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The application of bibliometric analyses in the evaluation of social science research. Who benefits from it, and why it is still feasible

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The paper discusses an application of bibliometric techniques in the social sciences. While the interest of policy makers is growing, the topic is getting more and more attention from bibliometricians. However, many efforts are put into developing tools to measure scientific output and impact outside the world of the Social Sciences Citation Index, while the use of the SSCI for bibliometric applications is covered with obscurity and myths. This study attempts to clarify some of the topics mentioned against the application of the SSCI for evaluation purposes. The study will cover topics like the existing publication and citation culture within the social sciences, the effect of variable citation windows, and the (geographical) origin of citation flows.

Introduction

Application of bibliometric techniques in the social sciences has been long a topic of discussion, a controversial issue very well covered Diana Hicks in Scientometrics in 1999 and the handbook of Quantitative Science and Technology Research in 2004.[1,2] The last couple of years, studies for example in the UK and Canada have indicated the possibilities and advantages of applying bibliometrics in the evaluation of social sciences.[3,4] Careful suggestions to start rethinking the possibilities of applying bibliometrics in the social sciences are found.[5,6] On the other, we also find studies that attempt to develop quantitative measures for the social sciences, starting from data not originating from the SSCI,[7] while we currently saw studies presented in which quantitative measures were developed, additional to or replacing bibliometric scores calculated for the natural and life sciences.[8,9]

The most important source of information for extensive bibliometric analyses of the social sciences, including citation analyses, is the Social Sciences Citation Index (SSCI), produced by the former Institute for Scientific Information (ISI), nowadays Thomson Scientific. The main argument against applying bibliometric techniques in the evaluation of social sciences research has always been (and still is) the (poor) coverage

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of the social sciences by ISI's SSCI, both in terms of the types of literature covered as well as in the scope of the journals covered, indicating a limitation of this database due to the distinction between "outside the ISI world", contrary to "within the ISI world". Without underestimating these limitations, but accepting them for now as a 'fact', the focus in this study has been on the characteristics of the publications covered *within* the ISI world, and more in particular, on the citation flows within the social sciences.

The study deals with three main aspects of bibliometric analysis and citation flows within the social sciences. The first deals with coverage of the social sciences in terms of references, the second with the length of applied citation windows in the measurement of impact of social sciences research papers, and the third aspect relates to the origin of publications and citations within the social sciences.

The first aspect, the adequacy of the coverage of the SSCI, will be analyzed through the reference lists attached to publications in 10 major disciplines in the social sciences. This topic has been researched previously in relation to publication types not covered within the SSCI[10,11] or by analyzing journal-to-journal citation relations within the social sciences.[12] The issue will here be introduced by an example from outside the domain of the social sciences, namely by a study on the largest university of technology in the Netherlands, in Delft. Mean length of reference lists, the distribution of references within and outside the world covered by the journals in the ISI databases and the comparison with the natural and life sciences are topics covered in this part of the analysis.

Next, the analysis will focus on the adequacy of the length of citation windows. This topic has been discussed previously, for example for a number of social science research areas,[13] and in more general terms for the natural and life sciences as well.[14,15] In this study, the focus will be on the role variable citation windows can play, in other words, what patterns of citation flows do we observe for the social sciences, and to what extent do citation windows that vary in length, play a role in impact analyses in the social sciences.

Finally, a longstanding claim against the application of bibliometric in the social sciences relates to the supposed bias of the Social Sciences Citation Index towards the Anglo Saxon world, and more in particular, in favor of the USA.[16] Therefore, the third part of the analysis will focus on the origin of publications and citations between regions, and the role the US output plays in the publication and citation patterns in the social sciences.

For the study, data from several projects are combined, and where possible, results from studies in the natural and life sciences are used to compare the results from the current study on the social sciences, thereby analyzing the feasibility of applying bibliometric methods and techniques for evaluation purposes in the social sciences.

Data

The data used in the study all originate from the citations indexes of Thomson Scientific, more in particular from the in-house database of CWTS based on the indexes produced by Thomson Scientific. Not only did we use the Social Sciences Citation Index, but where necessary, the Science Citation Index was used for reasons of comparing the outcomes for the social sciences with the natural and life sciences. From several studies conducted at CWTS, secondary analyses were conducted on data material and results retrieved in those studies. One study from which data were used was a study on behalf of the Delft University of Technology, covering the publication output and impact of the university over the period 1991–2001. Yet another study from which collected data were used is a study commissioned by the English Economics & Social Sciences Research Council, ESRC. In this study, an international comparison of a limited number of countries over large disciplines in the social sciences was conducted, covering both aspects of output and impact.

Results

The publication culture within the social sciences

In this section, the focus will be on the publication culture in the social sciences. The main question that needs to be answered now is dealing with the coverage of the SSCI in terms of the channels of scientific communication, so to what extent is the SSCI covering types of scientific communication through which social scientists worldwide can disseminate their research findings, and to what extent can we find differences between social scientists from different nationalities?

Before we can come to answer this question, it is important to realize that the SSCI covers journal literature. So therefore, an answer to this question is very difficult to find within the boundaries of the publications covered in the SSCI, so an alternative way should be used to be able to answer the above raised question. This alternative consists of an analysis of the references used in the publications covered in the SSCI, starting from the hypothesis that the reference behavior of scientists reflects (to a certain extent) their publication behavior. This type of analysis was conducted in a study for the Delft University of Technology in the Netherlands, which was commissioned by a group of internal experts and representatives of research entities within the university. The output of the period 1991–2001 was labeled with the faculty structure as it existed in 2002. This resulted in output and impact numbers per faculty. However, the main goal of the study was to analyze the disciplinary orientation of the faculties within the university, resulting in so-called research profiles. The large differences in output numbers in terms of ISI-covered publications did raise the question within the commission on the

orientation of each faculty on the journal literature covered by the citation indexes. This resulted in an analysis in which the publication behavior of the Delft scientists could be displayed. For this analysis, two types of information were used. One consists of the references given in the publication output of scientists of each faculty, thereby making a distinction between references related with other publications covered in the citation indexes as source papers, and those references to publications that can not be identified as source papers within the citation indexes. The other type of information consists of the (aggregated) lists of publications per faculty, as these lists are annually generated to feed into the research funding allocation model as it is applied within the Delft University of Technology. In this model, a distinction in 'rewards' is made between ISI-covered output and non ISI-covered output. Therefore, overviews of ISI-covered and non ISI-covered output per faculty could be generated across for a number of years across faculties to compare with the outcomes of the reference analysis.

Figure 1 contains the results of the analysis of the reference lists, indicating the percentage of references given to other ISI-covered publications, and not. The Faculties are presented by ascending number of ISI-covered publications in the period 1991–2001, indicated by the number following the name of the faculty.

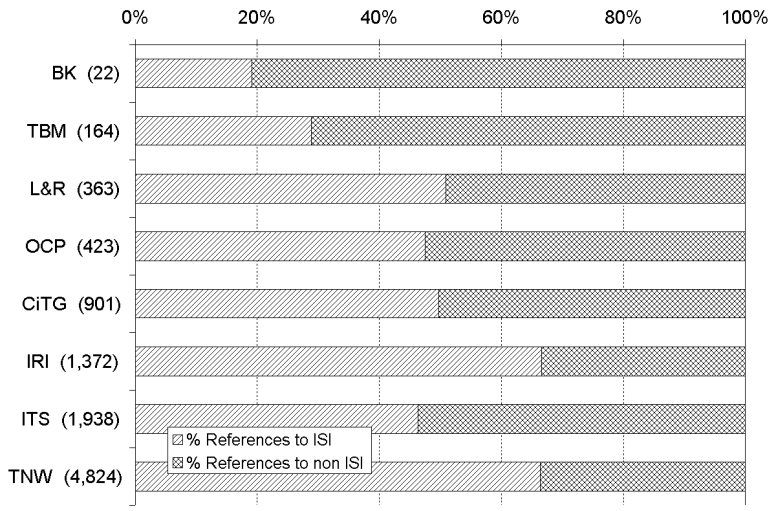

Figure 1. Shares of references to ISI and non ISI-covered publications, Faculties within the Delft University of Technology, 1991–2001

Legend: The abbreviations for the Faculties are: BK is Architecture, TBM is Technology, Policy, Management, L&R is Aerospace Engineering, OCP is the combined faculty of Mechanical engineering, marine Technology , and Industrial Design Engineering, CiTG is Civil Engineering and Geosciences, IRI is the nuclear reactor facility, ITS is Electrical engineering, mathematics and Computer science, and TNW is applied sciences

In Figure 1, one clearly observes a strong focus of the faculties having a small output, to types of scientific literature that is not covered by the citation indexes. For BK and TBM, the smallest faculties in terms of ISI-covered publications, we find small percentages of references to other ISI covered publications. In general, we find a tendency that the faculties having a larger output in scientific journals covered in the citation indexes, have larger shares of references towards the journal literature itself. However, not necessarily, as can be concluded from the share of ISI related references for ITS. Here the references to conference proceedings play an important role in the reference behavior of the scientists involved.

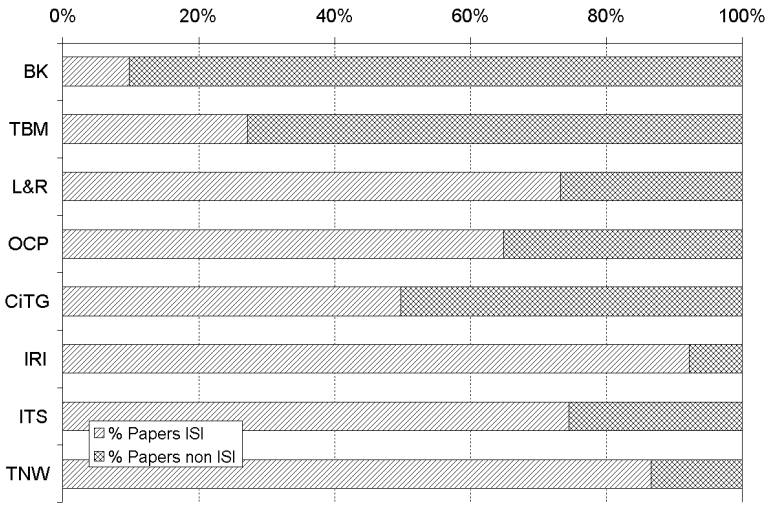

Figure 2. Shares of ISI and non ISI-covered publications, Faculties within the Delft University of Technology, 1998–2001

In Figure 2, the output itself is analyzed on the characteristic 'ISI versus non ISI'. Here we find that the two faculties with the smallest output share in ISI covered journals are BK and TBM. For the other faculties, we find a much stronger focus on journals covered in the citation indexes, with perhaps as an exception the faculty CiTG, where we observe some balance between both types of scientific output.

This analysis shows that the analysis of references can indicate the ISI orientation of entities within the science system, in this case in a university mostly focused on the natural and technical sciences. The faculties having the lowest percentages of references towards ISI covered journal literature have the lowest shares of output in this type of scientific communication. A rank correlation analysis (Pearson's rank correlation)

indicates a strong correlation between the two approaches (R^2=0.94). Almost naturally, one comes to the conclusion that bibliometric analysis of the output of these two faculties should be interpreted with the utmost care.

This leads to the question whether or not this type of reference analysis can be conducted for the social sciences. The answer is given in Figure 3, where we find a similar analysis presented like the one presented in Figure 1. For eight large disciplines in the social sciences, based on groupings of so-called ISI Journal Subject Categories, the share of ISI and non-ISI-related references is determined. If one follows the reasoning applied above on the Delft University of Technology results, one could come to the conclusions that the application of bibliometric techniques is at least questionable in a number of those disciplines, due to the fact that publishing in scientific journals, or at least the ones covered in the SSCI, is apparently not the most obvious way for social scientists of different origins to publish their research findings in.

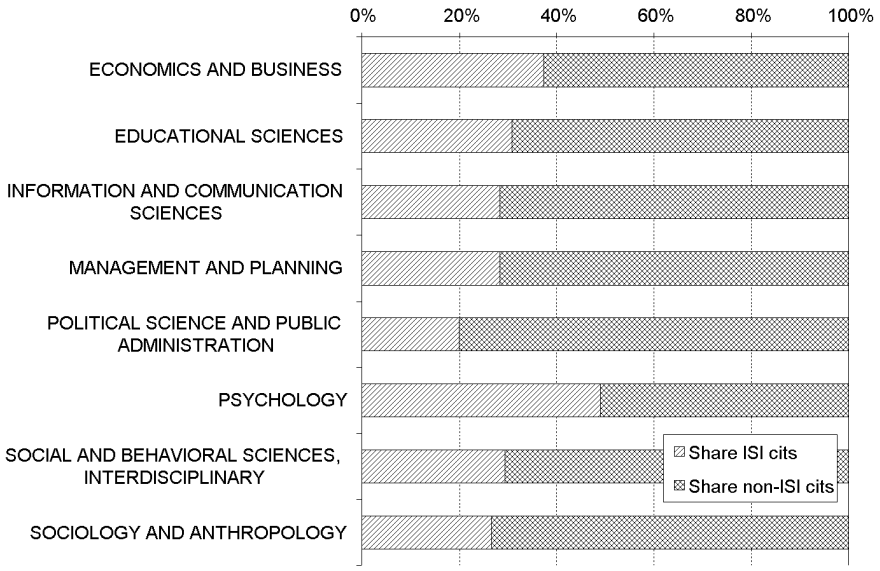

Figure 3. Shares of references to ISI and non ISI-covered publications, large disciplines in the social sciences, 1994–2003

Yet another way of comparing the publication culture across nations within the SSCI starts from the analysis already conducted for Figure 1 and 3. Again, an analysis of the reference lists in terms of the distribution over ISI and non-ISI-covered sources on the level of countries provides information of the differences between the US on the one hand, and five other countries on the other hand.

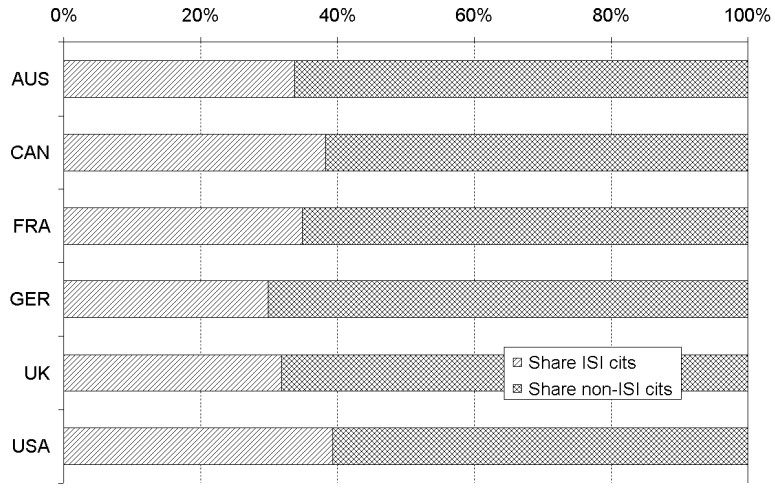

Figure 4. Shares of references to ISI and non ISI-covered publications in the social sciences over countries, 1994–2003

Figure 4 shows that social scientists originating from different countries have relatively the same pattern in their referencing behavior, where German social scientists have relatively the lowest share of references to ISI covered publications (35%), and US social scientists have relatively the largest share of their references to ISI covered publications (39%). The differences are rather small, thereby indicating a strong resemblance in their publication behavior. As these six countries cover roughly 70% of the output in the SSCI, an average ISI-non ISI was determined. Next, deviations of the mean value are determined for each country. We then find a negative deviation of 3% for Germany (indicating a somewhat lesser focus on the ISI-covered scientific literature), and a positive deviation of 3% for the USA (thereby indicating a somewhat stronger focus on ISI-covered scientific literature).

However, if these results lead to a complete rejection of bibliometric analysis in general, one is also running the risk to ignore at least some quantitative insight in the situation in the social sciences. Therefore, one needs to obtain a more detailed insight on the contents of the SSCI. One important issue, already mentioned in the introduction, relates to the supposed bias in the SSCI towards the Anglo-Saxon world. In order to get some better insight in the publication culture, the SSCI is analyzed on the aspect of the origin of the papers. In Figure 5, the development of the growth of the output in the SSCI is shown, against the perspective of the position of the US herein.

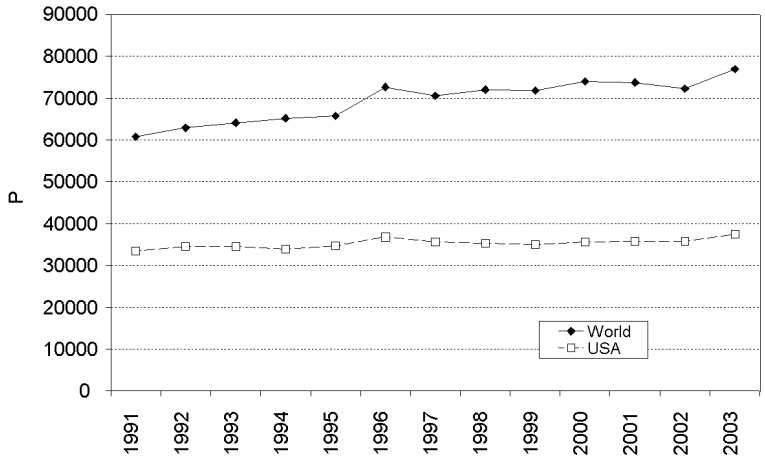

Figure 5. Annual output numbers in the SSCI, overall and for the US, 1991–2003

Figure 5 indicates that growth in the SSCI is not caused by an increase of the scientists from the US. The increase of nearly 20,000 papers over 12 years between 1991 and 2003 is only partially related with a growth of the output of US-based social scientists. The R^2 value for the output trend for US-based social scientists is 0.60, while the R^2 value for the worldwide increase is 0.87.

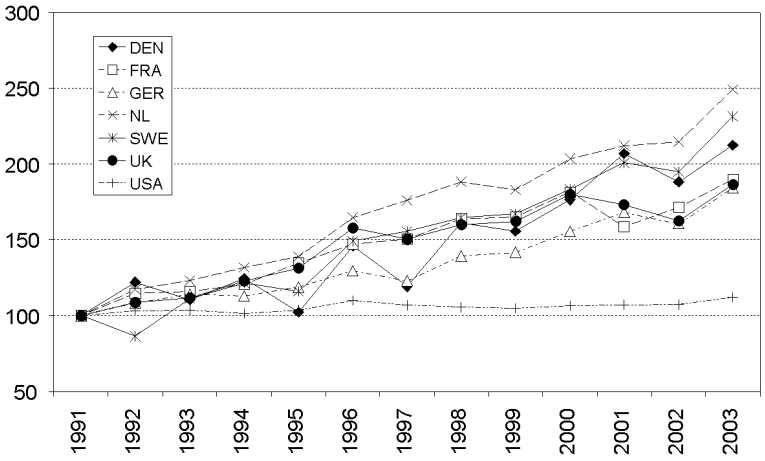

Figure 6. Annual increase in output in the SSCI, 1991–2003, index year is 1991

In Figure 6, the development of the growth in output in the SSCI is compared for some European countries with the growth of the US in the SSCI.

In Figure 6, one clearly finds the relative stable position of the US within the SSCI over the period 1991-2003, while on the other hand the output of the European countries shows a strong increase of the output. The Netherlands, Denmark and Sweden have more than double the output in 2003 compared to 1991, while the larger European countries like France, the UK, and Germany have nearly twice as much output in 2003 compared to 1991. The European countries, both large and small, seem to catch up in the SSCI with the US. Figure 5 already indicated that the share of papers not originating from the US is increasing, thus repelling the dominant position of the US within the SSCI.

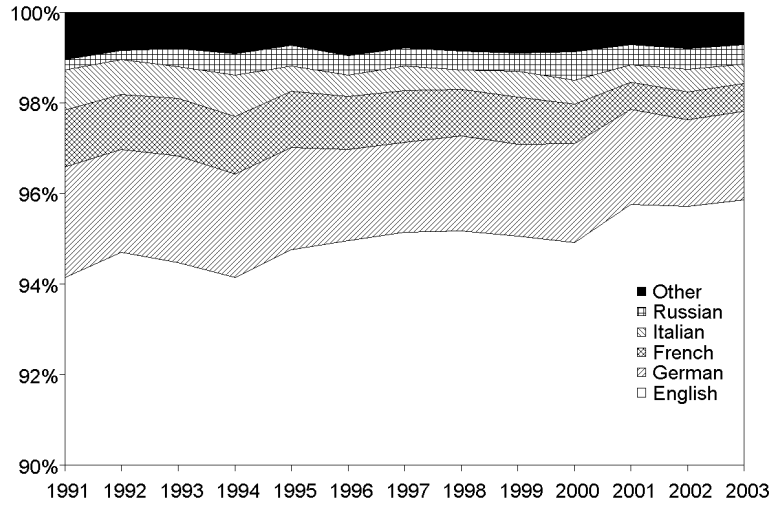

Figure 7. Languages covered in the SSCI, 1991–2003

Figure 7 shows the dominant position of English in the SSCI as a language of publication. This is compared to the natural, life and technical sciences, as covered in the SCI, a more or less stable situation. Where English is increasing its dominant position within the SCI,[17] such a strong development is not observed for the social sciences.

The citation culture within the social sciences

While the previous section dealt with the supposed problematic publication behavior of social scientists, will this section deal with the supposed different citation culture, and its consequences for the application of bibliometric techniques in the social sciences. An important argument has always been that the citation pattern differs so strong from the ones found for the natural and life sciences, in particular with respect to the length of citation windows, that bibliometrics could not be adequately applied in the social sciences.

In order to establish a proper insight in the citation patterns in the social sciences, we have to analyze citation histories over large volumes of publications, combined with a time period long enough to exclude annual fluctuations. Therefore, all external citations received by the output covered by the SSCI between 1993 and 2002 are analyzed (thus excluding self-citations). The result, 'citation histories' on an annual basis, are presented in Figure 8. Here one finds for each respective publication year, the number of citations received by the publications published in that year, with citation windows that become shorter in time (e.g., a citation window of ten year for the papers of 1993, and a citation window of only four years for the papers published in 1999).

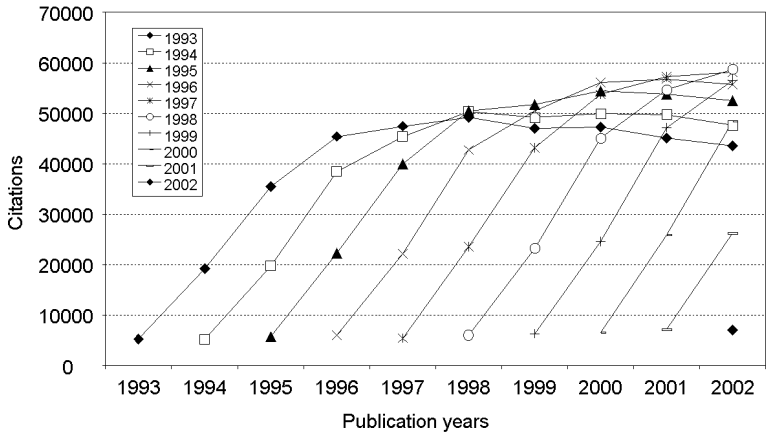

Figure 8. Citation histories of all social sciences combined, 1993–1998

Quite obviously, the citation histories show a tendency of increasing numbers of received citations per year. For the early years 1993 up until 1997, the peak in the

number of received citations is mostly found in the sixth year after publication (including the year of publication itself), with a change in the slope of the number of received citations after the third or fourth year. Unfortunately, it is more difficult, if not impossible, to find the peak for the year 1997 up until 2003, due to the incompleteness of the citation data over such a long period. Therefore, an additional analysis of the citation windows could provide the insight in the development over time.

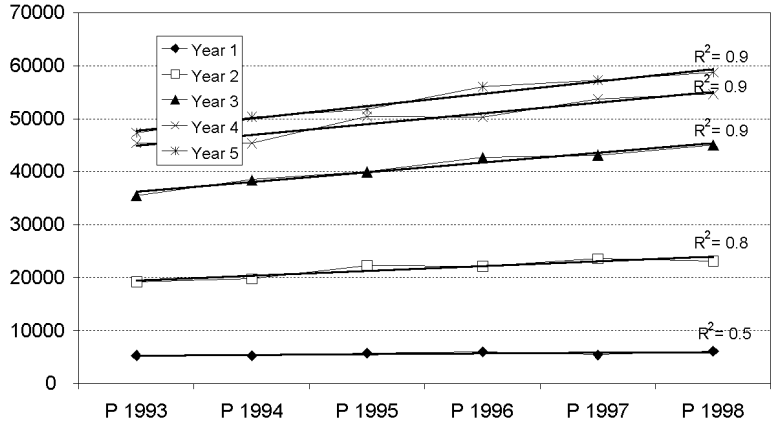

Figure 9. Year-to-year development of citation patterns, all social sciences, 1993–1998

In Figure 9, the data underlying Figure 8 are presented in a different manner. Here, the annual number of received citations is compared for the publication years 1993 to 1998 (thereby covering a maximum citation window of five years). For each publications year, we have taken the number of citations received in year 1, in year 2, etc., up until year 5. This analysis clearly indicates an increase of the number of citations, in other words, worldwide the impact of social sciences is increasing. However, the year-to-year development shows no remarkable changes, as can be concluded from the R^2 values of the trends in annual increase, which are all very high (ranging from 0.8 to 0.9), indicating a stable increase in time, except for the number of citations received by the papers published in 1997, causing the R^2 value of the citations received in year 1 to be at a value of only 0.5. A remarkable aspect of the analyzed citation pattern is the strong increase in the number of received citations, from year-2 to year-3. For each of the years 1993 to 1998, such a strong increase is found, an increase that is even becoming larger in the later years of the analysis.

Once we have established an understanding of citation patterns in general in the social sciences, the question arises how this works out on lower levels of analysis in the social sciences. Therefore, we have analyzed the citation patterns of both the US and the UK, in the domain of Economics and Business. The publications used cover the period 1993 to 2002, while the citation windows applied range from a three-year citation window to a six-year citation window. Due to these citation window lengths, the last year that can be analyzed adequately with a three-year window is 2000, while the last publication year that can be analyzed with a six-year window is 1997. In Figure 10, the mean citation rates for US scientists in the domain Economics and Business are displayed.

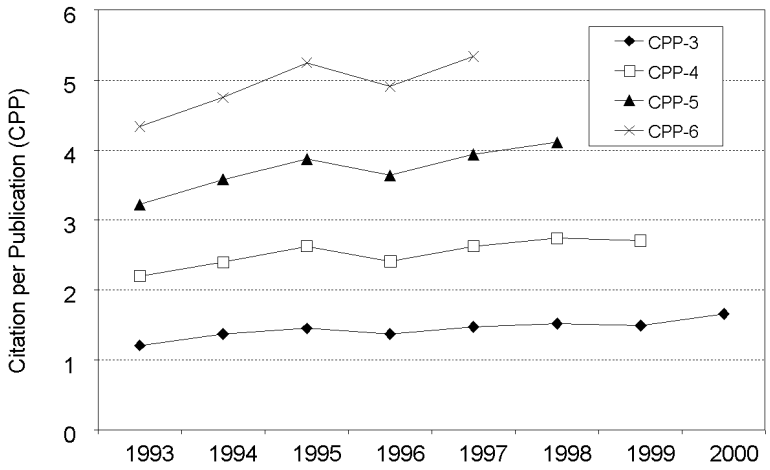

Figure 10. Citation per publication rates (CPP), for the US in Economics and Business, 1993–2002

In Figure 10, we clearly find the increase of the impact, or in this case, mean citation rates (for the US in this discipline), in time, consistent with the general trend in the social sciences in general, as was already displayed in Figure 8. A publication year with an apparent high or low impact score based on a three-year citation window comes out more pronounced, when longer citation windows are applied.

In Figure 11, a likewise analysis was conducted for the UK in the discipline Economics and Business. The results show a strong resemblance with those of the US, raising the questions which citation window is the most appropriate one, and how to interpret the differences in mean citation rates per paper between the UK and the US.

An answer to these questions can be found in calculating field-normalized impact scores. The results of this analysis are presented in Figure 12 (for the US) and Figure 13 (for the UK).

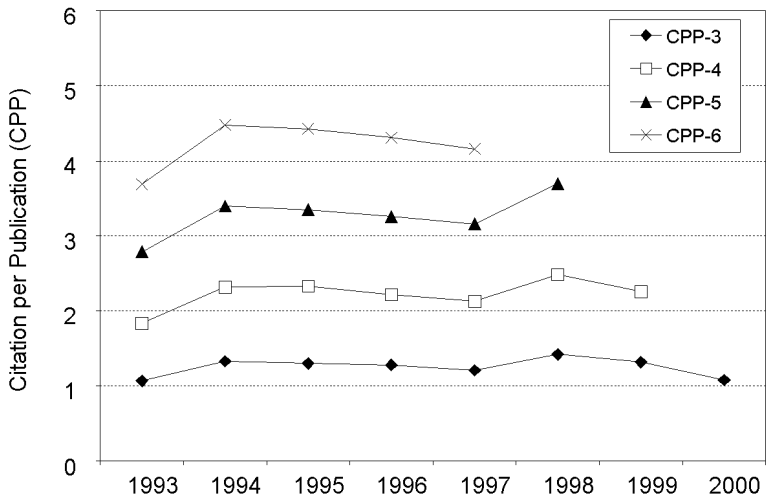

Figure 11. Citation per publication rates (CPP), for the UK in Economics and Business, 1993–2002

As Figure 12 shows, the applied field normalization causes the US impact scores to run more concurrently than the plain mean impact rates tend to do. However, one still finds some difference due to the applied time-frame in the citation window. Another remarkable finding is the apparent increasing impact of US scientists in Economics and Business.

In Figure 13, a likewise analysis is conducted for the UK output in Economics and Business. Contrary to the results of the US scientists in the same discipline, the differences due to longer citation windows are much smaller, or even non-existent.

Another remarkable aspect of this analysis is the strong fluctuating pattern of normalized impact scores. While the US scores showed an increasing tendency, we here find strong fluctuations. These yearly changing impact scores cannot be caused by statistical fluctuations due to small numbers of publications. Where the US publishes roughly about 6000 papers annually in this discipline, do we still find roughly UK 1000 publications per year in this discipline. In general, the citation window length seems to be of less importance, particularly if the impact measures used are normalized scores.

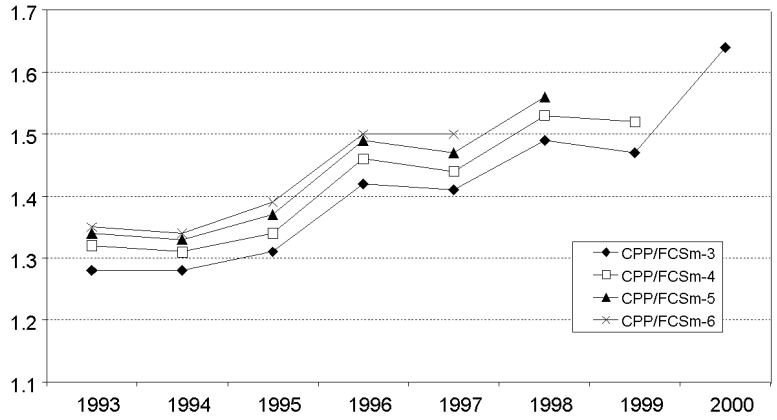

Figure 12. Citation per publication rates (CPP) compared with Field Citation Scores (FCS), for the US in Economics and Business, 1993–2002

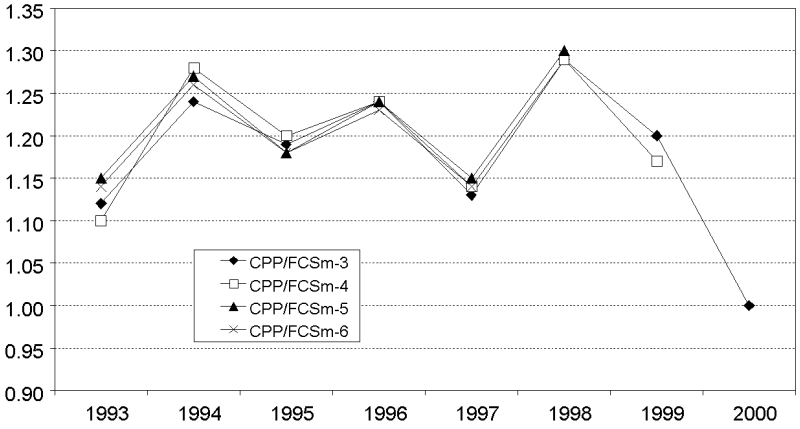

Figure 13. Citation per publication rates (CPP) compared with Field Citation Scores (FCS), for the UK in Economics and Business, 1993–2002

In the end, if normalization is applied, one first compares like with like, before comparing it with scores related to other units (like countries, institutes, etc.).

The 'regional origin' of output and impact in the social sciences.

While the two previous sections covered the areas of publication output and citation impact, a third characteristic is now added, namely the geographical origin of output and impact. This third aspect of bibliometric analysis allows us to gain insight in how citation flows operate in the social sciences between regions in the world.

The data used in this section are coming from both the SCI and the SSCI, and are covering the time-period 1991–2003. The SSCI data presented relate to 4 ISI Journal Subject Categories (Applied Linguistics, Economics, Information & Library Science, and Psychology, General), while the SCI data cover five of such fields (Biology, Chemistry, Immunology, Pathology, and Physics). The data are contributed to three mutually exclusive geographical areas, three classes that contain publications that originate solely from the US ('Single USA'), publications in which we find scientific cooperation with the US ('Coop. with USA'), and publications with no US involvement at all ('No USA involved'). Figure 14 contains the results of the output analysis of this classification of publications in the SCI and SSCI fields.

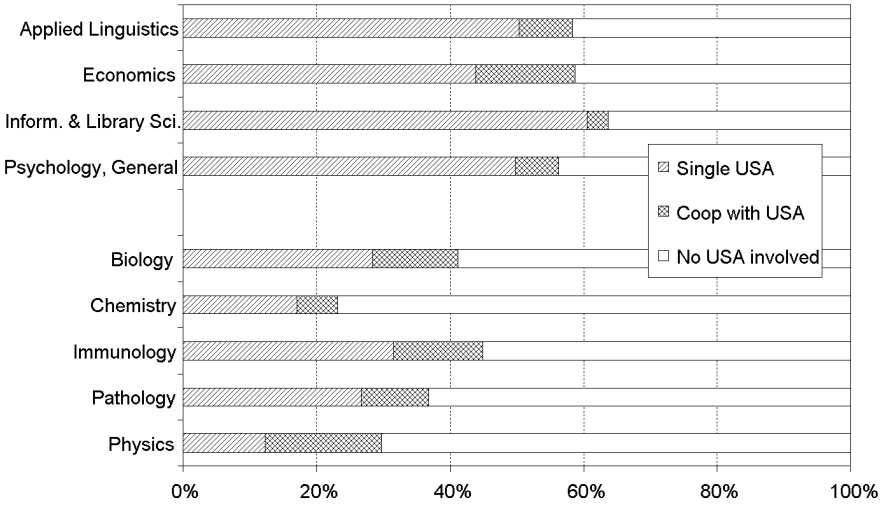

Figure 14. Output shares of geographic regional classes for the SSCI and SCI, 1991–2003

Figure 14 clearly indicates the differences between the SSCI and the SCI: while in most SSCI fields, the USA plays a dominant role, the SCI fields show a more modest position of the USA in global science (although still related to over 40% of the output in Biology and Immunology). In the SSCI fields, the USA covers nearly 60% of the output, either singular or through scientific cooperation. As Figure 5 already indicated,

the share of the USA in the SSCI is decreasing, so the later years in the analysis might provide a somewhat different situation. However, in general is bibliometric analysis not limited to output measurement only, and impact measurement plays an important role in it. While the previous section indicated that the length of the citation window is really the issue, and that you rather seem to measure 'annual intrinsic quality' rather that the analysis of citation window length is indicative for the supposed US-bias, the focus is turned to the origin of the impact, in other words, not the fact that citations are given, but rather, who is citing to which output.

Therefore, we analyzed the data from this perspective. For each of the publications years from 1991 to 1995, the citing papers were analyzed on the addresses attached to them. Papers that are self-citing papers were excluded from the analysis. For each paper, the three classes of geographical origin were determined over an eight year time-frame (so for 1991 publications, the citing years were 1991 up until 1999, for 1992 papers up until 2000, etc., and finally, for 1995 papers, up until 2003). The results were aggregated, and mean scores were calculated over the total set of data. An example of this analysis is displayed in Figure 15, for the field Economics

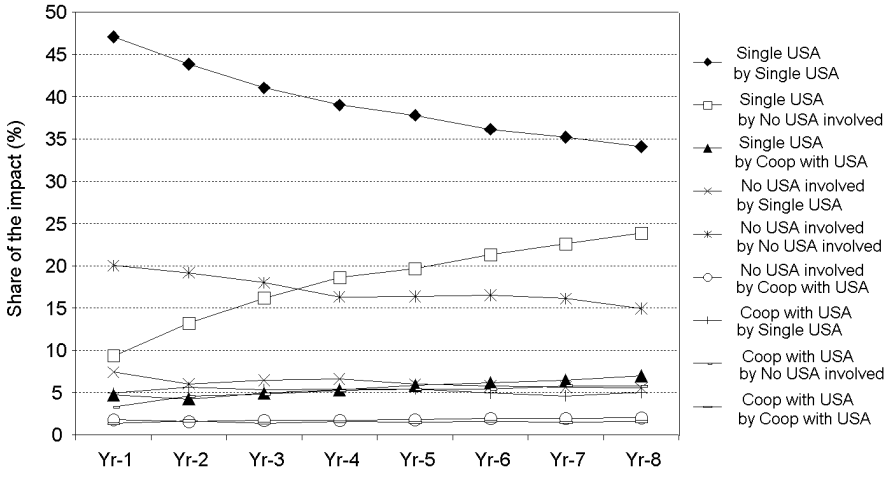

Figure 15. Mean citation shares by type (year 1-8) to publications by type (1991–1995) in Economics (excluding self-citations)

In Figure 15, we find the citations received by one of the three geographical regions of origin of the citations, to publications labeled with the same regional origin. The citation flow from 'Single USA' publications to 'Single USA' publications is the largest citation flow, but shows a decreasing tendency, from 45% in year-1 to 35% in year-8.

The citation flow of 'No USA involvement' to 'No USA involvement' is much smaller, and decreasing as well, namely from 20% to 15%. The citation flow from 'No USA involvement' papers to 'Single USA' publications is increasing in its share, namely from 10% in year-1 to 25% in year-8. The opposite flow, from 'Single USA' to 'No USA involvement' is much smaller in volume, and shows a relatively stable situation, with only a minor decrease within an eight year period. The first five types of citation flows contain, on average about 85% of all citations within the field of Economics. For the other three SSCI fields analyzed, we have found similar patterns of citation flows between regions.

A similar analysis was conducted for the SCI field of Immunology. The results are displayed in Figure 16.

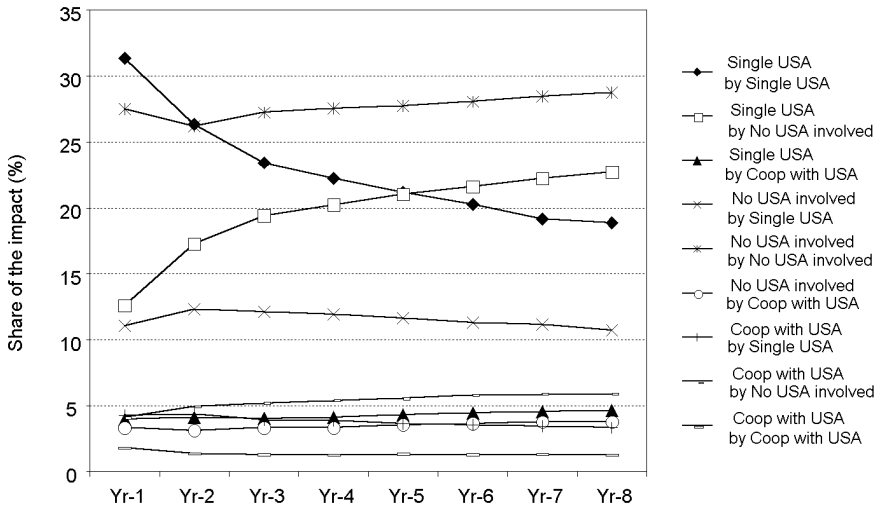

Figure 16. Mean citation shares by type (year 1-8) to publications by type (1991–1995) in Immunology (excluding self-citations)

In Figure 16, we find some patterns that resemble strongly the situation found for the SSCI fields. We find, for instance, 86% of all citations flowing within the first five types of regional origin. Another resemblance is found in the decreasing share of the 'Single USA' publications to other 'Single USA' publications, just like the increasing share of received citations by 'Single USA' from 'No USA involved'. A remarkable difference is the relatively large share of the citation flow covered by citations from 'No USA involved' to 'No USA involved', which is, compared to the field of Economics, much larger in its share of citations. A possible explanation for this phenomenon might be found in the larger share of the output within the class 'No USA involvement'.

A more comprehensive method of comparing the output and impact shares of regions is displayed in Figures 17 and 18. For the nine fields, four from the SSCI and five from the SCI, we have displayed the shares in output and received citations for both the classes 'Single USA' as well as 'No USA involvement'.

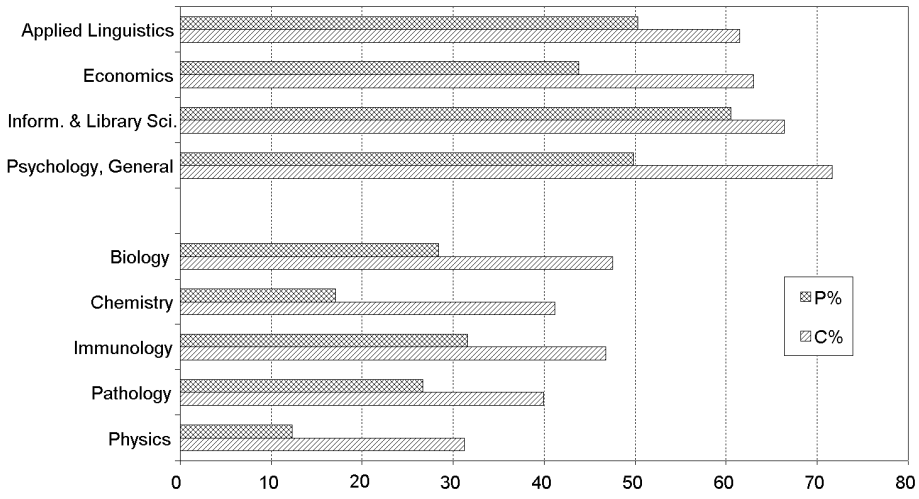

Figure 17. Mean shares of publications (1991–1995) and citations (1991–2003) for the class 'Single USA'

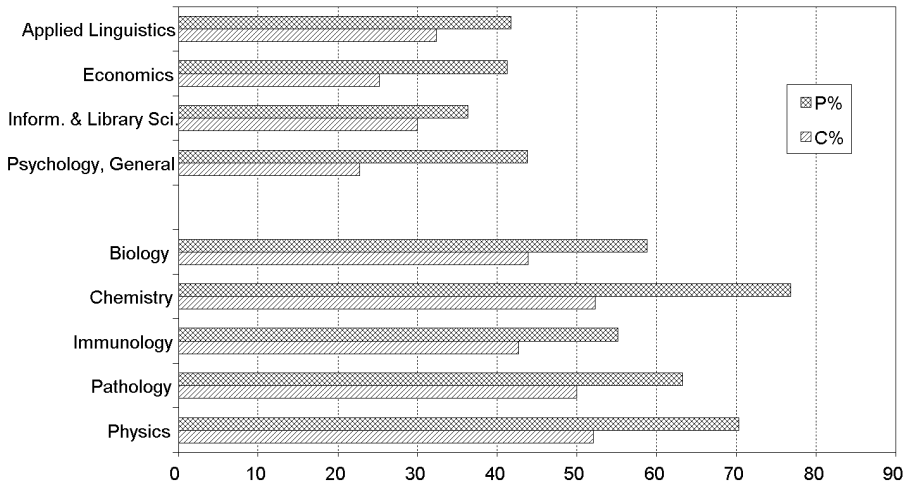

Figure 18. Mean shares of publications (1991–1995) and citations (1991–2003) for the class 'No USA involvement'

Figure 17 contains the comparing scores for the class 'Single USA'. The upper bar indicates the share of the output, while the lower bar for each field indicates the share of the citations received. With respect to the output shares, we find a confirmation of the results in Figure 14, were we found larger shares in the SSCI fields, and lower output shares in the SCI fields. However, with respect to the shares of received citations, we find that the papers classified as 'Single USA' receive relatively lower share of the total citation flow in the fields analyzed.

In Figure 18, a likewise analysis is conducted for the class of publications labeled as 'No USA involvement'. Here we find two remarkable phenomena, one already mentioned in Figure 14, namely a larger share of the No USA involvement publications in the SCI fields than in the SSCI fields, but more importantly, as the second difference, much larger shares of output than of impact. Comparing both the output and the impact for 'Single USA' with 'No USA involvement' shows that the latter class has a higher visibility in terms of the numbers of papers covered, but a smaller visibility in terms of the number of citations received by the latter class of publications.

Conclusions and discussion

A first remark in this section relates to the efforts colleagues in the field make to extend the instruments to conduct bibliometric analyses in the field of the social sciences. In this study, the described bibliometric characteristics are only related to ISI-based information, and by no means suggest that the development of instruments and/or indicators based on other types of information (like the ones based on non ISI source material, of specific types of communication not covered by the Index, like books, chapters, etc.) has less priority or relevance. The main purpose of this study is to provide more knowledge of the workings of publication and citation cultures within the social sciences, if one decides to use bibliometric data in the evaluation of social sciences research.

The analysis applied in the first part of the results section indicated that the publication cultures within the social sciences differ across disciplines. However, the results on country level show a strong resemblance of the publication behavior across nations, in other words, within the social sciences, US and non-US scientists show likewise publication behavior. The differences across disciplines indicate the low level of reliability and validity if one decides to apply bibliometric techniques within some of the disciplines within the domain of the social sciences in a macro bibliometric approach. Whereas the application of micro bibliometrics, that is, on the level of research groups within a field, within a specific country, is most often combined with peer review, the peer review committee has the freedom to neglect either the application

of bibliometrics in general, or the results of a bibliometric analysis applied in the research assessment process. The observed publication culture in some of the social sciences disciplines clearly indicates that the interpretation of bibliometric scores based on the limited output in SSCI-covered journals is at least vulnerable for over-interpretation. However, as long as it is clear to the users of bibliometric results to what extent the results are based on ISI-covered material, the bibliometric data can be useful in any evaluation process, because it is better to know at least something of a small portion of the output, than to have no insight in the impact of these papers at all.

The first section also indicated the growth of the literature in the SSCI, and thereby in the international scientific literature as covered in journals by Thomson Scientific in its citation indexes. The share of the non-US output increases strongly, while the share of English-language papers is more or less stable, thus leading to the conclusions that the European social scientists are publishing more and more in journal covered in the Social Sciences Citation Index in the first place, and do so more and more in the English language, thereby reaching a much larger audience.

The second section indicated that the length of the applied citation windows is of less importance, in particular if field normalization is applied. The differences in impact scores are rather indicative of 'intrinsic quality' of the science involved, than they are the effect of differences in length of the applied citation window. Where the analysis started from the idea that six years was the period necessary for publications to reach its peak, and thereby excluding the application of short-term citation windows, the application of field-normalization showed that all publications in the same field 'suffer' from this same disadvantage. If a change in impact scores occurs while applying longer term citations windows, this seems to indicate intrinsic quality of the published material rather than a shortcoming of the applied technique and/or citation window.

As the share of the journal output of non-US scientists seems to increase over the last fifteen years in the social sciences, as covered by the SSCI, and in particular as the results in the study have shown, European countries have shown a strong increase in research output. A discarding of bibliometric techniques in the research assessment of social scientists in Europe would therefore exclude an increasing share of their output, at least in comparison to their output in previous years, from evaluation and international comparison.

The results in this study have not indicated that a US-bias within the social sciences exists. If we can speak about a bias, it would be a bias of US scientists in general with respect to their countrymen's research output, not limited to the social sciences, but observed in the sciences as well. The analyses applied in this study indicate a high impact position of US scientists in general due to the contents of their work rather than due to a US-bias within the Thomson Scientific databases.

Finally, this study was entirely based on ISI-covered material. The recent conference on Science and Technology Indicators, held in Leiden in September 2004, contained a number of very important contributions, in which the development of indicators based on non ISI-covered material played a central role. This process is of utmost importance, and as such, by conducting this study, the author does not want to argue the relevance and validity of this specific research. However, it is the strong conviction of the author that the underlying dynamics of the social sciences, both in terms of publication as well as in terms of citation culture, should be analyzed in more detail, in order to create a more well-founded insight and knowledge of the social sciences, and in particular with respect to the possible application of bibliometrics in the assessment of social sciences.

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