | 0.69         | 0.71          | 20% | 31% |
| Companies              | 302  | 2083  | 6.90  | 0.85         | 0.57         | 0.66          | 25% | 23% |
| Other                  | 26   | 146   | 5.62  | 0.81         | 0.63         | 0.78          | 31% | 31% |

Table 25 Main bibliometric indicators for Czech scientific institutions – Basic Life Sciences

| Institute                                                          | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm<br>/<br>FCSm | %nc | %sc |
|--------------------------------------------------------------------|------|-------|-------|--------------|--------------|-------------------|-----|-----|
| Academy of Sciences (global)                                       | 5650 | 56887 | 10.07 | 0.84         | 0.63         | 0.75              | 18% | 30% |
| Charles University in Prague                                       | 2434 | 21384 | 8.79  | 0.81         | 0.62         | 0.76              | 22% | 27% |
| Institute of Microbiology ASCR                                     | 1210 | 8714  | 7.20  | 0.74         | 0.47         | 0.63              | 21% | 29% |
| Masaryk University                                                 | 933  | 7553  | 8.10  | 0.78         | 0.61         | 0.78              | 20% | 32% |
| Institute of Physiology ASCR                                       | 657  | 6874  | 10.46 | 0.73         | 0.54         | 0.75              | 20% | 30% |
| Institute of Organic Chemistry and Biochemistry ASCR               | 623  | 4827  | 7.75  | 0.73         | 0.51         | 0.69              | 21% | 34% |
| Institute of Molecular Genetics ASCR                               | 581  | 7032  | 12.10 | 0.74         | 0.66         | 0.89              | 16% | 27% |
| Institute of Biophysics ASCR                                       | 565  | 7026  | 12.44 | 0.87         | 0.76         | 0.87              | 17% | 37% |
| Biology Centre ASCR                                                | 548  | 4722  | 8.62  | 0.86         | 0.63         | 0.73              | 18% | 33% |
| University of South Bohemia in Ceske Budejovice                    | 499  | 3491  | 7.00  | 0.84         | 0.69         | 0.82              | 23% | 32% |
| Palacky University Olomouc                                         | 477  | 3997  | 8.38  | 1.01         | 0.74         | 0.74              | 24% | 26% |
| Institute of Chemical Technology Prague                            | 471  | 4083  | 8.67  | 0.84         | 0.68         | 0.80              | 20% | 22% |
| Institute of Experimental Medicine ASCR                            | 402  | 5016  | 12.48 | 0.93         | 0.68         | 0.74              | 13% | 27% |
| Institute of Animal Physiology and Genetics ASCR                   | 344  | 3400  | 9.88  | 0.91         | 0.60         | 0.66              | 16% | 31% |
| National Institute of Public Health and regional hygienic stations | 314  | 2898  | 9.23  | 0.99         | 0.71         | 0.72              | 17% | 30% |
| Institute of Analytical Chemistry ASCR                             | 288  | 3196  | 11.10 | 0.76         | 0.87         | 1.15              | 14% | 22% |
| Institute of Experimental Botany ASCR                              | 287  | 3515  | 12.25 | 1.09         | 0.86         | 0.79              | 15% | 27% |
| Veterinary Research Institute                                      | 217  | 1697  | 7.82  | 0.97         | 0.71         | 0.73              | 21% | 36% |
| University of Pardubice                                            | 186  | 1707  | 9.18  | 0.96         | 0.91         | 0.94              | 24% | 25% |
| Institute of Macromolecular Chemistry ASCR                         | 170  | 2147  | 12.63 | 1.15         | 0.99         | 0.86              | 18% | 26% |
| Mendel University in Brno                                          | 156  | 835   | 5.35  | 0.72         | 0.53         | 0.74              | 24% | 44% |
| Institute of Hematology and Blood Transfusion                      | 140  | 1251  | 8.94  | 0.76         | 0.49         | 0.65              | 16% | 29% |
| University of Defense                                              | 133  | 1102  | 8.29  | 1.00         | 0.87         | 0.87              | 23% | 33% |
| University of Veterinary and Pharmaceutical Sciences Brno          | 114  | 422   | 3.70  | 0.75         | 0.43         | 0.57              | 36% | 32% |
| J. Heyrovsky Institute of Physical Chemistry ASCR                  | 109  | 1792  | 16.44 | 1.22         | 0.94         | 0.77              | 15% | 32% |
| Institute of Animal Science                                        | 99   | 1012  | 10.22 | 0.87         | 0.65         | 0.75              | 22% | 22% |

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| Institute                                        | P  | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm<br>/<br>FCSm | %nc | %sc |
|--------------------------------------------------|----|------|-------|--------------|--------------|-------------------|-----|-----|
| Institute of Endocrinology                       | 97 | 967  | 9.97  | 0.88         | 0.54         | 0.62              | 11% | 30% |
| General University Hospital Prague               | 95 | 891  | 9.38  | 0.78         | 0.63         | 0.81              | 23% | 24% |
| Czech University of Life Sciences Prague         | 89 | 403  | 4.53  | 0.79         | 0.41         | 0.52              | 30% | 39% |
| University Hospital Brno                         | 85 | 675  | 7.94  | 0.82         | 0.55         | 0.68              | 21% | 17% |
| University Hospital Motol                        | 84 | 699  | 8.32  | 0.72         | 0.69         | 0.96              | 25% | 27% |
| Institute for Clinical and Experimental Medicine | 83 | 685  | 8.25  | 0.71         | 0.57         | 0.81              | 18% | 25% |
| Institute of Systems Biology and Ecology ASCR    | 82 | 723  | 8.82  | 1.00         | 0.70         | 0.70              | 22% | 24% |
| Institute of Botany ASCR                         | 78 | 494  | 6.33  | 1.17         | 0.67         | 0.57              | 22% | 34% |
| University Hospital Hradec Kralove               | 72 | 484  | 6.72  | 1.09         | 0.67         | 0.61              | 32% | 22% |
| University Hospital Olomouc                      | 72 | 467  | 6.49  | 0.87         | 0.57         | 0.66              | 25% | 18% |
| Masaryk Memorial Cancer Institute                | 70 | 924  | 13.20 | 0.82         | 0.84         | 1.03              | 14% | 27% |
| Institute of Vertebrate Biology ASCR             | 61 | 290  | 4.75  | 0.93         | 0.57         | 0.61              | 38% | 31% |
| Brno University of Technology                    | 55 | 202  | 3.67  | 0.56         | 0.39         | 0.69              | 33% | 33% |
| Crop Research Institute                          | 50 | 230  | 4.60  | 0.98         | 0.53         | 0.54              | 36% | 36% |

### Basic Medical Sciences

Table 26 Main bibliometric indicators for Czech institutional sectors – Basic Medical Sciences

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 590 | 3100 | 5.25 | 0.78         | 0.59         | 0.75          | 29% | 40% |
| Research organizations | 453 | 2637 | 5.82 | 0.64         | 0.58         | 0.91          | 25% | 38% |
| Hospitals              | 100 | 580  | 5.80 | 0.94         | 0.68         | 0.73          | 27% | 20% |
| Companies              | 74  | 459  | 6.20 | 0.97         | 0.66         | 0.68          | 38% | 27% |
| Government             | 38  | 222  | 5.84 | 1.06         | 0.64         | 0.60          | 29% | 34% |

Table 27 Main bibliometric indicators for Czech scientific institutions – Basic Medical Sciences

| Institute                                                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                              | 413 | 2372 | 5.74 | 0.62         | 0.57         | 0.93          | 24% | 39% |
| Charles University in Prague                              | 345 | 1643 | 4.76 | 0.69         | 0.51         | 0.75          | 28% | 40% |
| Institute of Organic Chemistry and Biochemistry ASCR      | 120 | 723  | 6.03 | 0.59         | 0.64         | 1.10          | 28% | 40% |
| Institute of Macromolecular Chemistry ASCR                | 85  | 494  | 5.81 | 0.48         | 0.48         | 1.00          | 20% | 37% |
| Palacky University Olomouc                                | 70  | 632  | 9.03 | 1.35         | 1.15         | 0.85          | 30% | 28% |
| Masaryk University                                        | 48  | 286  | 5.96 | 0.86         | 0.60         | 0.70          | 19% | 37% |
| Institute of Microbiology ASCR                            | 46  | 322  | 7.00 | 0.93         | 0.65         | 0.70          | 17% | 37% |
| University of Defense                                     | 42  | 128  | 3.05 | 0.98         | 0.51         | 0.51          | 29% | 79% |
| Institute of Chemical Technology Prague                   | 42  | 417  | 9.93 | 0.72         | 0.93         | 1.28          | 10% | 43% |
| Czech Technical University in Prague                      | 40  | 218  | 5.45 | 0.95         | 0.69         | 0.73          | 30% | 23% |
| University of Veterinary and Pharmaceutical Sciences Brno | 35  | 88   | 2.51 | 0.77         | 0.29         | 0.38          | 46% | 32% |

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**Biological Sciences**

Table 28 Main bibliometric indicators for Czech institutional sectors – Biological Sciences

| Sector                 | P    | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|-------|------|--------------|--------------|---------------|-----|-----|
| Research organizations | 4741 | 28438 | 6.00 | 0.87         | 0.64         | 0.74          | 27% | 32% |
| Universities           | 4085 | 18568 | 4.55 | 0.90         | 0.59         | 0.66          | 36% | 33% |
| Other                  | 305  | 542   | 1.78 | 0.75         | 0.41         | 0.55          | 56% | 37% |
| Government             | 192  | 529   | 2.76 | 0.70         | 0.35         | 0.50          | 44% | 38% |
| Companies              | 168  | 628   | 3.74 | 0.82         | 0.40         | 0.48          | 33% | 37% |
| Hospitals              | 118  | 587   | 4.97 | 1.10         | 0.45         | 0.40          | 36% | 21% |

Table 29 Main bibliometric indicators for Czech scientific institutions – Biological Sciences

| Institute                                                                     | P    | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-------------------------------------------------------------------------------|------|-------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                                                  | 4141 | 26175 | 6.32 | 0.87         | 0.66         | 0.75          | 25% | 32% |
| Charles University in Prague                                                  | 1410 | 6238  | 4.42 | 0.88         | 0.52         | 0.60          | 35% | 34% |
| Biology Centre ASCR                                                           | 1190 | 7985  | 6.71 | 0.98         | 0.80         | 0.82          | 27% | 31% |
| University of South Bohemia in Ceske Budejovice                               | 1064 | 5771  | 5.42 | 0.88         | 0.79         | 0.90          | 32% | 31% |
| Masaryk University                                                            | 719  | 3203  | 4.45 | 0.99         | 0.59         | 0.60          | 36% | 34% |
| Institute of Botany ASCR                                                      | 688  | 3411  | 4.96 | 0.86         | 0.66         | 0.77          | 26% | 33% |
| Palacky University Olomouc                                                    | 506  | 2712  | 5.36 | 0.98         | 0.68         | 0.69          | 35% | 33% |
| Institute of Experimental Botany ASCR                                         | 473  | 4539  | 9.60 | 0.96         | 0.87         | 0.90          | 17% | 27% |
| Institute of Vertebrate Biology ASCR                                          | 363  | 1660  | 4.57 | 1.03         | 0.79         | 0.76          | 28% | 38% |
| Institute of Microbiology ASCR                                                | 341  | 2465  | 7.23 | 0.71         | 0.59         | 0.84          | 19% | 27% |
| Crop Research Institute                                                       | 323  | 892   | 2.76 | 0.79         | 0.49         | 0.62          | 41% | 39% |
| Institute of Systems Biology and Ecology ASCR                                 | 270  | 1243  | 4.60 | 0.94         | 0.50         | 0.53          | 27% | 35% |
| Mendel University in Brno                                                     | 231  | 589   | 2.55 | 0.82         | 0.43         | 0.52          | 45% | 41% |
| Institute of Physiology ASCR                                                  | 222  | 1281  | 5.77 | 0.61         | 0.43         | 0.71          | 25% | 37% |
| Czech University of Life Sciences Prague                                      | 213  | 486   | 2.28 | 0.97         | 0.54         | 0.56          | 49% | 37% |
| Institute of Animal Physiology and Genetics ASCR                              | 209  | 1325  | 6.34 | 1.02         | 0.69         | 0.68          | 22% | 34% |
| National Museum                                                               | 173  | 304   | 1.76 | 0.80         | 0.50         | 0.62          | 60% | 37% |
| Institute of Organic Chemistry and Biochemistry ASCR                          | 171  | 822   | 4.81 | 0.72         | 0.46         | 0.64          | 27% | 38% |
| Institute of Biophysics ASCR                                                  | 156  | 1511  | 9.69 | 0.68         | 0.80         | 1.17          | 12% | 38% |
| Institute of Molecular Genetics ASCR                                          | 155  | 705   | 4.55 | 0.74         | 0.25         | 0.33          | 35% | 36% |
| Institute of Animal Science                                                   | 121  | 608   | 5.02 | 0.65         | 0.54         | 0.83          | 26% | 30% |
| University of Veterinary and Pharmaceutical Sciences Brno                     | 115  | 190   | 1.65 | 0.62         | 0.37         | 0.59          | 49% | 46% |
| National Institute of Public Health and regional hygienic stations            | 64   | 211   | 3.30 | 0.56         | 0.29         | 0.51          | 44% | 36% |
| Institute of Chemical Technology Prague                                       | 57   | 277   | 4.86 | 0.85         | 0.54         | 0.64          | 25% | 25% |
| Moravian Museum                                                               | 56   | 72    | 1.29 | 0.68         | 0.29         | 0.42          | 55% | 36% |
| Agency for Nature Conservation and Landscape Protection of the Czech Republic | 53   | 131   | 2.47 | 1.10         | 0.42         | 0.38          | 34% | 45% |
| Institute of Hematology and Blood Transfusion                                 | 50   | 178   | 3.56 | 0.69         | 0.22         | 0.32          | 34% | 44% |

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**Biomedical Sciences**

Table 30 Main bibliometric indicators for Czech institutional sectors – Biomedical Sciences

| Sector                 | P    | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|-------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 4825 | 26833 | 5.56 | 0.88         | 0.50         | 0.58          | 35% | 28% |
| Research organizations | 3923 | 32115 | 8.19 | 0.78         | 0.58         | 0.75          | 23% | 30% |
| Hospitals              | 1739 | 6696  | 3.85 | 0.97         | 0.35         | 0.36          | 47% | 22% |
| Government             | 377  | 3197  | 8.48 | 0.96         | 0.68         | 0.71          | 19% | 27% |
| Companies              | 256  | 1454  | 5.68 | 0.81         | 0.45         | 0.55          | 31% | 31% |
| Other                  | 13   | 17    | 1.31 | 1.29         | 0.13         | 0.10          | 54% | 26% |

Table 31 Main bibliometric indicators for Czech scientific institutions – Biomedical Sciences

| Institute                                                          | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------------------------------------------|------|-------|-------|--------------|--------------|---------------|-----|-----|
| Charles University in Prague                                       | 3169 | 19605 | 6.19  | 0.87         | 0.52         | 0.60          | 33% | 26% |
| Academy of Sciences (global)                                       | 3107 | 27309 | 8.79  | 0.76         | 0.61         | 0.80          | 21% | 30% |
| Institute of Physiology ASCR                                       | 999  | 7566  | 7.57  | 0.59         | 0.47         | 0.79          | 22% | 32% |
| Masaryk University                                                 | 682  | 3292  | 4.83  | 0.88         | 0.43         | 0.49          | 33% | 27% |
| Institute of Experimental Medicine ASCR                            | 492  | 4905  | 9.97  | 0.94         | 0.72         | 0.77          | 19% | 30% |
| Palacky University Olomouc                                         | 400  | 1865  | 4.66  | 1.07         | 0.56         | 0.53          | 45% | 23% |
| Institute for Clinical and Experimental Medicine                   | 386  | 2528  | 6.55  | 0.94         | 0.53         | 0.57          | 24% | 21% |
| Institute of Molecular Genetics ASCR                               | 347  | 4673  | 13.47 | 0.80         | 0.74         | 0.93          | 18% | 24% |
| National Institute of Public Health and regional hygienic stations | 332  | 3055  | 9.20  | 0.98         | 0.72         | 0.73          | 17% | 27% |
| Institute of Microbiology ASCR                                     | 320  | 2950  | 9.22  | 0.76         | 0.59         | 0.77          | 15% | 34% |
| University of Defense                                              | 251  | 1266  | 5.04  | 0.95         | 0.54         | 0.57          | 30% | 46% |
| Institute of Organic Chemistry and Biochemistry ASCR               | 225  | 1353  | 6.01  | 0.61         | 0.49         | 0.80          | 25% | 42% |
| Biology Centre ASCR                                                | 209  | 1551  | 7.42  | 0.86         | 0.63         | 0.73          | 22% | 30% |
| General University Hospital Prague                                 | 198  | 864   | 4.36  | 1.11         | 0.39         | 0.35          | 48% | 21% |
| University Hospital Olomouc                                        | 190  | 434   | 2.28  | 0.94         | 0.27         | 0.28          | 57% | 18% |
| University Hospital Hradec Kralove                                 | 189  | 545   | 2.88  | 0.77         | 0.31         | 0.40          | 43% | 28% |
| University Hospital Motol                                          | 188  | 967   | 5.14  | 0.95         | 0.46         | 0.49          | 39% | 23% |
| Institute of Biophysics ASCR                                       | 184  | 1116  | 6.07  | 0.75         | 0.55         | 0.73          | 24% | 38% |
| University of South Bohemia in Ceske Budejovice                    | 183  | 895   | 4.89  | 0.97         | 0.65         | 0.67          | 37% | 24% |
| University Hospital Brno                                           | 179  | 585   | 3.27  | 0.87         | 0.30         | 0.34          | 45% | 19% |
| University of Veterinary and Pharmaceutical Sciences Brno          | 144  | 581   | 4.03  | 1.02         | 0.53         | 0.52          | 42% | 23% |
| Czech Technical University in Prague                               | 126  | 334   | 2.65  | 0.82         | 0.44         | 0.54          | 48% | 31% |
| Institute of Endocrinology                                         | 124  | 637   | 5.14  | 0.81         | 0.34         | 0.42          | 23% | 27% |
| Veterinary Research Institute                                      | 122  | 970   | 7.95  | 1.04         | 0.82         | 0.80          | 20% | 34% |
| Institute of Hematology and Blood Transfusion                      | 118  | 884   | 7.49  | 0.56         | 0.45         | 0.81          | 25% | 31% |
| Na Homolce Hospital                                                | 117  | 963   | 8.23  | 1.35         | 0.70         | 0.52          | 44% | 16% |
| Institute of Chemical Technology Prague                            | 112  | 603   | 5.38  | 0.83         | 0.60         | 0.72          | 23% | 30% |
| St. Anne's University Hospital Brno                                | 102  | 227   | 2.23  | 0.68         | 0.16         | 0.24          | 56% | 23% |

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| Institute                                        | P  | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------------------------|----|------|-------|--------------|--------------|---------------|-----|-----|
| Nuclear Physics Institute ASCR                   | 94 | 269  | 2.86  | 0.59         | 0.38         | 0.63          | 39% | 39% |
| Prague Psychiatric Centre                        | 90 | 432  | 4.80  | 0.82         | 0.42         | 0.52          | 33% | 22% |
| Institute of Macromolecular Chemistry ASCR       | 89 | 1547 | 17.38 | 1.15         | 1.44         | 1.25          | 9%  | 31% |
| University Hospital Ostrava                      | 78 | 228  | 2.92  | 1.29         | 0.27         | 0.21          | 62% | 16% |
| University Hospital in Plzen                     | 77 | 212  | 2.75  | 0.83         | 0.31         | 0.37          | 43% | 18% |
| Institute for Postgraduate Medical Education     | 74 | 356  | 4.81  | 1.13         | 0.33         | 0.29          | 45% | 26% |
| Institute of Experimental Botany ASCR            | 73 | 480  | 6.58  | 0.66         | 0.43         | 0.65          | 16% | 31% |
| Thomayer University Hospital                     | 68 | 206  | 3.03  | 1.06         | 0.28         | 0.26          | 60% | 14% |
| Institute of Animal Physiology and Genetics ASCR | 65 | 274  | 4.22  | 0.63         | 0.35         | 0.55          | 25% | 40% |
| ASCR unresolved                                  | 60 | 785  | 13.08 | 1.21         | 0.99         | 0.82          | 28% | 16% |
| National Radiation Protection Institute          | 58 | 108  | 1.86  | 0.90         | 0.42         | 0.47          | 57% | 42% |
| Central Military Hospital Prague                 | 58 | 123  | 2.12  | 1.18         | 0.20         | 0.17          | 57% | 15% |
| University Hospital Kralovske Vinohrady          | 56 | 295  | 5.27  | 1.29         | 0.48         | 0.37          | 54% | 29% |
| Faculty Hospital Na Bulovce                      | 54 | 246  | 4.56  | 1.01         | 0.37         | 0.37          | 50% | 19% |

**Chemistry and Chemical Engineering**

Table 32 Main bibliometric indicators for Czech institutional sectors – Chemistry and Chemical Engineering

| Sector                 | P     | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-------|-------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 10941 | 55625 | 5.08 | 0.83         | 0.49         | 0.59          | 35% | 36% |
| Research organizations | 10111 | 74174 | 7.34 | 0.86         | 0.72         | 0.83          | 27% | 35% |
| Companies              | 1094  | 4487  | 4.10 | 0.75         | 0.39         | 0.52          | 36% | 34% |
| Government             | 235   | 947   | 4.03 | 0.93         | 0.31         | 0.34          | 33% | 33% |
| Hospitals              | 149   | 808   | 5.42 | 0.91         | 0.50         | 0.55          | 44% | 19% |
| Other                  | 62    | 81    | 1.31 | 0.50         | 0.24         | 0.47          | 50% | 87% |

Table 33 Main bibliometric indicators for Czech scientific institutions – Chemistry and Chemical Engineering

| Institute                                            | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------------------|------|-------|-------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                         | 9787 | 72554 | 7.41  | 0.86         | 0.73         | 0.85          | 27% | 35% |
| Charles University in Prague                         | 3587 | 19562 | 5.45  | 0.82         | 0.53         | 0.65          | 31% | 39% |
| Institute of Chemical Technology Prague              | 2782 | 13437 | 4.83  | 0.80         | 0.39         | 0.49          | 35% | 34% |
| J. Heyrovsky Institute of Physical Chemistry ASCR    | 2252 | 25353 | 11.26 | 0.99         | 0.99         | 1.01          | 21% | 31% |
| Institute of Organic Chemistry and Biochemistry ASCR | 1723 | 13352 | 7.75  | 1.03         | 0.74         | 0.72          | 26% | 35% |
| Institute of Macromolecular Chemistry ASCR           | 1690 | 12559 | 7.43  | 0.82         | 0.76         | 0.92          | 24% | 32% |
| University of Pardubice                              | 1416 | 7358  | 5.20  | 0.88         | 0.56         | 0.64          | 33% | 36% |
| Masaryk University                                   | 1282 | 8003  | 6.24  | 0.87         | 0.58         | 0.66          | 27% | 36% |
| Institute of Chemical Process Fundamentals ASCR      | 1009 | 5190  | 5.14  | 0.67         | 0.55         | 0.82          | 31% | 39% |
| Institute of Physics ASCR                            | 900  | 3556  | 3.95  | 0.64         | 0.50         | 0.78          | 36% | 53% |

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| Institute                                                          | P   | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------------------------------------------|-----|------|-------|--------------|--------------|---------------|-----|-----|
| Institute of Inorganic Chemistry ASCR                              | 652 | 2946 | 4.52  | 0.56         | 0.47         | 0.83          | 31% | 47% |
| Palacky University Olomouc                                         | 603 | 2868 | 4.76  | 0.94         | 0.50         | 0.53          | 35% | 30% |
| Institute of Analytical Chemistry ASCR                             | 477 | 4511 | 9.46  | 0.72         | 0.81         | 1.11          | 17% | 25% |
| Brno University of Technology                                      | 462 | 1701 | 3.68  | 0.66         | 0.39         | 0.59          | 40% | 36% |
| Czech Technical University in Prague                               | 455 | 1519 | 3.34  | 0.82         | 0.50         | 0.60          | 47% | 46% |
| Institute of Microbiology ASCR                                     | 403 | 2154 | 5.34  | 0.64         | 0.44         | 0.69          | 25% | 40% |
| Nuclear Physics Institute ASCR                                     | 357 | 808  | 2.26  | 0.63         | 0.29         | 0.46          | 48% | 51% |
| Institute of Biophysics ASCR                                       | 327 | 5775 | 17.66 | 1.57         | 1.70         | 1.08          | 21% | 34% |
| Tomas Bata University in Zlin                                      | 306 | 828  | 2.71  | 0.70         | 0.51         | 0.72          | 49% | 40% |
| Mendel University in Brno                                          | 249 | 1144 | 4.59  | 1.02         | 0.61         | 0.60          | 33% | 53% |
| University of West Bohemia in Plzen                                | 190 | 138  | 0.73  | 0.40         | 0.15         | 0.37          | 78% | 69% |
| University of South Bohemia in Ceske Budejovice                    | 173 | 1080 | 6.24  | 1.07         | 0.75         | 0.70          | 46% | 23% |
| Research Institute of Organic Syntheses                            | 166 | 609  | 3.67  | 0.76         | 0.41         | 0.53          | 39% | 48% |
| University of Defense                                              | 154 | 578  | 3.75  | 0.96         | 0.34         | 0.36          | 44% | 52% |
| Zentiva                                                            | 152 | 486  | 3.20  | 0.75         | 0.26         | 0.35          | 34% | 35% |
| VSB-Technical University of Ostrava                                | 150 | 453  | 3.02  | 0.82         | 0.36         | 0.44          | 45% | 29% |
| Institute of Physiology ASCR                                       | 141 | 951  | 6.74  | 0.69         | 0.47         | 0.69          | 30% | 25% |
| University of Veterinary and Pharmaceutical Sciences Brno          | 134 | 178  | 1.33  | 0.77         | 0.20         | 0.27          | 56% | 64% |
| Jan Evangelista Purkyně University in Ústí nad Labem               | 123 | 408  | 3.32  | 0.61         | 0.43         | 0.71          | 44% | 27% |
| Institute of Experimental Botany ASCR                              | 117 | 541  | 4.62  | 0.84         | 0.50         | 0.59          | 38% | 41% |
| National Institute of Public Health and regional hygienic stations | 109 | 452  | 4.15  | 0.87         | 0.36         | 0.41          | 27% | 33% |
| Institute of Physics of Materials ASCR                             | 109 | 349  | 3.20  | 0.72         | 0.48         | 0.67          | 36% | 34% |
| Institute of Photonics and Electronics ASCR                        | 103 | 1474 | 14.31 | 1.61         | 1.66         | 1.03          | 31% | 18% |
| Technical University of Liberec                                    | 101 | 240  | 2.38  | 0.72         | 0.47         | 0.65          | 48% | 45% |
| Czech University of Life Sciences Prague                           | 101 | 498  | 4.93  | 1.24         | 0.45         | 0.36          | 38% | 33% |
| Teva Czech Industries                                              | 87  | 371  | 4.26  | 0.57         | 0.28         | 0.49          | 24% | 42% |
| Biology Centre ASCR                                                | 82  | 263  | 3.21  | 0.52         | 0.32         | 0.63          | 35% | 45% |
| ASCR unresolved                                                    | 82  | 636  | 7.76  | 0.96         | 0.69         | 0.72          | 28% | 35% |
| Nuclear Research Institute Rez                                     | 74  | 179  | 2.42  | 0.72         | 0.37         | 0.51          | 42% | 49% |
| Research Institute of Inorganic Chemistry                          | 56  | 265  | 4.73  | 0.62         | 0.51         | 0.82          | 32% | 32% |
| Veterinary Research Institute                                      | 55  | 462  | 8.40  | 0.98         | 0.87         | 0.89          | 20% | 30% |
| Institute of Systems Biology and Ecology ASCR                      | 53  | 501  | 9.45  | 1.85         | 0.92         | 0.50          | 42% | 15% |
| Institute of Experimental Medicine ASCR                            | 50  | 255  | 5.10  | 0.90         | 0.46         | 0.51          | 34% | 33% |

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**Civil Engineering and Construction**

Table 34 Main bibliometric indicators for Czech institutional sectors – Civil Engineering and Construction

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 223 | 526  | 2.36 | 0.62         | 0.64         | 1.04          | 46% | 30% |
| Research organizations | 90  | 311  | 3.46 | 0.72         | 0.71         | 0.99          | 38% | 23% |
| Companies              | 28  | 105  | 3.75 | 0.95         | 0.95         | 1.00          | 64% | 34% |
| Government             | 10  | 20   | 2.00 | 0.45         | 0.23         | 0.51          | 30% | 26% |
| Hospitals              | 6   | 2    | 0.33 | 0.17         | 0.06         | 0.32          | 83% | 50% |

Table 35 Main bibliometric indicators for Czech scientific institutions – Civil Engineering and Construction

| Institute                                           | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Czech Technical University in Prague                | 104 | 228  | 2.19 | 0.72         | 0.74         | 1.02          | 45% | 26% |
| Academy of Sciences (global)                        | 74  | 173  | 2.34 | 0.50         | 0.46         | 0.92          | 35% | 24% |
| Brno University of Technology                       | 55  | 100  | 1.82 | 0.44         | 0.49         | 1.13          | 42% | 39% |
| Institute of Theoretical and Applied Mechanics ASCR | 28  | 62   | 2.21 | 0.57         | 0.48         | 0.84          | 32% | 24% |
| Charles University in Prague                        | 25  | 40   | 1.60 | 0.40         | 0.29         | 0.72          | 56% | 32% |
| University of Pardubice                             | 13  | 17   | 1.31 | 0.26         | 0.44         | 1.69          | 46% | 35% |
| Institute of Chemical Technology Prague             | 13  | 25   | 1.92 | 0.36         | 0.39         | 1.08          | 38% | 22% |
| Institute of Thermomechanics ASCR                   | 9   | 5    | 0.56 | 0.12         | 0.12         | 0.99          | 67% | 64% |
| Institute of Hydrodynamics ASCR                     | 9   | 31   | 3.44 | 0.47         | 0.51         | 1.08          | 33% | 26% |
| Tomas Bata University in Zlin                       | 8   | 21   | 2.63 | 0.43         | 0.46         | 1.08          | 25% | 16% |
| Institute of Chemical Process Fundamentals ASCR     | 8   | 42   | 5.25 | 0.73         | 0.67         | 0.92          | 25% | 13% |

**Clinical Medicine**

Table 36 Main bibliometric indicators for Czech institutional sectors – Clinical Medicine

| Sector                 | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|-------|-------|--------------|--------------|---------------|-----|-----|
| Universities           | 7547 | 47836 | 6.34  | 1.02         | 0.69         | 0.68          | 34% | 23% |
| Research organizations | 4684 | 39150 | 8.36  | 1.05         | 0.76         | 0.72          | 27% | 27% |
| Hospitals              | 3624 | 24718 | 6.82  | 1.17         | 0.69         | 0.59          | 38% | 16% |
| Government             | 472  | 4820  | 10.21 | 1.08         | 0.97         | 0.90          | 26% | 22% |
| Companies              | 291  | 1245  | 4.28  | 0.82         | 0.50         | 0.60          | 38% | 29% |
| Other                  | 47   | 967   | 20.57 | 3.93         | 2.42         | 0.62          | 32% | 10% |

Table 37 Main bibliometric indicators for Czech scientific institutions – Clinical Medicine

| Institute                    | P    | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------|------|-------|------|--------------|--------------|---------------|-----|-----|
| Charles University in Prague | 4844 | 36906 | 7.62 | 1.04         | 0.75         | 0.72          | 31% | 22% |
| Academy of Sciences (global) | 2579 | 16667 | 6.46 | 0.81         | 0.56         | 0.69          | 25% | 35% |
| Masaryk University           | 1014 | 5366  | 5.29 | 1.02         | 0.57         | 0.56          | 35% | 22% |

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| Institute                                                          | P   | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------------------------------------------|-----|------|-------|--------------|--------------|---------------|-----|-----|
| University of Veterinary and Pharmaceutical Sciences Brno          | 912 | 2189 | 2.40  | 0.94         | 0.55         | 0.59          | 42% | 34% |
| Biology Centre ASCR                                                | 751 | 3563 | 4.74  | 0.98         | 0.66         | 0.68          | 26% | 38% |
| Institute for Clinical and Experimental Medicine                   | 586 | 7489 | 12.78 | 1.37         | 1.20         | 0.88          | 28% | 15% |
| University Hospital Brno                                           | 507 | 2993 | 5.90  | 1.16         | 0.62         | 0.54          | 37% | 14% |
| Palacky University Olomouc                                         | 484 | 2643 | 5.46  | 0.97         | 0.62         | 0.63          | 41% | 17% |
| General University Hospital Prague                                 | 473 | 3391 | 7.17  | 1.21         | 0.73         | 0.61          | 34% | 19% |
| Veterinary Research Institute                                      | 464 | 1683 | 3.63  | 1.07         | 0.71         | 0.66          | 35% | 46% |
| University Hospital Motol                                          | 457 | 3149 | 6.89  | 1.03         | 0.72         | 0.70          | 34% | 20% |
| Institute of Physiology ASCR                                       | 390 | 3015 | 7.73  | 0.60         | 0.51         | 0.85          | 22% | 35% |
| Institute of Hematology and Blood Transfusion                      | 378 | 2416 | 6.39  | 0.81         | 0.46         | 0.57          | 28% | 29% |
| National Institute of Public Health and regional hygienic stations | 375 | 4105 | 10.95 | 1.04         | 0.99         | 0.95          | 22% | 23% |
| University of South Bohemia in Ceske Budejovice                    | 350 | 1529 | 4.37  | 1.18         | 0.84         | 0.71          | 27% | 35% |
| Institute of Molecular Genetics ASCR                               | 349 | 2327 | 6.67  | 0.67         | 0.39         | 0.58          | 25% | 39% |
| University Hospital Hradec Kralove                                 | 316 | 2273 | 7.19  | 1.68         | 0.80         | 0.48          | 41% | 13% |
| University Hospital Olomouc                                        | 285 | 1144 | 4.01  | 0.83         | 0.40         | 0.49          | 46% | 19% |
| Institute of Experimental Medicine ASCR                            | 256 | 2671 | 10.43 | 1.00         | 0.78         | 0.79          | 20% | 30% |
| University Hospital in Plzen                                       | 252 | 1391 | 5.52  | 1.01         | 0.64         | 0.63          | 36% | 15% |
| Masaryk Memorial Cancer Institute                                  | 220 | 3977 | 18.08 | 1.56         | 1.29         | 0.82          | 24% | 14% |
| Na Homolce Hospital                                                | 218 | 1547 | 7.10  | 1.10         | 0.72         | 0.65          | 35% | 16% |
| Institute of Endocrinology                                         | 186 | 1532 | 8.24  | 0.78         | 0.49         | 0.63          | 14% | 24% |
| St. Anne's University Hospital Brno                                | 177 | 1059 | 5.98  | 1.16         | 0.55         | 0.48          | 45% | 13% |
| Institute of Microbiology ASCR                                     | 164 | 1102 | 6.72  | 0.71         | 0.49         | 0.69          | 16% | 36% |
| University Hospital Kralovske Vinohrady                            | 163 | 1483 | 9.10  | 1.21         | 0.92         | 0.76          | 36% | 16% |
| Institute of Animal Physiology and Genetics ASCR                   | 149 | 676  | 4.54  | 0.88         | 0.51         | 0.58          | 30% | 39% |
| Mendel University in Brno                                          | 145 | 428  | 2.95  | 0.84         | 0.43         | 0.51          | 34% | 42% |
| State Veterinary Administration of the Czech Republic              | 138 | 527  | 3.82  | 1.20         | 0.76         | 0.63          | 24% | 48% |
| University Hospital Ostrava                                        | 137 | 1139 | 8.31  | 1.48         | 0.79         | 0.54          | 51% | 13% |
| University of Defense                                              | 133 | 789  | 5.93  | 1.00         | 0.60         | 0.61          | 41% | 25% |
| Institute of Biophysics ASCR                                       | 124 | 551  | 4.44  | 0.52         | 0.32         | 0.60          | 27% | 42% |
| Institute of Vertebrate Biology ASCR                               | 124 | 978  | 7.89  | 1.90         | 1.39         | 0.73          | 30% | 17% |
| Faculty Hospital Na Bulovce                                        | 121 | 1030 | 8.51  | 1.01         | 0.74         | 0.73          | 40% | 16% |
| Central Military Hospital Prague                                   | 114 | 700  | 6.14  | 1.28         | 0.65         | 0.51          | 45% | 11% |
| Institute for Postgraduate Medical Education                       | 113 | 1156 | 10.23 | 1.28         | 0.75         | 0.59          | 40% | 17% |
| Institute of Rheumatology                                          | 111 | 3554 | 32.02 | 2.30         | 2.77         | 1.21          | 15% | 15% |
| Thomayer University Hospital                                       | 100 | 356  | 3.56  | 1.06         | 0.37         | 0.35          | 57% | 13% |
| Prague Psychiatric Centre                                          | 100 | 1117 | 11.17 | 1.25         | 1.06         | 0.85          | 31% | 13% |
| Institute of Organic Chemistry and Biochemistry ASCR               | 99  | 362  | 3.66  | 0.46         | 0.24         | 0.52          | 24% | 50% |
| Czech University of Life Sciences Prague                           | 89  | 339  | 3.81  | 0.84         | 0.52         | 0.62          | 39% | 23% |
| Institute of Animal Science                                        | 87  | 417  | 4.79  | 0.75         | 0.69         | 0.93          | 33% | 30% |

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| Institute                               | P  | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------|----|------|-------|--------------|--------------|---------------|-----|-----|
| Czech Technical University in Prague    | 76 | 202  | 2.66  | 0.68         | 0.40         | 0.58          | 50% | 26% |
| ASCR unresolved                         | 63 | 1020 | 16.19 | 1.39         | 1.27         | 0.92          | 21% | 14% |
| Masaryk Hospital in Ústí nad Labem,     | 62 | 392  | 6.32  | 1.72         | 0.54         | 0.31          | 48% | 19% |
| National Radiation Protection Institute | 60 | 319  | 5.32  | 1.68         | 0.83         | 0.49          | 43% | 21% |
| Nuclear Physics Institute ASCR          | 56 | 101  | 1.80  | 0.61         | 0.21         | 0.35          | 48% | 43% |
| Institute of Chemical Technology Prague | 54 | 233  | 4.31  | 0.65         | 0.48         | 0.75          | 26% | 32% |
| Pardubice Regional Hospital             | 53 | 460  | 8.68  | 1.27         | 1.24         | 0.98          | 57% | 9%  |
| Institute of Computer Science ASCR      | 52 | 429  | 8.25  | 1.25         | 0.69         | 0.55          | 29% | 12% |

### Computer Sciences

Table 38 Main bibliometric indicators for Czech institutional sectors – Computer Sciences

| Sector                 | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 2119 | 4239 | 2.00 | 0.83         | 0.60         | 0.72          | 58% | 32% |
| Research organizations | 984  | 3898 | 3.96 | 0.98         | 0.93         | 0.95          | 48% | 28% |
| Companies              | 67   | 103  | 1.54 | 0.88         | 0.50         | 0.56          | 43% | 28% |
| Hospitals              | 23   | 22   | 0.96 | 0.47         | 0.28         | 0.59          | 52% | 39% |
| Government             | 12   | 16   | 1.33 | 0.50         | 0.21         | 0.42          | 67% | 41% |

Table 39 Main bibliometric indicators for Czech scientific institutions – Computer Sciences

| Institute                                           | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                        | 965 | 3886 | 4.03 | 0.99         | 0.94         | 0.95          | 47% | 28% |
| Charles University in Prague                        | 629 | 1522 | 2.42 | 0.81         | 0.62         | 0.77          | 54% | 31% |
| Czech Technical University in Prague                | 524 | 1018 | 1.94 | 0.90         | 0.65         | 0.72          | 58% | 27% |
| Institute of Information Theory and Automation ASCR | 402 | 1953 | 4.86 | 1.25         | 1.24         | 0.99          | 47% | 23% |
| Institute of Computer Science ASCR                  | 301 | 759  | 2.52 | 0.75         | 0.61         | 0.82          | 53% | 33% |
| Masaryk University                                  | 246 | 453  | 1.84 | 0.74         | 0.58         | 0.78          | 58% | 40% |
| Brno University of Technology                       | 174 | 167  | 0.96 | 0.54         | 0.29         | 0.54          | 72% | 35% |
| VSB-Technical University of Ostrava                 | 165 | 413  | 2.50 | 1.08         | 0.78         | 0.72          | 46% | 40% |
| University of West Bohemia in Plzen                 | 154 | 200  | 1.30 | 0.83         | 0.41         | 0.49          | 72% | 35% |
| Institute of Mathematics ASCR                       | 103 | 434  | 4.21 | 1.30         | 1.33         | 1.02          | 44% | 24% |
| Palacky University Olomouc                          | 86  | 111  | 1.29 | 0.81         | 0.69         | 0.85          | 63% | 42% |
| Silesian University in Opava                        | 58  | 155  | 2.67 | 0.95         | 0.87         | 0.91          | 43% | 25% |
| University of Economics Prague                      | 56  | 164  | 2.93 | 1.18         | 0.67         | 0.57          | 59% | 19% |
| University of Ostrava                               | 52  | 178  | 3.42 | 1.26         | 1.08         | 0.86          | 37% | 31% |

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***Creative Arts, Culture and Music***

Table 40 Main bibliometric indicators for Czech institutional sectors – Creative Arts, Culture and Music

| Sector                 | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 78 | 38   | 0.49 | 0.90         | 0.75         | 0.84          | 85% | 24% |
| Research organizations | 38 | 11   | 0.29 | 1.15         | 0.80         | 0.69          | 87% | 35% |
| Other                  | 13 | 3    | 0.23 | 1.83         | 0.81         | 0.44          | 85% | 0%  |
| Government             | 6  | 4    | 0.67 | 1.24         | 1.96         | 1.58          | 83% | 0%  |

Table 41 Main bibliometric indicators for Czech scientific institutions – Creative Arts, Culture and Music

| Institute                             | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc  | %sc |
|---------------------------------------|----|------|------|--------------|--------------|---------------|------|-----|
| Charles University in Prague          | 41 | 9    | 0.22 | 0.55         | 0.45         | 0.82          | 85%  | 36% |
| Academy of Sciences (global)          | 30 | 11   | 0.37 | 1.48         | 1.33         | 0.90          | 83%  | 35% |
| Institute of Art History of the ASCR, | 13 | 2    | 0.15 | 1.47         | 2.44         | 1.66          | 92%  | 0%  |
| ASCR unresolved                       | 10 | 1    | 0.10 | 0.60         | 0.34         | 0.56          | 90%  | 0%  |
| Masaryk University                    | 9  | 1    | 0.11 | 0.43         | 0.44         | 1.03          | 89%  | 0%  |
| Palacky University Olomouc            | 7  | 0    | 0.00 | 0.00         | 0.00         | 0.39          | 100% |     |

***Earth Sciences and Technology***

Table 42 Main bibliometric indicators for Czech institutional sectors – Earth Sciences and Technology

| Sector                 | P    | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|-------|------|--------------|--------------|---------------|-----|-----|
| Research organizations | 2232 | 10690 | 4.79 | 0.88         | 0.58         | 0.66          | 34% | 34% |
| Universities           | 1560 | 7319  | 4.69 | 0.87         | 0.68         | 0.78          | 37% | 35% |
| Other                  | 151  | 433   | 2.87 | 0.66         | 0.45         | 0.67          | 38% | 43% |
| Companies              | 126  | 581   | 4.61 | 0.90         | 0.67         | 0.74          | 44% | 27% |
| Government             | 45   | 215   | 4.78 | 1.00         | 0.45         | 0.45          | 36% | 38% |
| Hospitals              | 5    | 4     | 0.80 | 0.30         | 0.17         | 0.58          | 40% | 43% |

Table 43 Main bibliometric indicators for Czech scientific institutions – Earth Sciences and Technology

| Institute                             | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|---------------------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)          | 1779 | 7591 | 4.27 | 0.82         | 0.50         | 0.62          | 35% | 37% |
| Charles University in Prague          | 1012 | 5126 | 5.07 | 0.90         | 0.67         | 0.74          | 33% | 35% |
| Institute of Geophysics ASCR          | 483  | 2271 | 4.70 | 0.77         | 0.45         | 0.58          | 29% | 39% |
| Czech Geological Survey               | 427  | 2762 | 6.47 | 1.04         | 0.91         | 0.88          | 30% | 29% |
| Institute of Atmospheric Physics ASCR | 364  | 1294 | 3.55 | 0.85         | 0.40         | 0.47          | 35% | 41% |
| Institute of Geology ASCR             | 329  | 1184 | 3.60 | 0.77         | 0.56         | 0.72          | 38% | 36% |
| Masaryk University                    | 181  | 828  | 4.57 | 0.88         | 0.68         | 0.76          | 34% | 36% |
| Astronomical Institute ASCR           | 178  | 469  | 2.63 | 0.80         | 0.26         | 0.32          | 49% | 39% |

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| Institute                                       | P   | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-------------------------------------------------|-----|------|-------|--------------|--------------|---------------|-----|-----|
| Institute of Rock Structure and Mechanics ASCR  | 133 | 274  | 2.06  | 0.70         | 0.39         | 0.55          | 55% | 37% |
| VSB-Technical University of Ostrava             | 97  | 290  | 2.99  | 0.95         | 0.75         | 0.79          | 62% | 26% |
| National Museum                                 | 97  | 201  | 2.07  | 0.63         | 0.38         | 0.61          | 44% | 46% |
| Czech Hydrometeorological Institute             | 79  | 471  | 5.96  | 0.96         | 0.87         | 0.91          | 30% | 28% |
| University of South Bohemia in Ceske Budejovice | 75  | 593  | 7.91  | 0.88         | 1.10         | 1.25          | 21% | 32% |
| Czech Technical University in Prague            | 71  | 134  | 1.89  | 0.46         | 0.35         | 0.76          | 59% | 32% |
| Biology Centre ASCR                             | 67  | 873  | 13.03 | 0.94         | 1.34         | 1.43          | 15% | 32% |

**Economics and Business**

Table 44 Main bibliometric indicators for Czech institutional sectors – Economics and Business

| Sector                 | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 1011 | 718  | 0.71 | 0.96         | 0.17         | 0.18          | 69% | 25% |
| Research organizations | 345  | 794  | 2.30 | 0.93         | 0.42         | 0.45          | 51% | 18% |
| Government             | 243  | 235  | 0.97 | 1.29         | 0.18         | 0.14          | 61% | 25% |
| Companies              | 119  | 92   | 0.77 | 0.84         | 0.12         | 0.15          | 65% | 21% |
| Other                  | 18   | 6    | 0.33 | 0.72         | 0.06         | 0.08          | 72% | 33% |

Table 45 Main bibliometric indicators for Czech scientific institutions – Economics and Business

| Institute                                                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| University of Economics Prague                            | 435 | 195  | 0.45 | 0.76         | 0.08         | 0.11          | 72% | 36% |
| Academy of Sciences (global)                              | 267 | 691  | 2.59 | 0.88         | 0.45         | 0.51          | 48% | 18% |
| Charles University in Prague                              | 254 | 331  | 1.30 | 1.33         | 0.31         | 0.23          | 63% | 17% |
| CERGE-Economics Institute ASCR                            | 223 | 604  | 2.71 | 0.83         | 0.47         | 0.56          | 46% | 18% |
| Czech National Bank                                       | 207 | 202  | 0.98 | 1.35         | 0.18         | 0.13          | 61% | 25% |
| VSB-Technical University of Ostrava                       | 68  | 44   | 0.65 | 1.10         | 0.12         | 0.11          | 71% | 35% |
| Mendel University in Brno                                 | 57  | 62   | 1.09 | 0.78         | 0.76         | 0.97          | 54% | 17% |
| Czech University of Life Sciences Prague                  | 57  | 47   | 0.82 | 1.00         | 1.52         | 1.52          | 58% | 22% |
| Masaryk University                                        | 49  | 12   | 0.24 | 0.42         | 0.06         | 0.14          | 80% | 33% |
| KOMERCNI BANKA AS                                         | 42  | 34   | 0.81 | 1.34         | 0.13         | 0.10          | 67% | 24% |
| Institute of Agricultural Economics and Information Praha | 34  | 42   | 1.24 | 1.20         | 0.33         | 0.28          | 68% | 29% |

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**Educational Sciences**

Table 46 Main bibliometric indicators for Czech institutional sectors – Educational Sciences

| Sector                 | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 61 | 41   | 0.67 | 0.48         | 0.20         | 0.42          | 72% | 36% |
| Research organizations | 12 | 26   | 2.17 | 0.49         | 0.36         | 0.73          | 33% | 19% |

Table 47 Main bibliometric indicators for Czech scientific institutions – Educational Sciences

| Institute                    | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc  | %sc  |
|------------------------------|----|------|------|--------------|--------------|---------------|------|------|
| Charles University in Prague | 23 | 22   | 0.96 | 0.57         | 0.23         | 0.41          | 65%  | 29%  |
| Academy of Sciences (global) | 12 | 26   | 2.17 | 0.49         | 0.36         | 0.73          | 33%  | 19%  |
| Masaryk University           | 10 | 9    | 0.90 | 0.64         | 0.22         | 0.34          | 70%  | 44%  |
| Palacky University Olomouc   | 9  | 7    | 0.78 | 0.31         | 0.16         | 0.52          | 56%  | 22%  |
| University of Ostrava        | 7  | 0    | 0.00 | 0.00         | 0.00         | 0.04          | 100% | 100% |
| Institute of Sociology ASCR  | 5  | 14   | 2.80 | 0.45         | 0.71         | 1.59          | 60%  | 18%  |

**Electrical Engineering and Telecommunication**

Table 48 Main bibliometric indicators for Czech institutional sectors – Electrical Engineering and Telecommunication

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 896 | 1776 | 1.98 | 0.64         | 0.54         | 0.84          | 55% | 36% |
| Research organizations | 594 | 2455 | 4.13 | 0.77         | 0.83         | 1.08          | 43% | 31% |
| Companies              | 82  | 140  | 1.71 | 0.81         | 0.50         | 0.62          | 56% | 36% |

Table 49 Main bibliometric indicators for Czech scientific institutions – Electrical Engineering and Telecommunication

| Institute                                           | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                        | 581 | 2435 | 4.19 | 0.77         | 0.84         | 1.08          | 43% | 31% |
| Czech Technical University in Prague                | 368 | 990  | 2.69 | 0.72         | 0.79         | 1.11          | 49% | 29% |
| Institute of Information Theory and Automation ASCR | 199 | 1469 | 7.38 | 0.86         | 1.54         | 1.80          | 33% | 22% |
| Brno University of Technology                       | 183 | 237  | 1.30 | 0.65         | 0.37         | 0.57          | 64% | 34% |
| Institute of Physics ASCR                           | 172 | 338  | 1.97 | 0.59         | 0.35         | 0.60          | 52% | 50% |
| Charles University in Prague                        | 131 | 310  | 2.37 | 0.61         | 0.47         | 0.76          | 46% | 47% |
| Institute of Photonics and Electronics ASCR         | 104 | 398  | 3.83 | 0.87         | 0.81         | 0.92          | 37% | 34% |
| University of West Bohemia in Plzen                 | 42  | 31   | 0.74 | 0.54         | 0.29         | 0.54          | 81% | 35% |
| University of Pardubice                             | 38  | 28   | 0.74 | 0.43         | 0.29         | 0.67          | 63% | 62% |
| Institute of Chemical Technology Prague             | 36  | 25   | 0.69 | 0.25         | 0.17         | 0.65          | 67% | 61% |
| Masaryk University                                  | 28  | 75   | 2.68 | 0.60         | 0.43         | 0.72          | 39% | 34% |

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**Energy Science and Technology**

Table 50 Main bibliometric indicators for Czech institutional sectors – Energy Science and Technology

| Sector                 | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Research organizations | 1161 | 3351 | 2.89 | 0.92         | 0.60         | 0.65          | 45% | 54% |
| Universities           | 964  | 2174 | 2.26 | 0.79         | 0.48         | 0.61          | 51% | 58% |
| Companies              | 212  | 503  | 2.37 | 0.99         | 0.64         | 0.65          | 50% | 45% |
| Government             | 41   | 120  | 2.93 | 0.64         | 0.40         | 0.62          | 39% | 34% |
| Hospitals              | 22   | 31   | 1.41 | 0.35         | 0.21         | 0.61          | 45% | 42% |

Table 51 Main bibliometric indicators for Czech scientific institutions – Energy Science and Technology

| Institute                                      | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                   | 1019 | 3055 | 3.00 | 0.94         | 0.63         | 0.67          | 44% | 55% |
| Nuclear Physics Institute ASCR                 | 400  | 842  | 2.11 | 0.67         | 0.39         | 0.58          | 45% | 53% |
| Czech Technical University in Prague           | 320  | 676  | 2.11 | 0.79         | 0.44         | 0.56          | 52% | 59% |
| Institute of Physics ASCR                      | 292  | 1276 | 4.37 | 1.49         | 0.94         | 0.63          | 41% | 62% |
| Charles University in Prague                   | 277  | 905  | 3.27 | 1.12         | 0.63         | 0.57          | 42% | 70% |
| Institute of Chemical Technology Prague        | 221  | 422  | 1.91 | 0.71         | 0.35         | 0.49          | 54% | 52% |
| University of West Bohemia in Plzen            | 78   | 27   | 0.35 | 0.29         | 0.08         | 0.28          | 82% | 73% |
| Nuclear Research Institute Rez                 | 75   | 125  | 1.67 | 0.80         | 0.48         | 0.60          | 52% | 42% |
| Brno University of Technology                  | 65   | 192  | 2.95 | 0.68         | 0.79         | 1.16          | 43% | 25% |
| VSB-Technical University of Ostrava            | 63   | 95   | 1.51 | 0.86         | 0.84         | 0.98          | 71% | 21% |
| Institute of Rock Structure and Mechanics ASCR | 61   | 87   | 1.43 | 0.51         | 0.49         | 0.97          | 67% | 30% |
| National Radiation Protection Institute        | 59   | 57   | 0.97 | 0.79         | 0.26         | 0.32          | 61% | 46% |
| Institute of Plasma Physics ASCR               | 54   | 77   | 1.43 | 0.89         | 0.75         | 0.85          | 65% | 58% |

**Environmental Sciences and Technology**

Table 52 Main bibliometric indicators for Czech institutional sectors – Environmental Sciences and Technology

| Sector                 | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|------|-------|-------|--------------|--------------|---------------|-----|-----|
| Universities           | 2125 | 12630 | 5.94  | 0.89         | 0.82         | 0.92          | 32% | 26% |
| Research organizations | 1895 | 14775 | 7.80  | 0.89         | 0.87         | 0.98          | 25% | 28% |
| Companies              | 193  | 1101  | 5.70  | 0.93         | 0.76         | 0.82          | 33% | 27% |
| Government             | 160  | 1647  | 10.29 | 1.04         | 1.11         | 1.07          | 23% | 23% |
| Other                  | 57   | 293   | 5.14  | 0.75         | 0.68         | 0.91          | 28% | 25% |
| Hospitals              | 34   | 239   | 7.03  | 1.03         | 0.91         | 0.88          | 41% | 15% |

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Table 53 Main bibliometric indicators for Czech scientific institutions – Environmental Sciences and Technology

| Institute                                                          | P    | C-sc  | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------------------------------------------|------|-------|-------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                                       | 1555 | 12319 | 7.92  | 0.89         | 0.87         | 0.99          | 24% | 29% |
| Charles University in Prague                                       | 522  | 2854  | 5.47  | 0.85         | 0.89         | 1.05          | 36% | 28% |
| University of South Bohemia in Ceske Budejovice                    | 442  | 3669  | 8.30  | 0.93         | 0.99         | 1.07          | 22% | 27% |
| Biology Centre ASCR                                                | 388  | 3978  | 10.25 | 0.89         | 0.86         | 0.97          | 15% | 28% |
| Masaryk University                                                 | 341  | 2121  | 6.22  | 1.04         | 1.04         | 1.00          | 29% | 29% |
| Institute of Botany ASCR                                           | 308  | 2490  | 8.08  | 1.05         | 1.09         | 1.04          | 20% | 25% |
| Institute of Chemical Technology Prague                            | 254  | 1588  | 6.25  | 0.79         | 0.73         | 0.93          | 25% | 20% |
| Mendel University in Brno                                          | 170  | 919   | 5.41  | 1.12         | 0.59         | 0.53          | 41% | 32% |
| Institute of Systems Biology and Ecology ASCR                      | 150  | 850   | 5.67  | 0.81         | 0.61         | 0.75          | 32% | 30% |
| Czech University of Life Sciences Prague                           | 120  | 492   | 4.10  | 1.03         | 0.78         | 0.75          | 44% | 30% |
| Czech Technical University in Prague                               | 118  | 354   | 3.00  | 0.63         | 0.47         | 0.75          | 46% | 23% |
| Palacky University Olomouc                                         | 114  | 637   | 5.59  | 0.92         | 0.76         | 0.83          | 38% | 22% |
| Czech Geological Survey                                            | 103  | 983   | 9.54  | 0.83         | 0.99         | 1.18          | 17% | 35% |
| National Institute of Public Health and regional hygienic stations | 98   | 1353  | 13.81 | 1.07         | 1.29         | 1.20          | 15% | 22% |
| Institute of Vertebrate Biology ASCR                               | 90   | 551   | 6.12  | 0.90         | 0.85         | 0.94          | 28% | 38% |
| Institute of Chemical Process Fundamentals ASCR                    | 83   | 500   | 6.02  | 0.52         | 0.66         | 1.27          | 22% | 31% |
| Institute of Microbiology ASCR                                     | 82   | 442   | 5.39  | 0.79         | 0.78         | 0.98          | 23% | 29% |
| J. Heyrovsky Institute of Physical Chemistry ASCR                  | 65   | 709   | 10.91 | 0.83         | 1.41         | 1.69          | 15% | 20% |
| Institute of Organic Chemistry and Biochemistry ASCR               | 62   | 381   | 6.15  | 0.74         | 0.51         | 0.69          | 19% | 44% |
| Nuclear Physics Institute ASCR                                     | 62   | 185   | 2.98  | 0.67         | 0.40         | 0.60          | 44% | 32% |
| Brno University of Technology                                      | 58   | 138   | 2.38  | 0.54         | 0.39         | 0.72          | 38% | 23% |
| National Radiation Protection Institute                            | 55   | 85    | 1.55  | 0.77         | 0.32         | 0.42          | 53% | 38% |
| Crop Research Institute                                            | 50   | 178   | 3.56  | 0.58         | 0.49         | 0.84          | 28% | 41% |

### *General and Industrial Engineering*

Table 54 Main bibliometric indicators for Czech institutional sectors – General and Industrial Engineering

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 220 | 453  | 2.06 | 0.69         | 0.62         | 0.90          | 47% | 34% |
| Research organizations | 119 | 309  | 2.60 | 0.68         | 0.78         | 1.15          | 45% | 35% |
| Companies              | 30  | 45   | 1.50 | 0.56         | 0.43         | 0.77          | 33% | 20% |

Table 55 Main bibliometric indicators for Czech scientific institutions – General and Industrial Engineering

| Institute                    | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global) | 113 | 305  | 2.70 | 0.68         | 0.80         | 1.18          | 43% | 34% |

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| Institute                                | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------|----|------|------|--------------|--------------|---------------|-----|-----|
| Czech Technical University in Prague     | 59 | 123  | 2.08 | 0.89         | 0.70         | 0.78          | 53% | 39% |
| Brno University of Technology            | 41 | 86   | 2.10 | 0.71         | 0.55         | 0.78          | 46% | 17% |
| VSB-Technical University of Ostrava      | 41 | 97   | 2.37 | 0.62         | 0.62         | 1.00          | 46% | 34% |
| Charles University in Prague             | 38 | 89   | 2.34 | 0.66         | 0.78         | 1.17          | 45% | 41% |
| Institute of Physics ASCR                | 21 | 76   | 3.62 | 0.95         | 1.44         | 1.51          | 52% | 24% |
| Institute of Mathematics ASCR            | 19 | 43   | 2.26 | 0.40         | 0.54         | 1.35          | 58% | 40% |
| University of West Bohemia in Plzen      | 16 | 38   | 2.38 | 0.66         | 0.66         | 1.00          | 31% | 16% |
| Institute of Scientific Instruments ASCR | 15 | 37   | 2.47 | 1.05         | 0.93         | 0.88          | 47% | 34% |
| Institute of Physics of Materials ASCR   | 12 | 28   | 2.33 | 0.85         | 0.57         | 0.67          | 17% | 48% |
| Institute of Thermomechanics ASCR        | 11 | 13   | 1.18 | 0.26         | 0.37         | 1.42          | 64% | 35% |

### Health Sciences

Table 56 Main bibliometric indicators for Czech institutional sectors – Health Sciences

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 185 | 853  | 4.61 | 0.66         | 0.51         | 0.78          | 32% | 24% |
| Research organizations | 89  | 418  | 4.70 | 0.60         | 0.51         | 0.85          | 26% | 28% |
| Hospitals              | 69  | 365  | 5.29 | 0.56         | 0.59         | 1.06          | 28% | 26% |
| Government             | 16  | 22   | 1.38 | 0.33         | 0.17         | 0.51          | 56% | 15% |
| Companies              | 5   | 22   | 4.40 | 0.67         | 0.53         | 0.79          | 60% | 19% |

Table 57 Main bibliometric indicators for Czech scientific institutions – Health Sciences

| Institute                                    | P   | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|----------------------------------------------|-----|------|-------|--------------|--------------|---------------|-----|-----|
| Charles University in Prague                 | 135 | 724  | 5.36  | 0.72         | 0.56         | 0.78          | 28% | 23% |
| Academy of Sciences (global)                 | 58  | 274  | 4.72  | 0.57         | 0.50         | 0.88          | 24% | 30% |
| Masaryk University                           | 22  | 86   | 3.91  | 0.39         | 0.33         | 0.84          | 36% | 36% |
| Institute of Computer Science ASCR           | 20  | 37   | 1.85  | 0.47         | 0.33         | 0.70          | 30% | 21% |
| Prague Psychiatric Centre                    | 20  | 133  | 6.65  | 0.54         | 0.52         | 0.97          | 15% | 30% |
| Palacky University Olomouc                   | 19  | 51   | 2.68  | 0.87         | 0.59         | 0.68          | 53% | 14% |
| Institute for Postgraduate Medical Education | 12  | 97   | 8.08  | 0.99         | 1.00         | 1.01          | 33% | 28% |
| Institute of Experimental Medicine ASCR      | 11  | 86   | 7.82  | 0.77         | 0.96         | 1.25          | 27% | 26% |
| Institute of Physiology ASCR                 | 10  | 48   | 4.80  | 0.33         | 0.28         | 0.85          | 20% | 38% |
| Faculty Hospital Na Bulovce                  | 9   | 118  | 13.11 | 0.72         | 1.07         | 1.49          | 22% | 27% |

### History, Philosophy and Religion

Table 58 Main bibliometric indicators for Czech institutional sectors – History, Philosophy and Religion

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 356 | 113  | 0.32 | 0.59         | 0.26         | 0.45          | 80% | 34% |
| Research organizations | 235 | 140  | 0.60 | 0.82         | 0.43         | 0.53          | 73% | 31% |
| Other                  | 28  | 41   | 1.46 | 1.03         | 0.89         | 0.86          | 64% | 23% |

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| Sector     | P | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------|---|------|------|--------------|--------------|---------------|-----|-----|
| Hospitals  | 7 | 7    | 1.00 | 0.44         | 0.49         | 1.14          | 57% | 36% |
| Government | 5 | 2    | 0.40 | 0.43         | 0.25         | 0.59          | 80% | 0%  |

Table 59 Main bibliometric indicators for Czech scientific institutions – History, Philosophy and Religion

| Institute                                       | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                    | 217 | 134  | 0.62 | 0.91         | 0.47         | 0.51          | 73% | 31% |
| Institute of Philosophy ASCR                    | 165 | 51   | 0.31 | 1.23         | 0.28         | 0.23          | 78% | 34% |
| Charles University in Prague                    | 153 | 52   | 0.34 | 0.47         | 0.25         | 0.54          | 78% | 36% |
| Masaryk University                              | 82  | 29   | 0.35 | 0.70         | 0.30         | 0.43          | 76% | 37% |
| Palacky University Olomouc                      | 47  | 8    | 0.17 | 0.41         | 0.18         | 0.43          | 87% | 11% |
| Institute of Archaeology ASCR                   | 21  | 48   | 2.29 | 0.76         | 0.99         | 1.30          | 57% | 24% |
| University of South Bohemia in Ceske Budejovice | 20  | 2    | 0.10 | 0.60         | 0.19         | 0.31          | 90% | 33% |
| VSB-Technical University of Ostrava             | 14  | 3    | 0.21 | 1.24         | 0.17         | 0.14          | 86% | 67% |
| University of Economics Prague                  | 13  | 4    | 0.31 | 1.09         | 0.19         | 0.18          | 77% | 0%  |
| University of West Bohemia in Plzen             | 10  | 3    | 0.30 | 0.47         | 0.50         | 1.06          | 70% | 50% |

**Information and Communication Sciences**

Table 60 Main bibliometric indicators for Czech institutional sectors – Information and Communication Sciences

| Sector       | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------|----|------|------|--------------|--------------|---------------|-----|-----|
| Universities | 27 | 78   | 2.89 | 0.75         | 0.72         | 0.96          | 48% | 24% |
| Government   | 6  | 18   | 3.00 | 0.73         | 0.94         | 1.29          | 50% | 0%  |

Table 61 Main bibliometric indicators for Czech scientific institutions – Information and Communication Sciences

| Institute                    | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------|----|------|------|--------------|--------------|---------------|-----|-----|
| Charles University in Prague | 10 | 47   | 4.70 | 0.93         | 0.69         | 0.74          | 40% | 22% |
| Masaryk University           | 7  | 3    | 0.43 | 0.33         | 0.52         | 1.59          | 86% | 67% |

### ***Instruments and Instrumentation***

Table 62 Main bibliometric indicators for Czech institutional sectors – Instruments and Instrumentation

| <b>Sector</b>          | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Research organizations | 765      | 3416        | 4.47       | 1.00                 | 0.77                 | 0.77                  | 36%        | 54%        |
| Universities           | 703      | 2749        | 3.91       | 0.91                 | 0.82                 | 0.90                  | 39%        | 53%        |
| Companies              | 50       | 271         | 5.42       | 1.39                 | 1.03                 | 0.74                  | 32%        | 40%        |
| Government             | 16       | 28          | 1.75       | 0.74                 | 0.32                 | 0.44                  | 44%        | 50%        |
| Hospitals              | 8        | 15          | 1.88       | 0.65                 | 0.47                 | 0.72                  | 38%        | 52%        |

Table 63 Main bibliometric indicators for Czech scientific institutions – Instruments and Instrumentation

| <b>Institute</b>                            | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|---------------------------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Academy of Sciences (global)                | 697      | 3243        | 4.65       | 1.02                 | 0.80                 | 0.78                  | 35%        | 54%        |
| Czech Technical University in Prague        | 296      | 984         | 3.32       | 1.07                 | 0.91                 | 0.85                  | 46%        | 51%        |
| Institute of Physics ASCR                   | 234      | 1284        | 5.49       | 1.34                 | 0.96                 | 0.72                  | 32%        | 65%        |
| Charles University in Prague                | 215      | 904         | 4.20       | 1.08                 | 0.77                 | 0.71                  | 31%        | 69%        |
| Nuclear Physics Institute ASCR              | 149      | 312         | 2.09       | 0.63                 | 0.37                 | 0.59                  | 45%        | 61%        |
| Institute of Scientific Instruments ASCR    | 79       | 170         | 2.15       | 0.57                 | 0.46                 | 0.80                  | 42%        | 51%        |
| Institute of Photonics and Electronics ASCR | 78       | 883         | 11.32      | 1.38                 | 1.84                 | 1.33                  | 23%        | 22%        |
| Masaryk University                          | 75       | 600         | 8.00       | 0.94                 | 1.14                 | 1.21                  | 31%        | 34%        |
| Institute of Chemical Technology Prague     | 67       | 368         | 5.49       | 1.02                 | 0.94                 | 0.92                  | 31%        | 32%        |
| Brno University of Technology               | 59       | 150         | 2.54       | 0.64                 | 0.64                 | 0.99                  | 47%        | 50%        |
| Czech Metrology Institute                   | 42       | 37          | 0.88       | 0.33                 | 0.20                 | 0.59                  | 64%        | 57%        |

### ***Language and Linguistics***

Table 64 Main bibliometric indicators for Czech institutional sectors – Language and Linguistics

| <b>Sector</b>          | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Universities           | 27       | 24          | 0.89       | 0.49                 | 0.55                 | 1.12                  | 81%        | 17%        |
| Research organizations | 11       | 19          | 1.73       | 0.96                 | 0.70                 | 0.73                  | 73%        | 5%         |

Table 65 Main bibliometric indicators for Czech scientific institutions – Language and Linguistics

| <b>Institute</b>                     | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|--------------------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Charles University in Prague         | 13       | 6           | 0.46       | 0.20                 | 0.19                 | 0.94                  | 77%        | 0%         |
| Academy of Sciences (global)         | 10       | 4           | 0.40       | 0.27                 | 0.19                 | 0.69                  | 80%        | 20%        |
| Institute of the Czech Language ASCR | 9        | 4           | 0.44       | 0.27                 | 0.19                 | 0.69                  | 78%        | 0%         |
| Masaryk University                   | 9        | 2           | 0.22       | 2.64                 | 0.48                 | 0.18                  | 89%        | 33%        |
| Palacky University Olomouc           | 6        | 16          | 2.67       | 0.86                 | 1.84                 | 2.13                  | 83%        | 24%        |

### ***Law and Criminology***

Table 66 Main bibliometric indicators for Czech institutional sectors – Law and Criminology

| <b>Sector</b>          | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Universities           | 47       | 181         | 3.85       | 0.73                 | 0.71                 | 0.98                  | 34%        | 10%        |
| Government             | 12       | 71          | 5.92       | 1.22                 | 1.27                 | 1.04                  | 17%        | 24%        |
| Hospitals              | 6        | 30          | 5.00       | 0.75                 | 0.86                 | 1.14                  | 17%        | 14%        |
| Research organizations | 5        | 41          | 8.20       | 1.14                 | 1.12                 | 0.98                  | 20%        | 18%        |

Table 67 Main bibliometric indicators for Czech scientific institutions – Law and Criminology

| <b>Institute</b>                        | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|-----------------------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Charles University in Prague            | 28       | 103         | 3.68       | 0.87                 | 0.78                 | 0.89                  | 29%        | 13%        |
| Institute of Criminalistics Praha       | 11       | 70          | 6.36       | 1.21                 | 1.41                 | 1.17                  | 18%        | 25%        |
| Institute of Chemical Technology Prague | 6        | 31          | 5.17       | 0.75                 | 0.77                 | 1.03                  | 17%        | 9%         |
| General University Hospital Prague      | 5        | 11          | 2.20       | 0.36                 | 0.37                 | 1.04                  | 20%        | 21%        |
| Masaryk University                      | 5        | 15          | 3.00       | 0.88                 | 0.73                 | 0.83                  | 60%        | 12%        |
| Palacky University Olomouc              | 5        | 14          | 2.80       | 0.61                 | 0.35                 | 0.57                  | 40%        | 13%        |

### ***Literature***

Table 68 Main bibliometric indicators for Czech institutional sectors – Literature

| <b>Sector</b>          | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Universities           | 224      | 34          | 0.15       | 0.99                 | 0.78                 | 0.79                  | 90%        | 36%        |
| Research organizations | 91       | 18          | 0.20       | 1.05                 | 0.98                 | 0.94                  | 86%        | 28%        |

Table 69 Main bibliometric indicators for Czech scientific institutions – Literature

| <b>Institute</b>                                | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|-------------------------------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Charles University in Prague                    | 124      | 21          | 0.17       | 1.11                 | 0.95                 | 0.85                  | 89%        | 40%        |
| Academy of Sciences (global)                    | 90       | 18          | 0.20       | 1.05                 | 0.98                 | 0.94                  | 86%        | 28%        |
| Institute of Czech Literature ASCR              | 81       | 17          | 0.21       | 1.12                 | 1.08                 | 0.96                  | 85%        | 29%        |
| Masaryk University                              | 37       | 7           | 0.19       | 1.20                 | 0.80                 | 0.67                  | 92%        | 22%        |
| University of South Bohemia in Ceske Budejovice | 20       | 2           | 0.10       | 0.90                 | 0.67                 | 0.74                  | 90%        | 50%        |
| Palacky University Olomouc                      | 17       | 0           | 0.00       | 0.00                 | 0.00                 | 0.52                  | 100%       |            |
| University of Ostrava                           | 12       | 3           | 0.25       | 1.32                 | 0.94                 | 0.71                  | 83%        | 25%        |
| University of Hradec Kralove                    | 7        | 0           | 0.00       | 0.00                 | 0.00                 | 1.11                  | 100%       |            |

### ***Management and Planning***

Table 70 Main bibliometric indicators for Czech institutional sectors – Management and Planning

| <b>Sector</b>          | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Universities           | 165      | 478         | 2.90       | 1.00                 | 0.95                 | 0.95                  | 58%        | 27%        |
| Research organizations | 72       | 302         | 4.19       | 1.00                 | 0.91                 | 0.91                  | 40%        | 24%        |
| Companies              | 6        | 22          | 3.67       | 0.75                 | 0.45                 | 0.60                  | 17%        | 8%         |

Table 71 Main bibliometric indicators for Czech scientific institutions – Management and Planning

| <b>Institute</b>                                    | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|-----------------------------------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Academy of Sciences (global)                        | 69       | 301         | 4.36       | 1.01                 | 0.93                 | 0.92                  | 39%        | 24%        |
| Charles University in Prague                        | 44       | 287         | 6.52       | 1.20                 | 1.33                 | 1.11                  | 41%        | 26%        |
| Institute of Information Theory and Automation ASCR | 31       | 107         | 3.45       | 0.82                 | 0.87                 | 1.07                  | 39%        | 26%        |
| VSB-Technical University of Ostrava                 | 18       | 68          | 3.78       | 0.99                 | 0.84                 | 0.85                  | 33%        | 38%        |
| Technical University of Liberec                     | 18       | 5           | 0.28       | 0.41                 | 0.20                 | 0.48                  | 78%        | 17%        |
| Institute of Computer Science ASCR                  | 17       | 75          | 4.41       | 0.88                 | 0.77                 | 0.88                  | 29%        | 23%        |
| Czech Technical University in Prague                | 14       | 19          | 1.36       | 0.42                 | 0.42                 | 0.98                  | 43%        | 41%        |
| University of Pardubice                             | 13       | 0           | 0.00       | 0.00                 | 0.00                 | 0.18                  | 100%       | 100%       |
| University of Hradec Kralove                        | 11       | 2           | 0.18       | 0.20                 | 0.22                 | 1.12                  | 91%        | 78%        |
| Institute of Mathematics ASCR                       | 10       | 60          | 6.00       | 1.96                 | 1.59                 | 0.81                  | 40%        | 34%        |
| Masaryk University                                  | 9        | 1           | 0.11       | 0.38                 | 0.23                 | 0.60                  | 89%        | 50%        |
| University of Economics Prague                      | 9        | 30          | 3.33       | 1.26                 | 0.99                 | 0.79                  | 56%        | 3%         |

### ***Mathematics and Statistical Sciences***

Table 72 Main bibliometric indicators for Czech institutional sectors – Mathematics and Statistical Sciences

| <b>Sector</b>          | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Universities           | 3082     | 7382        | 2.40       | 0.97                 | 0.81                 | 0.83                  | 51%        | 36%        |
| Research organizations | 1580     | 5680        | 3.59       | 1.15                 | 0.98                 | 0.85                  | 43%        | 33%        |
| Companies              | 14       | 13          | 0.93       | 0.27                 | 0.22                 | 0.82                  | 50%        | 48%        |
| Hospitals              | 6        | 2           | 0.33       | 0.15                 | 0.09                 | 0.60                  | 67%        | 71%        |

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Table 73 Main bibliometric indicators for Czech scientific institutions – Mathematics and Statistical Sciences

| Institute                                           | P    | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------|------|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                        | 1572 | 5679 | 3.61 | 1.15         | 0.99         | 0.86          | 42% | 33% |
| Charles University in Prague                        | 1498 | 3893 | 2.60 | 1.00         | 0.89         | 0.89          | 49% | 35% |
| Institute of Mathematics ASCR                       | 864  | 2494 | 2.89 | 1.12         | 1.00         | 0.89          | 46% | 34% |
| Czech Technical University in Prague                | 323  | 695  | 2.15 | 0.97         | 0.65         | 0.67          | 56% | 35% |
| Masaryk University                                  | 322  | 601  | 1.87 | 0.83         | 0.66         | 0.80          | 46% | 41% |
| Palacky University Olomouc                          | 268  | 460  | 1.72 | 0.97         | 0.74         | 0.76          | 61% | 42% |
| Institute of Computer Science ASCR                  | 245  | 1214 | 4.96 | 1.31         | 1.42         | 1.08          | 35% | 29% |
| Institute of Information Theory and Automation ASCR | 231  | 1198 | 5.19 | 1.40         | 1.17         | 0.84          | 33% | 32% |
| University of West Bohemia in Plzen                 | 201  | 620  | 3.08 | 1.26         | 1.10         | 0.88          | 53% | 25% |
| VSB-Technical University of Ostrava                 | 158  | 488  | 3.09 | 1.20         | 1.20         | 1.00          | 46% | 40% |
| Brno University of Technology                       | 145  | 202  | 1.39 | 0.57         | 0.39         | 0.68          | 58% | 45% |
| Silesian University in Opava                        | 88   | 227  | 2.58 | 0.91         | 0.82         | 0.90          | 40% | 30% |
| Institute of Thermomechanics ASCR                   | 64   | 90   | 1.41 | 0.60         | 0.35         | 0.58          | 69% | 20% |
| Technical University of Liberec                     | 52   | 73   | 1.40 | 0.87         | 0.57         | 0.65          | 63% | 24% |

***Mechanical Engineering and Aerospace***

Table 74 Main bibliometric indicators for Czech institutional sectors – Mechanical Engineering and Aerospace

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 486 | 1185 | 2.44 | 0.72         | 0.53         | 0.73          | 48% | 38% |
| Research organizations | 408 | 1254 | 3.07 | 0.73         | 0.65         | 0.88          | 47% | 33% |
| Companies              | 49  | 129  | 2.63 | 0.64         | 0.56         | 0.88          | 39% | 32% |
| Hospitals              | 6   | 16   | 2.67 | 0.85         | 0.84         | 0.98          | 33% | 30% |

Table 75 Main bibliometric indicators for Czech scientific institutions – Mechanical Engineering and Aerospace

| Institute                                           | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                        | 397 | 1193 | 3.01 | 0.71         | 0.63         | 0.88          | 47% | 33% |
| Czech Technical University in Prague                | 168 | 254  | 1.51 | 0.55         | 0.34         | 0.62          | 58% | 43% |
| Charles University in Prague                        | 101 | 375  | 3.71 | 1.12         | 0.72         | 0.64          | 44% | 37% |
| Brno University of Technology                       | 88  | 294  | 3.34 | 0.92         | 0.79         | 0.87          | 35% | 29% |
| Institute of Thermomechanics ASCR                   | 83  | 127  | 1.53 | 0.51         | 0.35         | 0.68          | 54% | 34% |
| Institute of Mathematics ASCR                       | 63  | 105  | 1.67 | 0.47         | 0.35         | 0.74          | 68% | 40% |
| Institute of Physics ASCR                           | 50  | 268  | 5.36 | 1.01         | 0.93         | 0.92          | 30% | 36% |
| Institute of Chemical Process Fundamentals ASCR     | 40  | 142  | 3.55 | 0.61         | 0.76         | 1.25          | 35% | 26% |
| Institute of Theoretical and Applied Mechanics ASCR | 34  | 103  | 3.03 | 0.74         | 0.61         | 0.83          | 44% | 27% |

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| Institute                               | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|-----------------------------------------|----|------|------|--------------|--------------|---------------|-----|-----|
| Institute of Physics of Materials ASCR  | 34 | 161  | 4.74 | 1.54         | 1.03         | 0.67          | 26% | 34% |
| Institute of Chemical Technology Prague | 27 | 44   | 1.63 | 0.33         | 0.27         | 0.82          | 44% | 59% |
| Institute of Hydrodynamics ASCR         | 27 | 90   | 3.33 | 0.71         | 0.77         | 1.10          | 48% | 36% |

**Multidisciplinary Journals**

Table 76 Main bibliometric indicators for Czech institutional sectors – Multidisciplinary Journals

| Sector                 | P   | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|-------|--------------|--------------|---------------|-----|-----|
| Research organizations | 239 | 5638 | 23.59 | 0.66         | 0.66         | 1.00          | 17% | 22% |
| Universities           | 227 | 5843 | 25.74 | 0.73         | 0.87         | 1.19          | 24% | 22% |
| Hospitals              | 14  | 578  | 41.29 | 1.49         | 1.23         | 0.83          | 7%  | 20% |
| Government             | 11  | 227  | 20.64 | 0.71         | 1.17         | 1.64          | 27% | 17% |
| Other                  | 7   | 3    | 0.43  | 0.08         | 0.01         | 0.09          | 71% | 50% |

Table 77 Main bibliometric indicators for Czech scientific institutions – Multidisciplinary Journals

| Institute                                            | P   | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------------------|-----|------|-------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                         | 214 | 5354 | 25.02 | 0.65         | 0.71         | 1.10          | 17% | 22% |
| Charles University in Prague                         | 141 | 3588 | 25.45 | 0.63         | 0.81         | 1.29          | 16% | 23% |
| Institute of Physiology ASCR                         | 37  | 797  | 21.54 | 0.47         | 0.45         | 0.96          | 8%  | 22% |
| Palacky University Olomouc                           | 25  | 1153 | 46.12 | 1.25         | 1.92         | 1.54          | 20% | 16% |
| Masaryk University                                   | 23  | 800  | 34.78 | 1.43         | 1.72         | 1.20          | 30% | 20% |
| University of South Bohemia in Ceske Budejovice      | 23  | 462  | 20.09 | 0.71         | 0.94         | 1.32          | 30% | 22% |
| Biology Centre ASCR                                  | 21  | 577  | 27.48 | 0.74         | 0.97         | 1.31          | 14% | 20% |
| Institute of Microbiology ASCR                       | 19  | 528  | 27.79 | 0.58         | 0.67         | 1.17          | 11% | 21% |
| Institute of Experimental Botany ASCR                | 17  | 667  | 39.24 | 1.51         | 1.83         | 1.21          | 18% | 17% |
| Astronomical Institute ASCR                          | 16  | 224  | 14.00 | 0.22         | 0.57         | 2.54          | 6%  | 40% |
| Institute of Organic Chemistry and Biochemistry ASCR | 16  | 339  | 21.19 | 0.68         | 0.87         | 1.29          | 25% | 33% |

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**Physics and Materials Science**

Table 78 Main bibliometric indicators for Czech institutional sectors – Physics and Materials Science

| Sector                 | P     | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-------|-------|------|--------------|--------------|---------------|-----|-----|
| Research organizations | 12120 | 73028 | 6.03 | 0.89         | 0.82         | 0.93          | 34% | 38% |
| Universities           | 11551 | 50954 | 4.41 | 0.80         | 0.65         | 0.81          | 40% | 39% |
| Companies              | 705   | 2190  | 3.11 | 1.04         | 0.60         | 0.58          | 50% | 35% |
| Government             | 59    | 109   | 1.85 | 0.69         | 0.24         | 0.36          | 58% | 51% |
| Hospitals              | 36    | 73    | 2.03 | 0.85         | 0.50         | 0.58          | 53% | 35% |
| Other                  | 19    | 25    | 1.32 | 0.81         | 0.25         | 0.31          | 63% | 24% |

Table 79 Main bibliometric indicators for Czech scientific institutions – Physics and Materials Science

| Institute                                            | P     | C-sc  | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------------------|-------|-------|------|--------------|--------------|---------------|-----|-----|
| Academy of Sciences (global)                         | 11954 | 72658 | 6.08 | 0.89         | 0.83         | 0.93          | 34% | 38% |
| Institute of Physics ASCR                            | 6012  | 37288 | 6.20 | 0.85         | 0.82         | 0.97          | 33% | 39% |
| Charles University in Prague                         | 4807  | 25921 | 5.39 | 0.80         | 0.72         | 0.91          | 35% | 41% |
| Czech Technical University in Prague                 | 1893  | 6060  | 3.20 | 0.83         | 0.54         | 0.65          | 47% | 41% |
| Nuclear Physics Institute ASCR                       | 1413  | 9244  | 6.54 | 1.01         | 0.87         | 0.86          | 34% | 41% |
| Institute of Chemical Technology Prague              | 1068  | 3402  | 3.19 | 0.70         | 0.49         | 0.70          | 40% | 44% |
| Masaryk University                                   | 1065  | 5728  | 5.38 | 0.88         | 0.77         | 0.88          | 37% | 29% |
| J. Heyrovsky Institute of Physical Chemistry ASCR    | 1033  | 9940  | 9.62 | 0.95         | 1.02         | 1.07          | 21% | 33% |
| Institute of Physics of Materials ASCR               | 879   | 3972  | 4.52 | 0.80         | 0.71         | 0.89          | 37% | 35% |
| Palacky University Olomouc                           | 763   | 3612  | 4.73 | 0.75         | 0.66         | 0.89          | 37% | 34% |
| Brno University of Technology                        | 759   | 1935  | 2.55 | 0.70         | 0.46         | 0.65          | 47% | 39% |
| University of Pardubice                              | 647   | 2412  | 3.73 | 0.77         | 0.59         | 0.76          | 36% | 40% |
| Institute of Plasma Physics ASCR                     | 517   | 1644  | 3.18 | 0.95         | 0.47         | 0.49          | 49% | 47% |
| Institute of Macromolecular Chemistry ASCR           | 476   | 3023  | 6.35 | 0.93         | 0.96         | 1.03          | 31% | 34% |
| Institute of Organic Chemistry and Biochemistry ASCR | 389   | 3830  | 9.85 | 1.54         | 1.78         | 1.16          | 23% | 30% |
| Institute of Inorganic Chemistry ASCR                | 385   | 1240  | 3.22 | 0.65         | 0.54         | 0.84          | 39% | 41% |
| Institute of Chemical Process Fundamentals ASCR      | 358   | 1913  | 5.34 | 0.71         | 0.68         | 0.97          | 26% | 43% |
| Institute of Photonics and Electronics ASCR          | 356   | 1398  | 3.93 | 0.71         | 0.63         | 0.89          | 40% | 31% |
| VSB-Technical University of Ostrava                  | 339   | 704   | 2.08 | 0.77         | 0.44         | 0.56          | 63% | 33% |
| Technical University of Liberec                      | 276   | 705   | 2.55 | 0.88         | 0.48         | 0.54          | 56% | 41% |
| University of West Bohemia in Plzen                  | 262   | 2180  | 8.32 | 1.94         | 1.59         | 0.82          | 33% | 22% |
| Institute of Scientific Instruments ASCR             | 175   | 621   | 3.55 | 0.84         | 0.50         | 0.59          | 40% | 42% |
| University of South Bohemia in Ceske Budejovice      | 166   | 336   | 2.02 | 0.86         | 0.53         | 0.63          | 57% | 37% |
| Institute of Thermomechanics ASCR                    | 158   | 485   | 3.07 | 0.71         | 0.54         | 0.76          | 47% | 32% |
| Silesian University in Opava                         | 154   | 396   | 2.57 | 0.37         | 0.31         | 0.84          | 40% | 54% |
| Jan Evangelista Purkyně University in Ústí nad       | 137   | 391   | 2.85 | 0.64         | 0.49         | 0.77          | 46% | 47% |

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| Institute                                      | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Labem                                          |     |      |      |              |              |               |     |     |
| ASCR unresolved                                | 134 | 694  | 5.18 | 0.79         | 0.63         | 0.79          | 28% | 36% |
| Tomas Bata University in Zlin                  | 113 | 311  | 2.75 | 1.13         | 0.73         | 0.65          | 46% | 33% |
| Institute of Mathematics ASCR                  | 110 | 357  | 3.25 | 0.74         | 0.51         | 0.69          | 47% | 40% |
| VUK Panenske Brezany                           | 74  | 98   | 1.32 | 0.62         | 0.32         | 0.52          | 62% | 42% |
| Czech Metrology Institute                      | 67  | 74   | 1.10 | 0.41         | 0.23         | 0.55          | 55% | 55% |
| Nuclear Research Institute Rez                 | 66  | 114  | 1.73 | 0.74         | 0.44         | 0.59          | 52% | 38% |
| Institute of Rock Structure and Mechanics ASCR | 61  | 105  | 1.72 | 0.36         | 0.28         | 0.77          | 52% | 40% |
| University of Hradec Kralove                   | 57  | 251  | 4.40 | 0.62         | 0.61         | 0.99          | 40% | 34% |
| CRYTUR Ltd                                     | 57  | 380  | 6.67 | 1.59         | 1.00         | 0.63          | 19% | 50% |
| Institute of Systems Biology and Ecology ASCR  | 54  | 73   | 1.35 | 0.66         | 0.44         | 0.67          | 61% | 47% |
| SKODA AUTO                                     | 51  | 141  | 2.76 | 0.80         | 0.46         | 0.58          | 39% | 17% |

**Political Science and Public Administration**

Table 8o Main bibliometric indicators for Czech institutional sectors – Political Science and Public Administration

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc  | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|------|-----|
| Universities           | 490 | 297  | 0.61 | 0.88         | 0.11         | 0.13          | 70%  | 28% |
| Research organizations | 145 | 129  | 0.89 | 0.69         | 0.18         | 0.26          | 60%  | 22% |
| Government             | 125 | 115  | 0.92 | 1.47         | 0.16         | 0.11          | 60%  | 29% |
| Companies              | 49  | 32   | 0.65 | 1.00         | 0.10         | 0.10          | 67%  | 30% |
| Other                  | 9   | 0    | 0.00 | 0.00         | 0.00         | 0.10          | 100% |     |

Table 81 Main bibliometric indicators for Czech scientific institutions – Political Science and Public Administration

| Institute                            | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| University of Economics Prague       | 317 | 160  | 0.50 | 0.82         | 0.09         | 0.11          | 69% | 35% |
| Charles University in Prague         | 104 | 109  | 1.05 | 1.30         | 0.22         | 0.17          | 67% | 16% |
| Czech National Bank                  | 94  | 99   | 1.05 | 1.87         | 0.17         | 0.09          | 59% | 28% |
| Academy of Sciences (global)         | 78  | 52   | 0.67 | 0.43         | 0.12         | 0.29          | 63% | 29% |
| CERGE-Economics Institute ASCR       | 39  | 19   | 0.49 | 0.60         | 0.07         | 0.12          | 67% | 21% |
| Masaryk University                   | 34  | 10   | 0.29 | 0.35         | 0.08         | 0.23          | 79% | 41% |
| KOMERCNI BANKA AS                    | 24  | 22   | 0.92 | 1.54         | 0.13         | 0.09          | 63% | 29% |
| VSB-Technical University of Ostrava  | 20  | 9    | 0.45 | 0.86         | 0.08         | 0.09          | 65% | 18% |
| Institute of Sociology ASCR          | 19  | 23   | 1.21 | 0.57         | 0.36         | 0.64          | 47% | 36% |
| Institute of International Relations | 14  | 15   | 1.07 | 0.98         | 0.57         | 0.58          | 57% | 25% |
| ASCR unresolved                      | 13  | 8    | 0.62 | 0.18         | 0.10         | 0.57          | 69% | 11% |

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**Psychology**

Table 82 Main bibliometric indicators for Czech institutional sectors – Psychology

| Sector                 | P   | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|-----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 479 | 990  | 2.07 | 0.85         | 0.25         | 0.29          | 58% | 30% |
| Research organizations | 300 | 1123 | 3.74 | 1.00         | 0.38         | 0.37          | 49% | 25% |
| Hospitals              | 157 | 371  | 2.36 | 1.06         | 0.23         | 0.22          | 69% | 29% |
| Government             | 34  | 90   | 2.65 | 0.98         | 0.32         | 0.32          | 47% | 37% |
| Companies              | 7   | 10   | 1.43 | 0.66         | 0.11         | 0.17          | 86% | 41% |

Table 83 Main bibliometric indicators for Czech scientific institutions – Psychology

| Institute                                                          | P   | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------------------------------------------|-----|------|-------|--------------|--------------|---------------|-----|-----|
| Charles University in Prague                                       | 282 | 675  | 2.39  | 0.88         | 0.27         | 0.31          | 58% | 32% |
| Academy of Sciences (global)                                       | 274 | 1087 | 3.97  | 1.06         | 0.40         | 0.38          | 47% | 24% |
| Institute of Psychology ASCR                                       | 210 | 559  | 2.66  | 1.75         | 0.29         | 0.16          | 53% | 27% |
| Masaryk University                                                 | 110 | 160  | 1.45  | 0.99         | 0.22         | 0.22          | 57% | 21% |
| Prague Psychiatric Centre                                          | 66  | 107  | 1.62  | 0.77         | 0.17         | 0.21          | 64% | 42% |
| University of South Bohemia in Ceske Budejovice                    | 34  | 65   | 1.91  | 0.71         | 0.24         | 0.35          | 62% | 36% |
| Institute of Physiology ASCR                                       | 32  | 291  | 9.09  | 0.69         | 0.64         | 0.93          | 16% | 23% |
| Palacky University Olomouc                                         | 30  | 19   | 0.63  | 0.77         | 0.10         | 0.13          | 77% | 27% |
| National Institute of Public Health and regional hygienic stations | 25  | 85   | 3.40  | 1.05         | 0.42         | 0.40          | 40% | 36% |
| General University Hospital Prague                                 | 19  | 3    | 0.16  | 0.13         | 0.02         | 0.15          | 84% | 82% |
| ASCR unresolved                                                    | 15  | 193  | 12.87 | 1.22         | 1.14         | 0.93          | 33% | 18% |

**Social and Behavioral Sciences, Interdisciplinary**

Table 84 Main bibliometric indicators for Czech institutional sectors – Social and Behavioral Sciences, Interdisciplinary

| Sector                 | P  | C-sc | CPP  | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|------------------------|----|------|------|--------------|--------------|---------------|-----|-----|
| Universities           | 61 | 174  | 2.85 | 0.52         | 0.52         | 1.01          | 30% | 16% |
| Research organizations | 20 | 90   | 4.50 | 0.82         | 0.82         | 1.00          | 25% | 21% |

Table 85 Main bibliometric indicators for Czech scientific institutions – Social and Behavioral Sciences, Interdisciplinary

| Institute                      | P  | C-sc | CPP   | CPP/<br>JCSm | CPP/<br>FCSm | JCSm/<br>FCSm | %nc | %sc |
|--------------------------------|----|------|-------|--------------|--------------|---------------|-----|-----|
| Charles University in Prague   | 47 | 115  | 2.45  | 0.50         | 0.43         | 0.86          | 26% | 15% |
| Academy of Sciences (global)   | 16 | 88   | 5.50  | 0.86         | 0.89         | 1.03          | 19% | 21% |
| Masaryk University             | 10 | 36   | 3.60  | 0.56         | 0.97         | 1.72          | 40% | 16% |
| CERGE-Economics Institute ASCR | 7  | 74   | 10.57 | 0.87         | 1.29         | 1.50          | 0%  | 22% |

### ***Sociology and Anthropology***

Table 86 Main bibliometric indicators for Czech institutional sectors – Sociology and Anthropology

| <b>Sector</b>          | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Universities           | 361      | 443         | 1.23       | 0.66                 | 0.22                 | 0.34                  | 59%        | 21%        |
| Research organizations | 252      | 390         | 1.55       | 0.99                 | 0.32                 | 0.33                  | 48%        | 28%        |
| Other                  | 17       | 49          | 2.88       | 0.79                 | 0.49                 | 0.62                  | 53%        | 23%        |
| Government             | 14       | 14          | 1.00       | 0.47                 | 0.16                 | 0.34                  | 50%        | 26%        |
| Hospitals              | 7        | 10          | 1.43       | 0.24                 | 0.20                 | 0.84                  | 29%        | 33%        |
| Companies              | 6        | 7           | 1.17       | 1.35                 | 0.18                 | 0.13                  | 67%        | 0%         |

Table 87 Main bibliometric indicators for Czech scientific institutions – Sociology and Anthropology

| <b>Institute</b>                         | <b>P</b> | <b>C-sc</b> | <b>CPP</b> | <b>CPP/<br/>JCSm</b> | <b>CPP/<br/>FCSm</b> | <b>JCSm/<br/>FCSm</b> | <b>%nc</b> | <b>%sc</b> |
|------------------------------------------|----------|-------------|------------|----------------------|----------------------|-----------------------|------------|------------|
| Academy of Sciences (global)             | 228      | 322         | 1.41       | 0.95                 | 0.29                 | 0.31                  | 49%        | 31%        |
| Charles University in Prague             | 181      | 243         | 1.34       | 0.72                 | 0.23                 | 0.32                  | 62%        | 19%        |
| Institute of Sociology ASCR              | 176      | 179         | 1.02       | 1.08                 | 0.21                 | 0.19                  | 49%        | 37%        |
| Masaryk University                       | 101      | 105         | 1.04       | 0.80                 | 0.19                 | 0.24                  | 50%        | 25%        |
| University of West Bohemia in Plzen      | 23       | 32          | 1.39       | 0.71                 | 0.64                 | 0.90                  | 61%        | 24%        |
| Palacky University Olomouc               | 22       | 7           | 0.32       | 0.29                 | 0.07                 | 0.23                  | 77%        | 22%        |
| Institute of Archaeology ASCR            | 22       | 83          | 3.77       | 0.82                 | 0.91                 | 1.10                  | 45%        | 19%        |
| Czech University of Life Sciences Prague | 13       | 29          | 2.23       | 0.28                 | 0.30                 | 1.06                  | 23%        | 34%        |
| National Museum                          | 11       | 35          | 3.18       | 1.36                 | 0.73                 | 0.54                  | 55%        | 10%        |
| University of Ostrava                    | 10       | 2           | 0.20       | 0.39                 | 0.04                 | 0.10                  | 90%        | 33%        |
| ASCR unresolved                          | 7        | 13          | 1.86       | 0.71                 | 0.23                 | 0.33                  | 14%        | 41%        |
| Institute of Philosophy ASCR             | 7        | 1           | 0.14       | 0.24                 | 0.03                 | 0.14                  | 86%        | 50%        |



In Brighton, 30/09/2011



Erik Arnold  
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Managing Director

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