

Bibliometric Indicators and the Social Sciences

prepared for

ESRC
Polaris House
North Star Avenue
Swindon SN2 1UJ

by

J. Sylvan Katz
SPRU, University of Sussex
Brighton, E. Sussex
UK, BN1 9RF

j.s.katz@sussex.ac.uk

08 December 1999

Executive Summary

Social science research is published in a wider variety of publication types and addresses more national issues than natural science research. This makes the construction of internationally comparable bibliometric indicators somewhat problematic. However, in internationally oriented fields, like economics and psychology, bibliometric indicators can provide a reasonable measure of the publishing size and impact of these research communities.

The UK share of the world publications in the social sciences and behavioural sciences increased between 1981 and 1998 according to data derived from the National Science Indicators on diskette (NSIOD) produced by the Institute for Scientific Information (ISI).

The UK has its largest percentage share of world papers in environmental studies and geography & development. Its strongest growth in percentage share of world papers was in the management sciences. The UK share of psychology publications grew from 7% to 10% and economics publications grew from 10% to 13% over the 18-year time interval.

England displayed its greatest growth in the percentage share of UK publications in rehabilitation, Scotland in communications, Wales in library & information sciences and North Ireland in psychology.

It is shown in this report that the conventional impact indicator (citations/paper) gives a distorted view of the UK's impact because impact increases non-linearly with publishing size. A new indicator, the *relative international citation impact* (RICI) indicator that has been corrected to account for the non-linear relationship between impact and publishing size, is introduced.

Using a sequence of fourteen 5-year overlapping time periods, the RICI indicator portrays a different picture of the impact of UK psychology and economics research than the conventional impact indicator. It shows that UK impact exceeded the US impact in psychology across all 13 time intervals and it matched or exceeded the US impact in economics in 8 out of the 13 intervals.

Bibliometric Indicators and the Social Sciences¹

1 Introduction

There has been considerable debate in the academic literature and among research evaluators concerning the usefulness of bibliometric indicators as an evaluative tool for the social sciences. This report provides a synthesis of the current state of the debate on this topic and provides some indicators for a selected set of social science fields. Also, it introduces a publishing size corrected impact indicator that suggests the impact of UK research is higher than that portrayed by the conventional impact indicator.

The report is comprised of three main components: an overview of bibliometric techniques and indicators; a review of the literature on the use of bibliometric indicators to evaluate social science research; and a set of internationally comparable bibliometric indicators for some fields of social science research.

1.1 General overview of bibliometric indicators

The increase in research evaluation activities and advances in our understanding of innovation have led to a call for new types of statistical data and indicators. Bibliometric techniques have been shown to be useful in development of indicators of scientific research activity to address emerging concerns such as institutional level analysis of capabilities and networks (Katz and Hicks, 1997). Bibliometric indicators have been used for policy purposes for nearly 25 years (Narin, 1976) and were developed to address central concerns of classical science policy - level of research output and its impact. In this sense they have been so useful that they are incorporated in regular statistical series such as the National Science Foundation's (NSF) science indicators and are used in high profile analyses by leading scientists and policy makers (e.g. May, 1997). Recently some bibliometricians have begun to explore the possibility of developing bibliometric indicators for the social sciences (Hicks, 1999; Tijssen et al., 1996; Glänzel, 1996).

Research papers are particularly valuable as the basis for constructing indicators because they not only represent an increment to publicly available knowledge (indicating output), they can be graded by impact (a proxy for quality), and they contain traces of linkages between institutions and nations. Jointly authored papers reflect collaborative research and are one indicator of links between researchers (Katz and Martin, 1997). The cited references in papers indicate use of research by others (Hicks et al., 1994). Potentially, the publishing archive can even reveal the movement of researchers among institutions and sectors. Bibliometric indicators allow us to examine the development and flow of research-based knowledge thus enabling us to map the structure and changing shape of knowledge resources in the economy and society as a whole.

Bibliometric indicators cannot capture all knowledge production in a society and inform us of its quality. As with any indicator, they fall short of the ideal in several ways:

1. Papers represent the published output of research activity. They do not, for example, capture the innovative contributions made through such things as books and monographs.

¹ Diana Hicks provided valuable information on the evolution of social science indicators from the research she done recently at CHI Research. Ben Martin valuable made comments on the final draft.

Furthermore they will not capture the large and growing segment of knowledge production made through software and database construction.

2. There is not a one-to-one match between publication output and research expenditure. Published information is but one component of knowledge that also has tacit and material elements. The codified element has the advantage of being easily distributed and so can be diffused far and wide. Neither the material nor tacit components of knowledge can be communicated in a publication.
3. Bibliometric indicators do not represent all publishing. These indicators are usually derived from bibliographic information indexed in one of the Institute for Scientific Information's databases (ISI): the Science Citation Index (SCI), Social Science Citation Index (SSCI) and Arts and Humanities Citation Index (AHCI). Although these databases have an international coverage, they have a certain amount of bias. They contain more minor US journals than minor European journals, and non-English language journals are not as comprehensively indexed. From a non-English speaking world perspective bibliometric indicators represent only international level, predominantly English language, higher impact, peer-reviewed, publicly available research output.

Citation counts, that is, the number of references to a publication, cannot tell us about the "quality" of a piece of research. Ideally, we would like to be able to know which work is of high quality and which is not. Citation counts can only give us an indication of the "impact" research has had on work that follows.

2 Review of the literature on bibliometric indicators for the social sciences

Compared to the natural sciences, the social sciences are not as amenable to controlled experimentation and subsequently they have a less of an empirical focus. Also the social sciences have more competing paradigms and a greater national orientation. These differences affect the structure of the social science literature and this has bibliometric implications (Hicks, 1999). Unlike the SCI's coverage of the natural sciences, the SSCI is less comprehensive in its coverage of the social sciences. This limits its usefulness as a source for developing a comprehensive and robust collection of bibliometric indicators for the social sciences. The main difficulties fall into two general areas: non-journal publications and more national orientation of many social sciences.

2.1 Journal versus non-journal publications

At the aggregate and national level social scientists publish a lower percentage of their research output in journal articles and conference proceedings than natural scientists. An Australian study (Bourke et al., 1996) based on Australian university bibliographies found that while natural scientists publish about 85% of their research in journal articles or conference papers the figure was about 60% for social scientists. Books, book chapters, monographs, reports, etc accounted for the remaining 40%. A study of the Spanish Research Councils (CSIC) came to a similar conclusion (Pestaña et al., 1995). This suggests that journal-based bibliometric indicators for the social sciences will be based on a smaller fraction of research output than that for the natural sciences.

Three detailed studies provide some insight into the coverage of journal articles for various fields in the social sciences. Table 1 gives an estimate of the percentage of publications in various fields that were indexed by ISI. The data suggest that the SSCI coverage is quite variable across social

Table 1 - SSCI coverage by Field

Field	% coverage in ISI databases		
	UK ^a (1985-86)	Dutch ^b (1980-85)	Australian ^c (1995)
Anthropology	20	15	44
Geography	35	-	39
Economics	42	-	43
Education	27	-	-
Linguistics	36	21	-
Psychology	37	62	-
Philosophy and law	-	-	43
Political science	17	-	27
Public administration	-	2	-
Statistics-computer methods	32	-	-
Sociology	31	-	32

Notes: field definitions in each study vary some what. UK values were estimated using the '% journal articles' column from table 6 (Burnhill et al., 1994) and the claim that ISI covered 67% of the 'scholarly journals'.

Data sources: (a) Burnhill et al., 1994; (b) Nederhof et al., 1991; (c) private communications see Hicks, 1999

Table 2 - Concentration, uncitedness and citedness

Field	Concentration	% Uncited	Top 1%
Computer Science	5.2	44.5 (1)	47 (17)
Economics/Business	5.5	37.8 (5)	64 (14)
Molecular Biology/Genetics	6.7	14.7 (20)	285 (1)
Education	6.7	43.5 (2)	32 (21)
Engineering	6.8	38.2 (4)	49 (16)
Materials Science	7.0	39.3 (3)	46 (18)
Physics	7.1	26.1 (8)	91 (10)
Psychology/Psychiatry	7.1	25.4 (11)	100 (8)
Mathematics	7.3	33.7 (6)	46 (19)
Clinical Medicine	7.4	22.1 (14)	136 (6)
Pharmacology	7.8	20.4 (15)	97 (9)
Immunology	8.1	13.2 (21)	212 (2)
Biology/Biochemistry	8.1	15.4 (17)	167 (3)
Geosciences	8.4	25.3 (12)	87 (11)
Ecology/Environment	8.6	25.4 (10)	65 (13)
Microbiology	8.7	15.5 (16)	137 (5)
Neuroscience	8.8	15.0 (19)	165 (4)
Agricultural Sciences	9.0	33.5 (7)	43 (20)
Chemistry	9.2	22.5 (13)	80 (12)
Plant/Animal Science	9.2	25.8 (9)	61 (15)
Astrophysics	10.2	15.4 (18)	128 (7)

Note: values in () are rank.

Data source: ISI Science Watch, Jan/Feb 1999

science fields and can vary from a few percent (public administration) to nearly 65% (psychology). However, it should be noted that two of these studies are rather old, covering publications produced in the early to mid 1980s. In light of the steadily increasing amount of domestic and international collaboration and pressures from assessment exercises over the past fifteen years it is possible that the amount of social science research published in journal articles and indexed by ISI has increased.

2.2 National orientation of the social sciences

From the simplest perspective social scientists investigate social phenomena and therefore the context of their research is inherently more nationally than internationally oriented. In general compared to natural scientists, social scientists publish in fewer foreign language and foreign owned journals (Hicks, 1999). However, with activities such as the globalisation of industry, greater integration of national economies through international tax and tariff harmonisation, decreasing cost of travel and rapidly increasing use of electronic communication the focus of many social scientists is shifting to international issues.

A comparison of the UNESCO 1986 *World List of Social Science Periodicals* with a list of journals indexed by ISI reveals that there are about 2.5 times as many journals on the UNESCO list than covered by the SSCI (Schoepflin, 1990). Furthermore, 60% of the SSCI is composed of US journals while the UNESCO list contains only 17% US journals. However, it must be remembered that SSCI is specifically designed to index only international social science research articles while the UNESCO list is a compendium of all social science journals. Similarly, the SCI only indexes research articles published in about 5,500 of the more than 50,000 science journals. Bibliometric indicators derived from either the SSCI or the SCI will more accurately reflect international contributions to research than national contributions.

There is some evidence to suggest that some social science fields are becoming more international in scope. Pestaña et al. (1995) and Van der Meulen (1991) found that the output from Spanish CSIC and Dutch philosophers is becoming more international. Perhaps more compelling evidence comes from fact that the number of internationally co-authored social science papers has been increasing. For example, in the US the number of internationally co-authored social science papers is increasing at the same rate as internationally co-authored natural science papers². Hicks (1999) suggests that four factors are forcing social science research to become more international in scope:

- greater internationalisation of economies and cultures;
- increased EU funding of social science research;
- transition of East and Central European nations;
- some concepts and paradigms are spreading across the social sciences.

2.3 Concentration, citedness and uncitedness

In general, just like the natural sciences, bibliometric measures in the social sciences exhibit field dependent characteristics. This is demonstrated in Table 2. This table gives the concentration (percentage of papers required to account for 50% of the citations), citedness (number of citations required to be in the top 1% of papers) and uncitedness (percentage of papers that receive no citations at all) for a number of research fields (ISI, Science Watch 1999).

² private communications with Diana Hicks, CHI Research

About 5% of the papers in computer science, economics/business, and molecular biology and genetics are required to account for half of the total citations in the field. On the other hand twice as many papers are required in chemistry, plant and animal sciences, and astrophysics. These data suggest that the outstanding contributions are less evenly distributed in the former than in the latter. And it appears that education and psychology/psychiatry are more akin to computer science, economics/business, and molecular biology than chemistry, plant and animal sciences, and astrophysics. However this could be due to the fact that there may be more citable material (or less of low utility) in the latter than the former. While education and economic/business papers fall in the top five most uncited fields in Table 2, psychology/psychiatry papers fair better, falling in the middle of the range. This could be due to the fact that research in this field is more similar to the natural science research than economics and education research. This notion is supported by the fact that psychology/psychiatry need nearly as many citations to be in the top 1% as an astrophysics, physics or pharmacology paper.

2.4 Summary

Social science research is published in a wider variety of publication types than natural science research. Also, it addresses more localised issues. This makes the construction of internationally comparable journal article based bibliometric indicators is somewhat problematic. However, bibliometric indicators may provide a reasonable measure of the size and impact of international and scholarly social science research in some fields like psychology and economics.

3 Bibliometric indicators for selected social science research fields

3.1 Data source

The bibliometric indicators in this report were derived from the deluxe version of ISI[®]'s National Science Indicators on Diskette (NSIOD) version 1.5. This is a database of summary publication and citation statistics taken from peer-reviewed journals indexed by ISI during the years 1981-1998. The data covers 170 countries and three geographical/political regions: Asia Pacific, European Union, and Latin America. The dataset contains information on 105 fields in the sciences, social sciences, and arts and humanities corresponding to ISI's *Current Contents*[®] (CC[®]) categories.

ISI currently indexes approximately 5,500 journals in the sciences, 1,800 in the social sciences, and 1,200 in the arts and humanities. All journals indexed by ISI are peer reviewed. As a group, these journals represent an elite body of internationally influential research publications. This plainly does not represent a comprehensive catalogue of the entire world's research journals, let alone all peer-reviewed research journals. In the NSIOD database, ISI counts articles, notes, reviews, and proceedings papers, but not other types of items such as editorials, letters, corrections, and abstracts. A paper is attributed to a country if the paper carried at least one author address of that country.

The social science indicators in this report focus primarily on psychology and economics research fields that are derived from ISI's Current Contents category - Social Science & Behavioural Sciences. A description of each research field in this category is provided in Appendix A.

3.2 Size of Social Science & Behavioural Science research fields

Table 3 gives the annual number of papers indexed in the NSIOD in all fields of research and the percentage of these papers that are accounted for by research publications in the social sciences and behavioural sciences. We can see that psychology and economics are the largest fields. They

Table 3 - Percentage of all papers

Field	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Papers in NSIOD	451057	463027	472040	470983	503612	522241	518624	538869	559148	572827	589329	627162	616610	651644	682871	691573	695596	718480	10345693
Psychology	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.2	2.1	2.3
Economics	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.1	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Public Hlth & Hlth Care Sci	0.6	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.9	0.9	1.2	1.1	1.1	1.1	0.8
Sociology & Anthropology	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6
Political Sci & Public Admin	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Education	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Environ Studies, Geog & Dev	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Management	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Law	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2
Social Work & Social Policy	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3
Library & Information Sci	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
Rehabilitation	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Communication	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Data source: ISI National Science Indicators on Disketter (1981-98)

each account for more than 1% of the world's research papers. The percentage fluctuated a bit but by and large it remained constant with time. This probably reflects the way ISI selects journals in this area.

Table 4 gives the annual number of papers published by various countries and regions for each of the fields listed in Table 3. The values for the US, UK, European Union, France, Germany, Netherlands, Canada and Australia are expressed as percentages of the world publication in the field. The values for England, Scotland, Wales and Northern Ireland are expressed as percentages of the total number of UK publications in the field. The last three columns give the slope, the standard error (SE) of the slope and the goodness of fit (R^2 or coefficient of determination) for a linear time regression fit of row values. For example we can see that the linear growth in economics is about 131 ± 10 papers per year ($R^2=0.92$) and the UK share of economics publications grew quite slowly at $0.13 \pm 0.06\%$ per year ($R^2=0.24$).

We see almost without exception that while the US share of world publications decreased with time the share of UK papers increased. The UK's largest percentage share of publication is in environmental studies, geography & development and it grew from 19% to 28% over the 18-year time period. The UK's strongest publication growth was in management (0.44%/yr). The share of psychology and economics papers grew on average at 0.17%/yr and 0.13%/yr, respectively. Library and information sciences was the only field to exhibit a small decline in the percentage share of world publications.

Within the UK we see that England's share of UK publications dropped in all fields except education, rehabilitation, social work & social policy, and sociology & anthropology. Scotland's exhibited its largest growth in communications (0.67%/yr) and library and information sciences (0.50%/yr) but its percentage share of UK papers tended to decline in social work & social policy, rehabilitation and sociology & anthropology. The Welsh publication share grew in library & information sciences (0.33%/yr), psychology (0.24%/yr) and management (0.22%/yr). North Ireland's strongest growth occurred in psychology (0.11%/yr) and communication (0.9%/yr).

3.3 Impact indicators for psychology and economics

Impact is measured by taking the ratio between the number of citations a collection of papers receives during a given time interval and the number of papers in the collection. For example, between 1981 and 1998 the NSIOD indexed 229,536 psychology and 105,416 economics papers. Over the same time interval these papers received 1,938,136 and 602,254 citations, respectively. Using these values we can determine that the impact of psychology papers was 8.4 citations/paper and economics 5.7 citations/paper. However, if the same calculation is done using a five-year time interval, for example 1994-98, then we find that the impact of psychology papers was 2.3 citations/paper and economics papers was 1.5 citations/paper, respectively.

The reason that the impact is greater over the 18-year interval than over the 5-year interval is due to the fact that the papers published earlier in the interval can accumulate more citations than those published later. For example, 1981 papers accumulate citations over a 18 year period while the 1998 papers accumulate few if any citations. In comparison using the 5-year interval, the 1994 papers accumulate citations over a 5 year time period while the 1998 papers again accumulate few if any citations. In fact, generally citations to natural science papers tend to peak in the 3rd to 5th year after publication but in the social sciences they tend to peak in the 5th to 7th year. Neither the 18-year nor the 5-year impact values accurately reflect the true impact, particularly in the social sciences where the citation peak is later, because they are more heavily influenced by publications produced earlier in the time interval than those produced later.

The method for measuring citations that was just described is known as the 'variable citation window' counting method. This method is used extensively by ISI and it is the method they use for their NSIOD data. A more accurate impact indicator is produced when citations are counted using a 'fixed citation window' counting procedure. In this method the number of citations received by papers published in given year are accumulated over a fixed time interval. Unfortunately, ISI charges a large fee to do this more accurate type of citation counting.

3.3.1 Relative International Citation Impact

3.3.1.1 Description

There may be an even more worrisome problem with the conventional impact measure. The general assumption that underpins the use of the impact measure for international comparisons is that it is not influenced by the publishing size of a country. In other words, it is assumed that there is no relationship between the impact the papers from a country has on subsequent research and the number of papers that country published. However, in a recent paper (Katz JS, 1999) it was demonstrated that impact can increase with publishing size. This result suggests in some instances a comparison of UK impact to US impact might be distorted in favour of the US simply due the size of the research effort in the US. By way of illustration examine Figure 1. Figure 1a is a linear plot and Figure 1b is a log-log plot of 1994-98 citations and papers for 170 countries across all fields of research, including the natural and the social sciences. These data are derived from the NSIOD dataset. A linear regression (upper dotted line) and power law regression (low solid line) are plotted through the data points. In both instances the R^2 values are excellent. However, when we inspect the log-log plot it becomes obvious that the linear regression (top line) has a rather poor fit for countries publishing 10 to 10,000 papers. The power law regression is the best fit and is expressed by the equation (1)

$$c = 1.31 p^{1.06} \quad (1)$$

where c is citations and p is papers. We can re-arrange equation (1) to compute the impact, I , yielding equation (2)

$$I = c/p = 1.31 p^{0.06} \quad (2)$$

This demonstrates that the impact increases in a slightly non-linear manner with the number of papers published. It seems the impact measure favours larger countries over smaller countries. This effect may be even more pronounced when citations are counted using a fixed citation counting window rather than a variable window.

Figure 2 contains log-log plots of citations and papers for economics and psychology over 1994-98 time period for countries that published, on average, two or more papers per year. Typically each analysis involved 60-70 countries.

Notice that for both economics and psychology the exponent of the power law regression equation is larger than in the previous example indicating that the impact measure favours larger countries even more than smaller countries in these fields than it did in Figure 1. In fact, the exponent for psychology grew from 1.14 in 1984-88 to 1.21 in 1994-98 while in economics it decreased from 1.21 to 1.13. The exponent of the power law relationship between citations and papers emerges from the complex interaction between all the factors that affect publishing size and the amount of recognition the papers receive. A detailed investigation of these factors would

Table 4 - percentage of world publications in the field

Field	COUNTRY	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total	slope	SE	R ²	
Communication	WORLD (papers)	397	501	419	487	561	627	598	537	575	539	596	627	690	644	935	821	797	866	11217	25	3	0.79	
	US	89.2	91.2	86.4	91.0	87.7	87.7	90.0	89.0	90.4	88.3	89.9	87.6	83.6	82.3	78.3	74.9	75.0	77.4	84.5	-0.85	0.15	0.66	
	UK	2.5	4.0	4.8	3.9	4.3	4.6	3.3	3.5	2.6	3.2	2.5	3.3	4.6	5.3	9.6	9.7	8.7	9.0	5.5	0.32	0.08	0.48	
	ENGLAND	100	90	100	84	92	97	80	74	87	94	93	76	63	85	93	86	93	76	86	-0.72	0.43	0.15	
	SCOTLAND	0	5	0	5	4	3	10	0	7	0	7	14	31	6	6	10	6	15	8	0.67	0.31	0.23	
	NORTH IRELAND	0	0	0	0	0	0	10	0	7	0	0	0	0	6	3	1	0	0	4	2	0.09	0.14	0.03
	WALES	0	5	0	11	8	0	0	26	0	6	0	14	0	6	2	5	4	6	5	0.05	0.31	0.00	
	EUROPEAN UNION	5.0	6.4	9.8	6.0	6.4	6.9	6.0	5.8	5.2	5.6	4.9	7.8	10.9	9.8	15.5	17.5	17.4	16.1	9.9	0.64	0.14	0.58	
	FRANCE	0.8	0.8	0.7	0.8	0.2	0.5	0.8	0.4	0.2	0.6	0.3	0.8	0.6	0.8	0.4	0.5	0.4	0.1	0.5	-0.02	0.01	0.17	
	GERMANY	0.5	0.6	1.0	0.2	1.1	0.6	1.2	0.6	0.9	0.6	1.2	0.8	1.3	1.1	1.7	1.8	2.8	1.3	1.2	0.08	0.02	0.51	
	NETHERLANDS	0.3	0.4	1.4	0.2	0.2	0.0	0.0	0.6	0.7	0.4	0.2	1.1	1.9	0.8	1.1	2.2	2.1	2.8	1.0	0.11	0.03	0.52	
	CANADA	3.3	2.4	2.9	1.4	3.2	3.3	1.7	2.8	1.9	2.0	2.0	3.0	2.6	4.7	3.0	2.1	2.6	3.2	2.7	0.02	0.04	0.03	
	AUSTRALIA	2.0	0.6	1.0	0.6	1.2	1.8	1.0	0.7	0.3	0.4	0.7	0.5	1.7	1.2	1.2	2.2	2.0	2.1	1.2	0.04	0.03	0.13	
	Economics	WORLD (papers)	4703	4811	5018	4942	5397	5612	5417	5459	5832	6468	6174	6231	6100	6082	6406	6826	6883	7055	105416	131	10	0.92
		US	66.9	66.6	66.3	67.8	67.6	68.4	67.0	67.9	66.8	68.2	66.8	65.7	65.6	64.0	61.2	59.7	59.6	56.6	64.8	-0.51	0.10	0.62
UK		10.5	11.4	10.8	10.3	10.1	9.2	10.2	9.7	8.9	7.7	9.8	10.4	10.3	10.9	12.2	12.4	12.6	13.4	10.7	0.13	0.06	0.24	
ENGLAND		86	90	89	91	90	90	88	89	88	87	86	88	90	89	87	88	89	87	88	-0.10	0.07	0.13	
SCOTLAND		11	7	9	8	7	8	9	9	9	11	11	11	11	9	10	9	10	10	10	0.11	0.05	0.22	
NORTH IRELAND		2	2	1	0	1	1	1	2	1	2	2	2	1	1	3	2	1	1	2	0.03	0.03	0.05	
WALES		2	1	3	2	2	5	4	3	3	5	5	3	3	4	4	3	4	6	4	0.15	0.04	0.42	
EUROPEAN UNION		19.1	20.1	19.9	19.4	19.6	19.1	19.7	19.6	20.2	18.4	20.7	22.9	23.1	24.4	26.9	28.6	29.2	32.4	22.8	0.67	0.10	0.72	
FRANCE		2.1	1.5	1.7	1.3	1.5	1.8	1.8	1.5	1.9	1.6	1.8	1.8	2.2	2.4	2.7	3.1	3.0	3.4	2.1	0.09	0.02	0.64	
GERMANY		1.3	1.8	1.8	1.9	1.7	1.6	2.0	2.3	2.5	2.1	2.0	2.2	2.4	2.3	2.5	2.5	2.6	3.5	2.2	0.08	0.01	0.72	
NETHERLANDS		1.3	1.1	1.2	1.2	1.5	1.6	1.5	1.6	1.9	1.8	2.0	2.7	3.1	2.8	3.2	3.2	3.9	4.0	2.3	0.17	0.01	0.91	
CANADA		6.4	5.8	7.5	6.3	6.3	7.1	7.4	6.9	7.8	7.6	7.4	7.1	7.1	6.6	6.9	7.7	6.6	6.1	6.9	0.02	0.03	0.03	
AUSTRALIA		3.9	3.3	4.1	3.9	3.3	3.2	3.1	2.8	3.0	2.9	3.2	2.8	2.8	3.0	3.9	3.4	3.5	3.8	3.3	-0.01	0.02	0.03	
Education		WORLD (papers)	2715	2819	2532	2381	2425	2315	2573	2409	2496	2581	2557	2453	2689	2460	2849	2563	2396	2560	45773	-1	7	0.00
		US	70.9	71.3	69.4	67.7	68.9	65.3	66.7	69.0	67.8	65.4	65.2	64.4	62.4	64.8	62.5	63.3	62.1	61.3	66.0	-0.53	0.05	0.86
	UK	12.3	11.7	13.3	12.9	13.0	13.0	11.5	11.9	10.8	11.8	10.6	13.8	11.0	12.2	12.1	13.5	13.1	14.6	12.4	0.04	0.05	0.05	
	ENGLAND	85	87	82	89	87	89	89	87	85	86	83	85	88	85	88	86	85	88	86	0.00	0.10	0.00	
	SCOTLAND	9	9	13	7	7	8	7	8	8	9	13	9	7	10	9	11	9	7	9	0.01	0.09	0.00	
	NORTH IRELAND	2	1	2	3	1	2	2	2	6	4	5	3	2	4	3	2	4	2	3	0.08	0.06	0.11	
	WALES	4	3	4	3	5	1	3	4	4	3	3	5	3	3	3	3	5	5	3	0.04	0.05	0.04	
	EUROPEAN UNION	15.7	15.3	18.1	16.8	17.2	18.4	16.2	15.7	15.5	17.3	17.6	19.8	20.9	18.2	19.9	19.5	20.3	22.2	18.0	0.30	0.06	0.61	
	FRANCE	0.6	0.7	0.2	0.4	0.5	1.1	0.5	0.6	0.6	0.4	0.5	0.6	0.6	0.3	0.6	0.4	0.6	0.2	0.5	-0.01	0.01	0.05	
	GERMANY	1.7	1.6	2.3	1.4	1.7	1.7	1.3	1.0	2.2	2.4	3.2	2.8	5.7	1.8	3.4	2.0	2.6	2.8	2.3	0.10	0.04	0.24	
	NETHERLANDS	0.2	0.5	0.5	0.7	0.7	1.3	1.0	1.1	0.8	1.3	1.4	1.2	1.9	1.5	1.8	1.7	2.0	2.0	1.2	0.10	0.01	0.87	
	CANADA	5.0	5.3	5.8	6.7	5.8	6.0	6.5	4.8	5.5	5.8	5.9	7.0	6.4	7.8	6.7	6.2	6.2	5.5	6.0	0.06	0.03	0.17	
	AUSTRALIA	3.4	3.2	2.8	5.1	3.6	3.5	4.7	4.6	4.7	4.6	4.5	4.4	4.2	5.3	4.6	4.7	5.1	4.6	4.3	0.09	0.02	0.45	

Note: Source ISI NSIOD 1981-97; world paper counts quoted with the permission of ISI; the values for England, Scotland, Wales and North Ireland are expressed as a percentage of UK papers

Table 4 - percentage of world publications in the field

Field	COUNTRY	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total	slope	SE	R ²	
Environ Studies, Geog &	WORLD (papers)	1854	1934	2043	2026	2120	2131	2158	2130	2315	2368	2255	2531	2514	2411	2734	2594	2533	2663	41314	47	4	0.91	
	US	50.1	45.8	47.1	46.1	46.8	45.1	47.3	47.9	46.7	47.3	46.7	47.1	46.6	43.5	46.7	40.4	40.8	38.5	45.4	-0.39	0.10	0.49	
	UK	19.0	23.9	21.4	22.4	22.5	21.4	22.4	20.9	19.9	18.5	22.4	21.6	24.5	25.1	25.6	28.4	25.5	27.9	23.1	0.36	0.10	0.46	
	ENGLAND	84	83	88	83	85	84	83	82	79	81	83	85	80	82	81	78	83	78	82	-0.30	0.09	0.41	
	SCOTLAND	10	10	8	10	8	12	10	11	13	13	13	12	14	13	12	14	11	12	12	0.23	0.07	0.41	
	NORTH IRELAND	2	1	2	2	2	2	3	2	4	3	2	2	2	3	2	3	2	4	2	0.06	0.03	0.19	
	WALES	4	7	4	7	9	3	7	8	7	6	6	5	8	5	8	9	8	11	7	0.18	0.09	0.22	
	EUROPEAN UNIOI	27.2	32.5	30.7	31.1	30.9	30.0	30.7	28.8	29.0	28.9	32.2	32.1	34.8	34.6	34.6	38.5	35.8	40.2	32.6	0.51	0.10	0.62	
	FRANCE	1.0	1.2	0.9	1.1	1.0	0.5	0.8	1.0	1.0	1.2	1.7	1.5	0.9	1.2	1.4	0.7	1.1	1.2	1.1	0.01	0.01	0.05	
	GERMANY	2.3	3.7	2.6	2.9	3.0	2.3	2.0	1.2	1.8	2.2	1.6	2.1	1.6	2.1	1.7	1.5	1.9	2.2	2.1	-0.07	0.02	0.36	
	NETHERLANDS	1.4	1.2	2.8	2.6	1.6	2.7	2.0	2.5	2.7	3.3	3.1	3.0	3.1	3.1	2.7	3.5	3.4	3.9	2.8	0.11	0.02	0.67	
	CANADA	8.0	6.9	7.7	8.1	9.6	10.0	7.9	9.2	8.7	8.8	9.6	8.9	7.6	8.3	8.3	8.6	9.0	7.2	8.5	0.01	0.04	0.00	
	AUSTRALIA	3.9	3.6	4.4	5.0	3.8	4.2	3.8	4.4	4.5	4.8	4.0	4.7	4.1	4.9	4.1	4.9	5.6	5.1	4.5	0.06	0.02	0.36	
	Law	WORLD (papers)	1548	1711	1834	1688	1626	1933	1949	1792	2071	2030	1975	2224	2132	1753	1854	1925	1684	1749	33478	11	8	0.10
		US	92.0	89.5	92.3	92.0	92.1	92.1	89.7	92.6	90.1	90.0	90.3	88.4	90.3	88.5	88.0	89.1	89.6	89.1	90.3	-0.20	0.05	0.49
UK		3.2	3.4	3.2	2.7	3.3	3.4	4.3	2.8	4.3	3.4	3.7	4.1	3.8	5.3	4.5	5.1	4.7	4.5	3.9	0.11	0.02	0.62	
ENGLAND		92	86	88	89	92	85	87	84	84	74	77	87	90	86	93	88	82	87	86	-0.15	0.23	0.03	
SCOTLAND		6	5	7	4	2	5	7	6	6	14	4	3	6	3	4	3	10	5	6	0.01	0.14	0.00	
NORTH IRELAND		0	2	3	2	2	2	1	2	0	1	3	2	2	1	2	1	1	4	2	0.04	0.05	0.04	
WALES		2	7	2	4	4	12	5	10	10	10	16	9	4	12	1	8	6	6	7	0.17	0.19	0.05	
EUROPEAN UNIOI		5.8	7.4	5.3	6.2	6.3	5.6	7.0	5.4	7.0	6.5	6.4	8.5	6.8	9.1	7.8	8.8	7.8	8.1	7.0	0.16	0.04	0.51	
FRANCE		0.3	0.4	0.1	0.1	0.4	0.2	0.4	0.1	0.2	0.1	0.2	0.3	0.3	0.5	0.1	0.1	0.3	0.2	0.2	0.00	0.01	0.01	
GERMANY		1.5	2.3	0.9	1.7	1.5	0.7	1.0	1.1	1.4	1.1	1.0	1.6	1.0	1.5	0.9	1.8	1.3	1.0	1.3	-0.02	0.02	0.04	
NETHERLANDS		0.2	0.3	0.1	0.5	0.2	0.2	0.3	0.2	0.2	0.3	0.6	0.8	0.7	0.4	0.5	0.7	0.5	1.1	0.4	0.04	0.01	0.52	
CANADA		1.1	1.8	1.8	1.4	1.2	1.2	1.7	1.1	1.2	1.7	1.3	2.0	1.2	1.2	1.3	0.9	1.2	1.5	1.4	-0.01	0.01	0.05	
AUSTRALIA		0.4	0.5	0.3	0.1	0.3	0.3	0.5	0.5	0.4	0.6	0.5	0.5	0.7	0.9	0.5	0.6	0.7	0.9	0.5	0.03	0.01	0.55	
Library & Information St		WORLD (papers)	1469	1483	1393	1425	1559	1488	1624	1531	1751	1917	1879	1792	1738	2000	2274	1855	1566	1627	30371	28	8	0.41
		US	59.3	61.2	60.4	65.3	63.6	62.4	60.5	59.4	61.8	65.3	66.3	65.4	65.4	61.2	67.9	64.2	60.2	61.5	63.1	0.15	0.12	0.10
	UK	10.4	11.5	13.2	12.2	10.8	13.0	11.9	11.1	10.0	8.1	8.8	9.5	9.1	11.6	9.4	12.7	14.0	11.4	10.9	-0.03	0.08	0.01	
	ENGLAND	93	95	92	93	90	86	87	90	86	78	82	85	84	80	80	83	84	81	86	-0.82	0.13	0.71	
	SCOTLAND	5	4	5	5	6	9	9	7	9	15	10	6	10	15	13	13	10	12	9	0.50	0.10	0.60	
	NORTH IRELAND	0	0	0	1	3	2	2	4	3	4	3	1	3	0	1	2	1	2	2	0.05	0.06	0.04	
	WALES	1	1	3	3	2	3	3	1	3	4	5	9	4	6	7	4	6	8	4	0.33	0.07	0.60	
	EUROPEAN UNIOI	21.9	23.1	23.8	21.3	19.7	22.2	23.1	21.6	20.7	18.5	18.9	19.4	18.5	21.5	21.3	23.8	25.5	24.2	21.5	0.04	0.10	0.01	
	FRANCE	0.6	0.7	0.9	0.7	0.8	0.9	1.0	0.9	1.2	0.9	1.5	1.8	1.5	1.6	1.4	1.5	1.0	1.2	1.1	0.05	0.01	0.51	
	GERMANY	8.0	7.1	6.5	5.5	5.5	5.3	7.6	6.7	5.4	5.5	5.2	2.4	3.3	3.1	5.4	3.8	3.8	4.5	5.2	-0.22	0.05	0.55	
	NETHERLANDS	1.0	1.8	0.9	0.5	1.2	0.9	1.0	0.7	1.5	1.1	1.0	1.6	1.6	2.0	1.7	1.3	2.4	1.9	1.4	0.06	0.02	0.43	
	CANADA	7.0	6.1	6.2	5.1	5.8	7.1	6.2	6.6	5.1	5.1	3.8	3.5	4.7	4.0	3.7	3.5	4.8	3.8	5.0	-0.19	0.03	0.66	
	AUSTRALIA	1.7	1.4	0.9	1.1	1.2	1.4	1.0	1.3	1.3	1.2	1.1	1.0	1.2	1.8	1.1	1.5	3.1	2.2	1.4	0.05	0.02	0.22	

Note: Source ISI NSIOD 1981-97; world paper counts quoted with the permission of ISI; the values for England, Scotland, Wales and North Ireland are expressed as a percentage of UK papers

Table 4 - percentage of world publications in the field

Field	COUNTRY	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total	slope	SE	R ²
Management	WORLD (papers)	1798	1819	1810	1863	1961	1936	2068	1792	2019	1886	2036	2160	2191	2451	2711	2646	2678	2611	38436	56	7	0.80
	US	73.1	74.7	74.3	75.6	73.0	73.5	74.2	73.8	74.9	74.3	72.6	72.8	70.1	64.5	64.0	58.6	57.0	53.8	68.8	-1.07	0.18	0.68
	UK	12.8	10.3	10.8	10.5	11.0	10.2	9.4	9.4	8.3	10.5	9.8	10.4	10.9	14.2	15.3	19.1	18.0	19.3	12.7	0.44	0.12	0.46
	ENGLAND	90	89	91	86	89	93	89	93	86	92	87	88	89	86	87	87	86	86	88	-0.25	0.10	0.27
	SCOTLAND	9	9	10	11	10	10	8	5	11	8	8	9	9	14	10	11	12	10	10	0.09	0.08	0.07
	NORTH IRELAND	1	1	1	1	0	0	2	1	4	1	2	0	1	1	1	1	2	2	1	0.05	0.04	0.10
	WALES	2	3	1	3	2	2	4	2	5	4	8	6	4	5	5	5	4	5	4	0.22	0.06	0.45
	EUROPEAN UNION	17.7	14.9	15.7	15.4	15.8	16.2	14.3	15.6	12.9	16.4	16.2	16.3	18.1	21.8	23.8	28.7	29.2	32.5	19.7	0.84	0.17	0.60
	FRANCE	1.4	0.9	1.4	0.8	0.6	1.5	0.9	1.8	1.1	1.4	1.0	1.3	2.1	1.4	2.0	1.6	1.9	2.3	1.5	0.06	0.02	0.43
	GERMANY	1.0	0.9	0.9	0.8	1.2	1.1	1.3	0.9	0.7	0.9	0.9	1.0	0.6	1.3	1.0	1.2	1.5	1.7	1.1	0.02	0.01	0.22
	NETHERLANDS	0.9	0.6	0.7	0.7	0.8	0.9	0.6	1.2	0.7	1.2	1.0	1.2	1.4	1.8	1.8	2.5	2.4	3.6	1.4	0.13	0.02	0.71
	CANADA	5.8	6.6	6.0	5.9	7.2	6.7	8.1	7.5	6.9	6.7	7.3	7.4	7.3	8.0	7.6	7.7	7.4	6.4	7.1	0.07	0.03	0.31
	AUSTRALIA	0.9	1.2	1.2	0.9	1.7	1.1	1.3	2.1	1.8	1.1	1.4	1.4	2.0	2.4	3.0	2.7	3.1	3.6	1.9	0.13	0.02	0.73
	Political Sci & Public Ad	WORLD (papers)	3314	3261	3352	3175	3313	3500	3485	3211	3564	3252	3586	3490	3811	3739	3866	3880	3729	3917	63445	40	6
US		57.1	57.5	56.4	60.9	62.3	59.3	60.6	59.5	62.9	60.3	58.5	58.0	56.4	56.7	53.1	54.7	53.2	54.2	57.7	-0.32	0.11	0.34
UK		12.4	12.5	11.8	11.3	11.3	10.6	11.1	9.7	9.7	10.9	10.3	10.2	12.1	11.8	14.5	14.2	15.3	14.7	12.0	0.17	0.07	0.26
ENGLAND		90	88	88	86	87	86	86	90	88	85	86	88	88	87	88	85	86	83	87	-0.15	0.08	0.20
SCOTLAND		8	10	9	12	10	10	8	6	10	11	10	10	8	8	9	10	11	10	9	0.01	0.06	0.00
NORTH IRELAND		2	1	2	1	1	4	4	1	1	4	3	1	3	4	2	3	2	2	2	0.06	0.05	0.09
WALES		2	3	2	2	3	3	4	3	3	2	3	2	3	3	3	4	4	6	3	0.11	0.04	0.34
EUROPEAN UNION		21.0	21.1	22.9	20.1	19.8	20.8	21.2	20.2	18.6	21.2	21.2	23.0	23.5	23.3	24.7	26.1	27.2	26.7	22.5	0.36	0.07	0.59
FRANCE		1.8	1.7	2.2	1.6	2.1	2.0	2.2	2.4	1.8	2.2	1.8	2.2	2.2	1.4	1.1	1.8	1.9	1.7	1.9	-0.02	0.02	0.06
GERMANY		4.2	4.2	5.9	4.3	3.3	4.9	4.2	5.0	4.6	4.6	4.9	6.6	5.3	5.4	5.0	5.3	5.0	4.5	4.8	0.05	0.03	0.15
NETHERLANDS		0.5	0.6	0.7	0.7	0.7	0.8	1.1	1.0	0.6	1.2	1.0	1.2	1.1	1.6	1.2	1.5	1.3	1.4	1.0	0.05	0.01	0.75
CANADA		8.1	6.9	7.4	6.6	6.8	6.5	6.4	7.3	6.6	7.0	6.6	5.5	6.2	5.7	6.1	5.8	5.8	5.9	6.5	-0.10	0.02	0.65
AUSTRALIA		5.3	5.4	4.5	4.4	3.6	5.1	4.0	4.2	3.9	4.1	4.6	5.6	4.6	5.5	6.2	4.8	4.4	5.1	4.8	0.03	0.03	0.06
Psychology		WORLD (papers)	11261	11535	11393	11323	11683	12346	11586	11862	12184	12484	12320	13257	12504	13691	15469	15206	14721	14711	229536	238	29
	US	68.8	68.3	67.7	66.1	66.4	65.7	64.3	64.9	63.6	65.2	63.9	64.3	61.8	59.5	60.8	59.3	59.5	57.1	63.4	-0.60	0.05	0.92
	UK	7.1	7.2	7.3	7.0	7.4	7.1	7.3	7.3	7.0	6.6	6.9	7.6	7.9	8.9	9.3	9.4	9.6	10.4	7.9	0.17	0.03	0.64
	ENGLAND	84	87	86	86	88	87	85	85	84	85	85	83	84	82	85	83	84	86	85	-0.14	0.06	0.24
	SCOTLAND	9	8	10	9	8	10	10	10	11	12	9	11	11	11	9	10	11	11	10	0.11	0.04	0.30
	NORTH IRELAND	3	2	2	3	2	3	4	4	4	3	5	5	5	7	4	5	2	2	4	0.11	0.05	0.21
	WALES	6	5	4	4	3	3	4	5	5	5	6	7	6	5	7	9	9	7	6	0.24	0.06	0.52
	EUROPEAN UNION	15.5	15.6	16.5	17.5	17.4	17.5	18.8	17.7	19.0	18.2	19.6	20.7	22.1	23.7	24.0	25.1	25.6	27.6	20.5	0.66	0.05	0.92
	FRANCE	1.1	1.1	1.0	1.4	1.2	1.2	1.5	1.5	1.6	1.4	1.8	1.7	2.0	1.8	2.0	1.8	2.1	2.1	1.6	0.07	0.01	0.90
	GERMANY	3.6	3.8	4.2	4.8	4.2	4.7	4.5	4.1	4.6	4.3	4.8	4.9	4.8	5.8	5.4	5.6	5.8	6.5	4.9	0.12	0.02	0.77
	NETHERLANDS	1.3	1.4	1.5	1.8	1.7	1.7	2.2	2.0	2.3	2.5	2.5	2.7	2.8	2.9	3.0	3.2	3.3	3.4	2.4	0.13	0.00	0.98
	CANADA	6.7	7.3	7.5	7.1	7.6	7.8	8.5	8.7	8.7	8.7	8.0	8.4	8.6	8.2	8.0	7.8	7.7	8.2	8.0	0.06	0.02	0.25
	AUSTRALIA	2.9	3.3	2.9	2.8	3.0	2.6	2.9	3.1	3.0	2.7	3.0	2.9	3.1	3.5	3.2	3.3	3.4	3.6	3.1	0.03	0.01	0.36

Note: Source ISI NSIOD 1981-97; world paper counts quoted with the permission of ISI; the values for England, Scotland, Wales and North Ireland are expressed as a percentage of UK papers

Table 4 - percentage of world publications in the field

Field	COUNTRY	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total	slope	SE	R ²	
Public Hlth & Hlth Care	WORLD (papers)	2815	2943	2873	3054	3465	3440	3596	3676	3950	3980	4314	4529	5132	5659	7719	7141	7615	7762	83663	309	30	0.87	
	US	72.3	71.8	73.1	73.8	72.5	71.3	72.1	70.2	69.9	69.1	66.0	68.4	65.0	64.3	63.2	60.9	62.5	60.3	66.6	-0.79	0.07	0.90	
	UK	8.8	8.6	8.2	6.9	7.9	8.6	8.7	9.5	7.4	9.3	10.7	10.3	11.3	12.3	12.6	14.3	12.1	13.1	10.7	0.35	0.05	0.76	
	ENGLAND	85	85	86	85	84	82	83	83	80	80	85	84	79	83	84	84	85	84	83	-0.07	0.09	0.04	
	SCOTLAND	11	11	9	11	11	13	12	12	13	11	10	15	16	12	12	11	13	12	12	0.10	0.07	0.11	
	NORTH IRELAND	3	1	0	2	3	2	2	2	2	2	3	4	3	3	2	2	2	2	3	2	0.06	0.04	0.14
	WALES	2	4	5	3	4	5	4	4	7	7	4	3	6	4	5	7	5	5	5	5	0.12	0.06	0.21
	EUROPEAN UNION	13.7	13.8	12.6	11.7	13.4	14.3	14.8	16.2	14.9	15.6	19.0	17.5	19.9	20.8	20.5	22.6	21.8	24.0	18.3	0.67	0.06	0.90	
	FRANCE	0.3	0.2	0.2	0.4	0.7	0.4	0.3	0.6	0.5	0.5	0.6	0.8	0.8	0.5	0.8	0.6	0.9	0.7	0.6	0.03	0.01	0.58	
	GERMANY	1.6	1.9	1.8	1.3	1.6	1.4	1.6	1.7	1.5	1.5	1.3	1.6	1.7	1.5	1.3	1.2	1.3	1.5	1.5	-0.02	0.01	0.34	
	NETHERLANDS	0.6	0.6	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.3	1.7	1.9	1.7	1.6	1.4	1.9	2.2	2.5	1.5	0.11	0.01	0.90	
	CANADA	6.9	6.5	6.8	6.4	6.4	6.6	5.8	6.8	8.1	7.9	7.7	7.3	7.5	7.5	6.6	7.0	7.1	6.4	7.0	0.03	0.03	0.08	
	AUSTRALIA	2.3	1.9	2.1	2.5	2.1	2.5	1.9	1.8	2.0	3.0	2.7	3.4	3.5	3.1	5.7	5.8	5.3	6.3	3.7	0.24	0.04	0.71	
	Rehabilitation	WORLD (papers)	1375.0	1385.0	1379.0	1120.0	1365.0	1357.0	1201.0	1172.0	1240.0	1257.0	1254.0	1063.0	1195.0	1234.0	1627.0	1442.0	1515.0	1421.0	23602.0	7	7	0.06
		US	80.9	82.1	85.9	78.9	82.8	82.9	83.8	81.3	76.9	74.8	80.8	79.3	76.5	73.3	71.7	72.8	66.9	74.2	77.9	-0.77	0.13	0.67
UK		3.9	5.6	4.8	8.0	5.8	5.8	6.4	6.6	8.5	7.6	6.6	7.1	6.9	8.9	10.8	9.6	12.9	8.2	7.5	0.33	0.06	0.63	
ENGLAND		75	83	88	77	84	82	82	75	84	81	81	88	87	89	79	79	83	83	82	0.16	0.19	0.04	
SCOTLAND		21	13	11	16	9	14	9	14	15	11	13	7	16	7	17	15	14	11	13	-0.10	0.17	0.02	
NORTH IRELAND		4	3	3	3	0	1	0	1	0	0	1	3	1	2	2	1	2	3	2	-0.02	0.06	0.01	
WALES		2	3	2	6	9	4	12	9	6	9	6	7	7	5	7	7	7	5	6	0.17	0.12	0.12	
EUROPEAN UNION		12.2	11.5	8.3	12.5	9.8	9.4	9.7	11.3	13.6	15.3	10.7	11.7	15.2	15.7	17.9	17.6	20.9	15.6	13.4	0.50	0.10	0.60	
FRANCE		0.1	0.4	0.0	0.0	0.2	0.1	0.3	0.3	0.4	0.6	0.4	0.4	0.6	0.5	0.2	0.5	0.7	0.5	0.3	0.03	0.01	0.52	
GERMANY		6.5	2.4	1.2	1.4	1.2	0.8	0.5	0.8	1.5	1.9	1.0	0.6	1.7	1.5	1.2	1.4	0.7	1.1	1.5	-0.11	0.06	0.19	
NETHERLANDS		0.4	0.7	0.5	1.1	0.8	1.0	0.5	1.4	1.5	2.0	1.0	1.5	1.8	2.0	2.5	2.4	2.8	2.1	1.5	0.13	0.02	0.81	
CANADA		3.6	3.4	3.3	4.5	4.3	4.9	4.7	5.3	4.8	5.7	5.9	5.9	5.7	7.0	6.9	4.7	6.6	5.1	5.1	0.16	0.03	0.61	
AUSTRALIA		1.3	1.5	1.9	1.8	1.1	1.0	1.0	1.1	1.5	2.2	2.0	2.7	1.8	2.8	3.6	3.8	4.0	3.2	2.2	0.15	0.03	0.67	
Social Work & Social Poli		WORLD (papers)	1859	1820	1790	1929	2004	1850	1755	1816	1790	1782	1972	1949	1767	1662	1941	1824	1693	1779	32982	-5	4	0.08
		US	71.9	76.8	74.4	74.4	74.6	72.6	70.1	72.7	66.7	64.5	64.6	67.1	69.5	68.5	68.1	65.8	66.1	65.1	69.7	-0.59	0.11	0.65
	UK	8.9	7.7	8.0	7.2	8.6	9.3	11.1	10.0	11.3	12.3	11.2	11.7	8.4	10.2	10.4	10.5	11.9	11.4	10.0	0.19	0.05	0.43	
	ENGLAND	85	87	83	85	88	90	87	87	87	86	83	81	89	84	93	87	88	84	86	0.06	0.12	0.01	
	SCOTLAND	8	10	14	10	8	9	11	10	9	12	11	14	9	10	5	6	8	10	10	-0.11	0.10	0.07	
	NORTH IRELAND	2	1	1	1	2	0	1	1	2	2	2	3	0	2	3	2	2	1	2	0.05	0.04	0.09	
	WALES	5	4	6	5	2	2	1	2	4	2	6	3	3	5	3	5	2	6	4	0.02	0.07	0.01	
	EUROPEAN UNION	11.1	9.6	10.7	11.2	11.7	13.0	14.2	13.6	16.5	17.6	17.0	17.4	13.3	15.6	16.4	15.5	18.5	17.1	14.4	0.43	0.07	0.70	
	FRANCE	0.2	0.3	0.2	0.6	0.3	0.6	0.6	0.3	0.7	0.8	0.7	0.7	0.9	0.7	0.8	0.4	0.7	0.7	0.6	0.03	0.01	0.38	
	GERMANY	0.4	0.4	0.7	0.8	0.4	0.8	0.7	0.8	0.7	1.1	1.1	1.3	1.5	0.7	1.2	0.8	0.8	0.7	0.8	0.03	0.01	0.27	
	NETHERLANDS	0.3	0.3	0.7	0.5	0.5	0.9	0.6	0.6	0.8	1.4	1.4	1.3	1.0	1.1	0.9	1.1	1.7	1.0	0.9	0.06	0.01	0.59	
	CANADA	4.2	5.1	3.6	3.5	4.5	4.6	6.3	5.2	5.7	6.0	5.3	6.5	4.9	6.2	6.2	6.5	5.3	6.6	5.3	0.13	0.03	0.54	
	AUSTRALIA	5.3	4.5	6.4	4.6	4.4	4.2	3.8	4.0	5.3	5.0	3.8	3.7	3.6	4.3	4.1	4.1	5.1	3.4	4.4	-0.07	0.03	0.22	

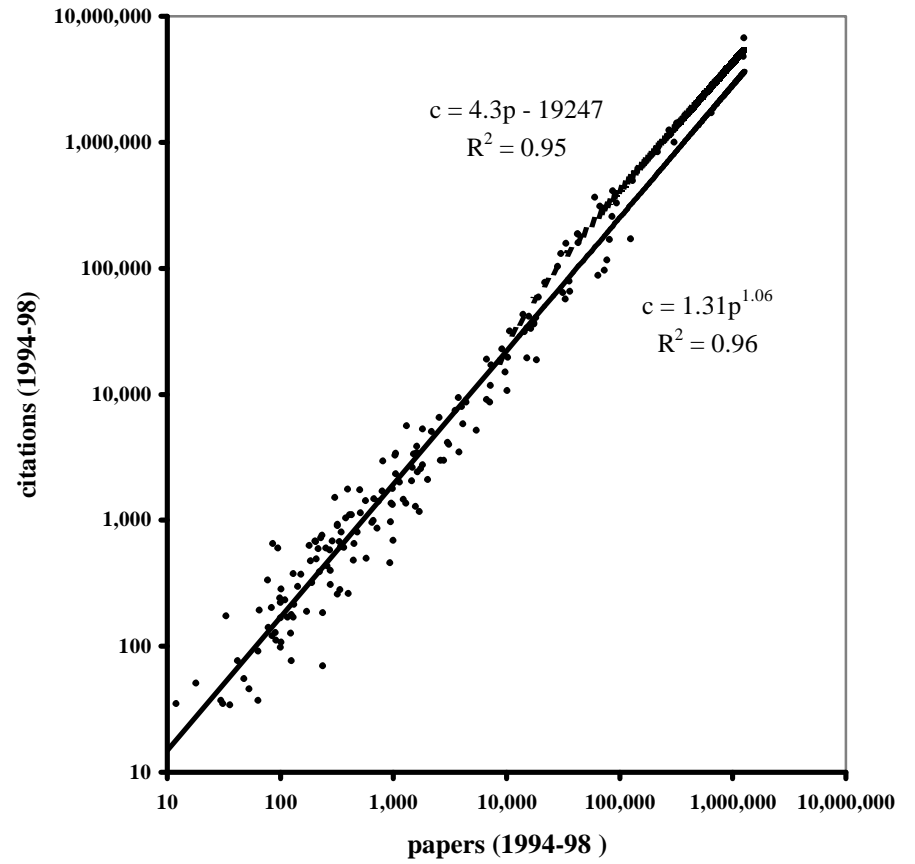
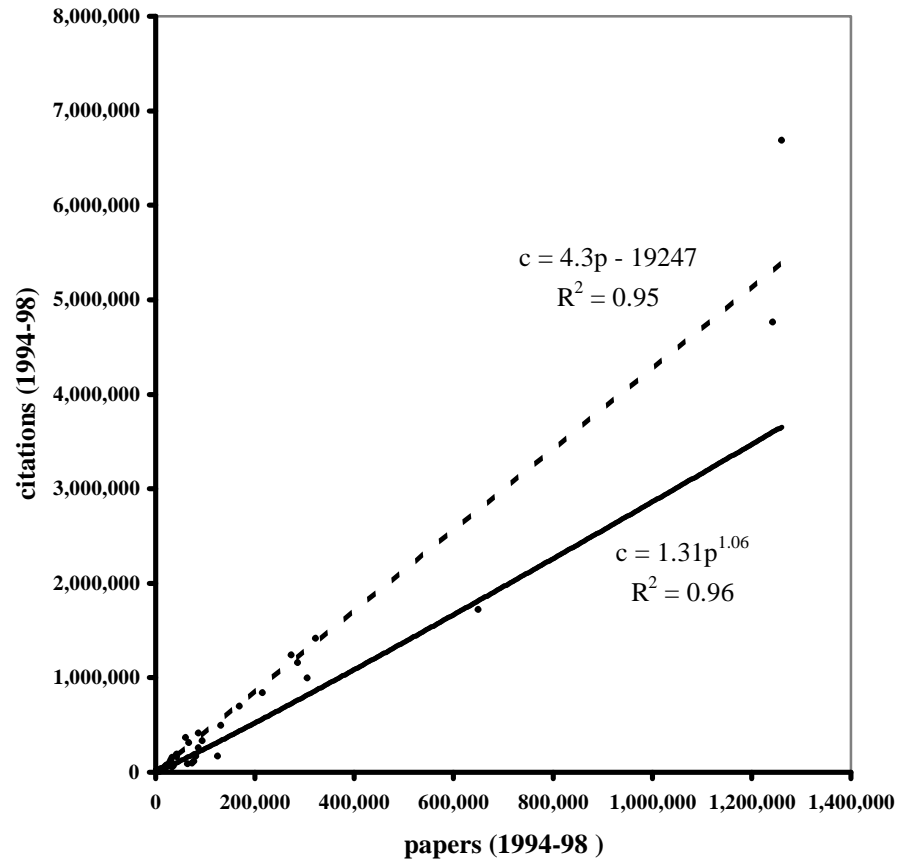
Note: Source ISI NSIOD 1981-97; world paper counts quoted with the permission of ISI; the values for England, Scotland, Wales and North Ireland are expressed as a percentage of UK papers

Table 4 - percentage of world publications in the field

Field	COUNTRY	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total	slope	SE	R ²
Sociology & Anthropology	WORLD (papers)	3889	3829	3780	3597	4036	4014	3618	3801	3972	4171	4236	4348	4110	4396	4574	4493	4388	4263	73515	45	8	0.67
	US	63.2	62.5	61.3	62.4	61.0	59.6	60.1	60.7	65.2	61.8	61.7	58.4	59.2	54.9	55.9	54.2	54.0	55.6	59.4	-0.50	0.09	0.65
	UK	6.9	6.4	6.5	5.9	7.1	6.9	6.6	5.6	5.3	5.8	6.8	7.4	7.6	7.6	10.2	9.2	9.4	11.0	7.4	0.22	0.05	0.54
	ENGLAND	88	85	87	82	85	87	85	83	86	89	84	87	90	88	86	90	85	87	86.6	0.12	0.09	0.09
	SCOTLAND	9	11	7	8	9	6	7	9	5	7	9	7	5	8	7	6	8	9	7.4	-0.09	0.08	0.08
	NORTH IRELAND	2	1	2	4	5	4	5	4	5	3	2	2	5	2	5	3	4	3	3.4	0.04	0.06	0.02
	WALES	3	5	5	7	3	5	2	6	5	2	6	7	4	5	3	3	5	3	4.2	-0.02	0.07	0.00
	EUROPEAN UNION	17.6	18.1	17.4	16.7	18.5	19.3	19.4	18.0	16.3	17.2	17.9	20.0	19.8	20.7	22.7	23.1	22.9	24.5	19.6	0.37	0.07	0.65
	FRANCE	3.2	4.4	3.1	3.1	4.5	5.4	4.4	4.5	4.0	4.0	3.3	4.5	3.7	4.1	3.6	4.2	4.4	4.8	4.1	0.03	0.03	0.06
	GERMANY	3.0	3.4	3.6	3.1	2.7	2.9	2.8	2.8	2.4	2.9	3.0	3.7	3.2	3.2	3.7	3.7	3.2	2.8	3.1	0.01	0.02	0.04
	NETHERLANDS	1.1	1.3	1.3	1.6	1.5	1.2	1.9	1.7	1.8	1.8	1.4	1.8	2.3	2.3	2.2	2.5	2.6	2.2	1.8	0.08	0.01	0.80
	CANADA	5.9	5.6	5.4	5.2	5.5	5.8	5.3	5.8	5.2	6.0	5.5	5.6	5.4	5.7	5.3	5.8	5.7	4.7	5.5	-0.01	0.01	0.03
	AUSTRALIA	2.6	2.6	3.2	3.0	2.6	3.0	3.4	3.0	2.6	2.4	2.5	2.5	2.8	2.9	3.2	3.2	3.5	3.2	2.9	0.02	0.02	0.11

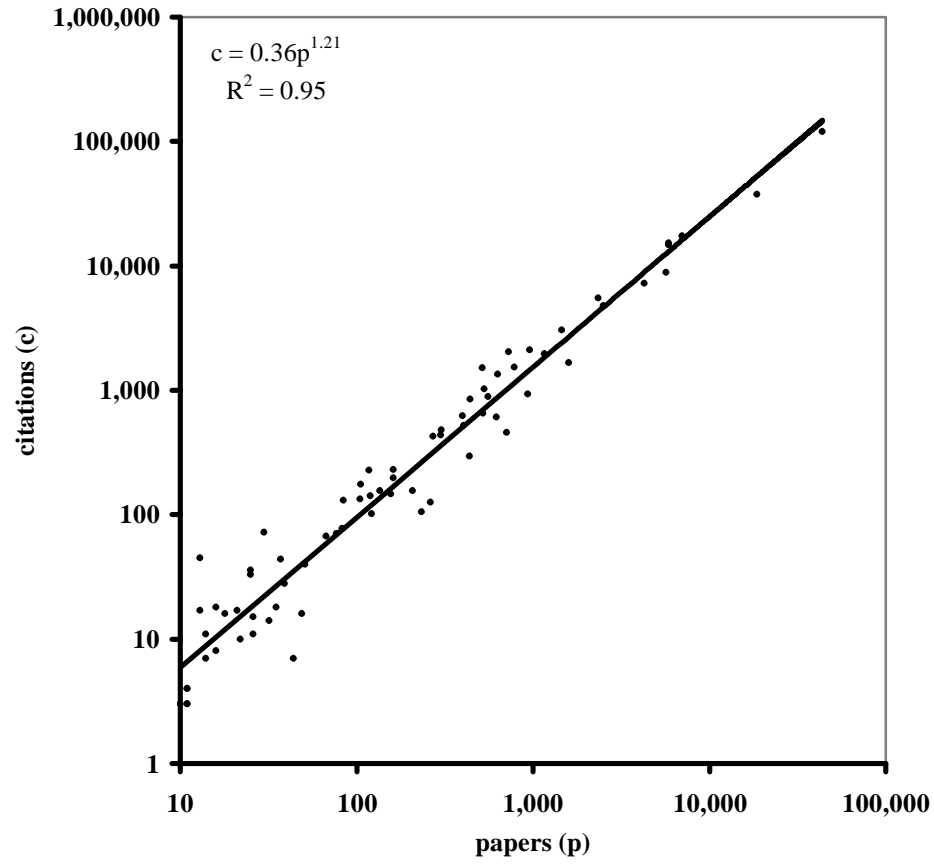
Note: Source ISI NSIOD 1981-97; world paper counts quoted with the permission of ISI; the values for England, Scotland, Wales and North Ireland are expressed as a percentage of UK papers

Figure 1- Citations vs papers for all research fields in the NSIOD (1994-95)

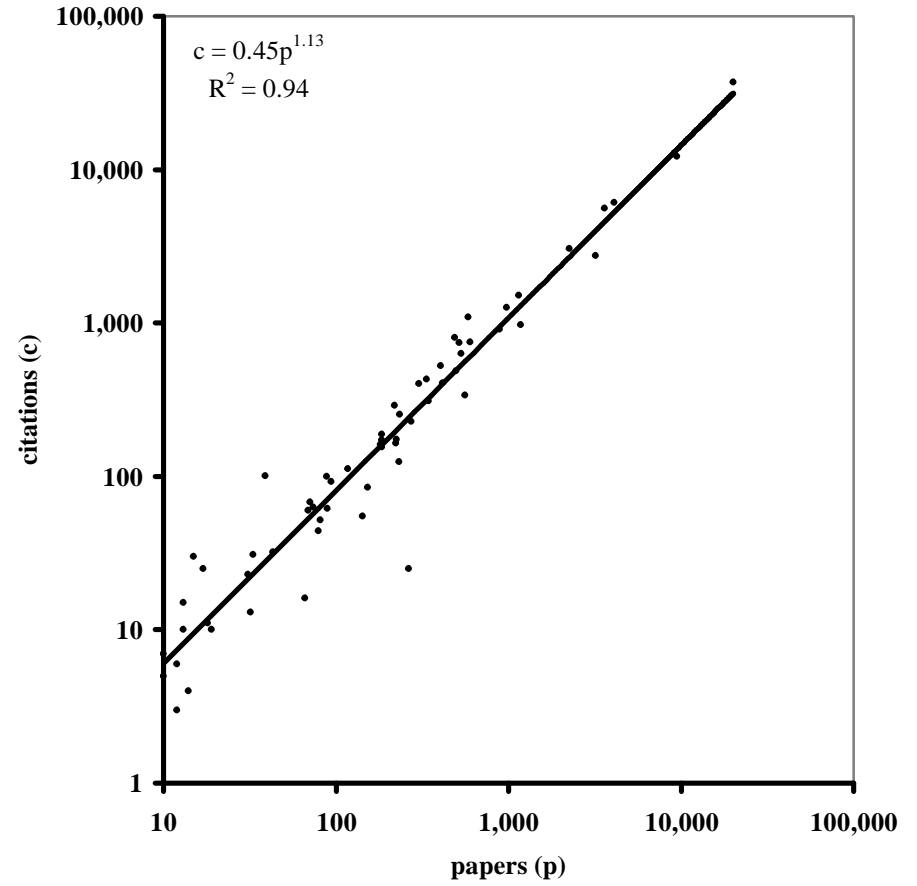


Data source: ISI National Science Indicators on Diskette (1981-1998)

Figure 2 - Citations vs papers (1994-98)



Psychology



Economics

Data source: ISI National Science Indicators on Diskette (1981-1998)

be required to explain why the exponent for economics increased while the exponent for psychology decreased.

The power law relationship between citations, c , and papers, p , is given by the general equation

$$c = kp^n \quad (3)$$

where n is the slope of the log-log regression line and k is a constant. This relationship can be used to calculate an impact measure that is adjusted for the effect of publishing size. Using the power law we can compute the number of citations, c_e , a country of a given publishing size should *expect* to receive in a particular field. Then we can calculate the expected impact, I_e , as follows

$$I_e = c_e/p = kp^{n-1} \quad (4)$$

where p is the number of papers published by the country. Next we calculate the conventional or *actual* impact, I_o , given by

$$I_o = c_o/p \quad (5)$$

The ratio between the observed impact and the expected impact gives us a measure of how much impact a nation is actually having compared to the amount of impact it is expected to have given its publishing size. This indicator is called the *relative international citation impact* (RICI) indicator and is given by the following equation

$$RICI = I_o/I_e = c_o/c_e \quad (6)$$

3.3.1.2 Comparison of impact measures

Using both the conventional impact indicator and the RICI indicator let us explore how the UK's research impact in psychology (Table 5) and economics (Table 6) compares with other nations. The indicators were prepared using the NSIOD and 5-year overlapping time intervals in order to minimise the effect of the variable window citation counts. Using the conventional impact indicator we can see that of the countries listed in Table 5a the US and Canada dominated the field. Although the UK performed reasonably well this indicator shows that it led the US in only one time interval. The RICI paints a completely different picture. We see that the UK outperformed the US in every time interval. More interestingly, the new indicator suggests that in psychology for its size Wales had the greatest research impact.

A similar story emerges when we examine these indicators in the field of economics. Using the conventional impact indicator we can see that of the countries listed in Table 6a, US research appears to have the greatest impact. However the picture is not as clear when one examines the RICI indicator. In 8 of the 14 time intervals the UK matched or exceeded the US research impact. In fact in 10 out of the 14 time intervals a UK country had the greatest impact.

3.3.2 Summary

The UK share of the world publications in the social sciences and behavioural sciences increased over the 18-year time period. It has its largest percentage share of world papers in environmental studies, geography & development and its strongest growth in management sciences. The UK share of psychology publications grew from 7% to 10% and economics publications grew from 10% to 13% over the 18-year time interval.

Table 5 - Psychology impact indicators

a. Impact (citations/paper)														
COUNTRY	1981-85	1982-96	1983-87	1984-88	1985-899	1986-90	1987-91	1988-92	1989-93	1990-94	1991-95	1992-96	1993-97	1994-98
US	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.4	2.5	2.6	2.6	2.7
UK	1.9	2.1	2.0	1.8	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.5	2.6	2.5
ENGLAND	2.0	2.1	2.0	1.9	2.1	2.1	2.1	2.1	2.3	2.2	2.3	2.3	2.4	2.6
SCOTLAND	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.6	1.7	1.6	1.6	2.1	2.4	2.8
WALES	1.5	1.6	1.6	1.6	1.5	1.6	1.7	1.7	2.1	2.2	2.2	2.3	2.6	2.9
NORTH IRELAND	0.8	0.8	0.8	0.7	0.8	1.1	1.2	1.0	0.9	0.8	1.0	1.2	1.4	1.6
EUROPEAN UNIO!	1.5	1.6	1.5	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.9	2.0
FRANCE	1.3	1.3	1.3	1.3	1.4	1.6	1.6	1.5	1.6	1.7	1.6	1.7	1.8	2.1
GERMANY	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.7
NETHERLANDS	1.6	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.9	2.1	2.2	2.2	2.1	2.4
CANADA	2.2	2.2	2.2	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.2	2.3	2.5
AUSTRALIA	1.7	1.8	1.9	1.7	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.8	1.9

b. Relative International Citation Impact (RICI)														
COUNTRY	1981-85	1982-96	1983-87	1984-88	1985-899	1986-90	1987-91	1988-92	1989-93	1990-94	1991-95	1992-96	1993-97	1994-98
US	1.0	1.0	1.0	1.2	1.2	1.1	1.0	0.9	0.9	0.8	1.0	0.9	1.0	0.8
UK	1.4	1.4	1.3	1.3	1.4	1.3	1.3	1.2	1.3	1.1	1.2	1.3	1.3	1.1
ENGLAND	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.3	1.4	1.3	1.3	1.3	1.2	1.2
SCOTLAND	1.7	1.6	1.5	1.4	1.4	1.4	1.5	1.4	1.5	1.4	1.4	1.6	1.7	1.9
WALES	1.7	1.7	1.7	1.6	1.4	1.5	1.7	1.7	2.0	2.4	2.1	1.9	2.0	2.2
NORTH IRELAND	1.0	0.9	0.9	0.7	0.8	1.1	1.3	1.1	1.0	0.9	1.0	1.1	1.2	1.3
EUROPEAN UNIO!	0.9	1.0	0.9	1.0	1.0	0.9	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.7
FRANCE	1.2	1.1	1.1	1.1	1.1	1.2	1.3	1.2	1.2	1.3	1.2	1.2	1.2	1.3
GERMANY	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.9	0.8
NETHERLANDS	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.4	1.4	1.5	1.4	1.3	1.3
CANADA	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.3	1.4	1.3	1.4	1.2	1.2	1.1
AUSTRALIA	1.3	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0

Table 6 - Economics impact indicators

a. citations/paper														
COUNTRY	1981-85	1982-96	1983-87	1984-88	1985-899	1986-90	1987-91	1988-92	1989-93	1990-94	1991-95	1992-96	1993-97	1994-98
US	1.4	1.5	1.5	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.8	1.8	1.8	1.9
UK	1.1	1.2	1.2	1.1	1.2	1.3	1.3	1.3	1.2	1.2	1.3	1.3	1.4	1.5
ENGLAND	1.1	1.2	1.2	1.2	1.3	1.4	1.4	1.4	1.2	1.3	1.4	1.4	1.4	1.6
SCOTLAND	0.7	0.6	0.6	0.6	0.7	0.7	0.8	0.9	0.8	0.8	1.1	1.1	1.3	1.3
NORTH IRELAND	1.0	0.6	0.9	1.1	1.4	0.7	0.7	1.0	0.6	0.5	0.5	0.5	0.5	0.9
WALES	0.7	0.6	0.6	0.4	0.5	0.6	0.7	0.8	0.6	0.8	0.8	0.8	0.8	0.9
EUROPEAN UNIO!	0.9	1.0	1.0	0.9	1.0	1.0	1.0	1.1	1.0	1.1	1.1	1.2	1.2	1.3
FRANCE	1.1	1.2	1.1	1.0	1.0	1.0	1.0	1.2	1.1	1.0	1.0	1.2	1.2	1.3
GERMANY	0.5	0.6	0.7	0.8	0.7	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0
NETHERLANDS	0.9	0.8	0.8	0.7	0.8	0.8	0.7	0.7	0.7	0.9	0.9	1.1	1.2	1.3
CANADA	1.2	1.2	1.3	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.4
AUSTRALIA	0.9	1.0	0.9	0.9	0.7	0.7	0.8	0.9	0.9	0.9	0.9	0.8	0.8	0.8

b. Relative International Citation Impact (RICI)														
COUNTRY	1981-85	1982-96	1983-87	1984-88	1985-899	1986-90	1987-91	1988-92	1989-93	1990-94	1991-95	1992-96	1993-97	1994-98
US	0.9	1.1	1.0	1.4	1.1	1.2	1.1	1.3	1.4	1.3	1.4	1.4	1.3	1.2
UK	1.0	1.1	1.1	1.3	1.2	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2
ENGLAND	1.1	1.2	1.2	1.4	1.3	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.2
SCOTLAND	1.1	0.8	0.8	1.0	1.1	1.1	1.2	1.2	1.0	1.1	1.3	1.3	1.4	1.4
NORTH IRELAND	2.5	1.2	1.9	2.0	2.9	1.4	1.3	1.6	0.9	0.9	0.8	0.8	0.8	1.1
WALES	1.4	1.1	1.0	0.6	1.0	1.1	1.3	1.1	0.8	1.3	1.1	1.0	1.1	1.0
EUROPEAN UNIO!	0.8	0.9	0.8	1.1	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9
FRANCE	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.5	1.4	1.3	1.1	1.3	1.2	1.2
GERMANY	0.8	0.8	0.9	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.0
NETHERLANDS	1.3	1.1	1.0	1.1	1.1	1.1	1.0	0.9	0.8	1.0	1.1	1.2	1.2	1.2
CANADA	1.3	1.2	1.3	1.5	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.1	1.1
AUSTRALIA	1.0	1.1	1.1	1.2	0.9	0.9	1.0	1.0	1.0	1.0	0.9	0.9	0.8	0.8

England displayed its greatest growth in the percentage share of UK publications in rehabilitation, Scotland in communications, Wales in library & information sciences and North Ireland in psychology.

The RICI impact indicator that has been corrected to account for the non-linear relationship between citations/paper and publishing size portrays a different picture of the impact of UK psychology and economics research than the conventional impact indicator. We see that the UK exceeded the US impact in psychology in all the time intervals and it matched or exceeded the US impact in economics in 8 out of the 14 time intervals. For its size, out of the countries examined Welsh research had the greatest impact in psychology and a UK country had the greatest impact in economics in 9 out of the 14 time intervals.

References

- Bourke, P.L. Butler, L. and Biglia B. (1996). *Monitoring Research in the Periphery: Australia and the ISI indices*, Research Evaluation and Policy Project, Monograph series No.3.
- Glänzel, W. (1996). 'A bibliometric approach to social sciences. National research performance in 6 selected social science areas 1990-1992', *Scientometrics*, Vol 35, No. 3, 291-307.
- Hicks, D. (1999). 'The difficulty of achieving full coverage of international social science literature and the bibliometric consequences', *Scientometrics*, Vol 44, No. 2., 193-215.
- Hicks, D.M., T. Ishizuka, P. Keen and S. Sweet (1994). 'Japanese Corporations, Scientific Research and Globalisation', *Research Policy*, Vol. 23, 375-384.
- Katz J.S (1999). 'The Self-Similar Science System', *Research Policy*, 28, 501-517, 1999
- Katz JS and Hicks D (1997). 'Bibliometric Indicators for National Systems of Innovation' prepared for IDEA project funded by TSER program of the EC, ESRC Centre on Science, Technology, Energy and Environment Policy Science Policy Research Unit, University of Sussex, Brighton, BN1 9RF, UK.
- Katz, J.S. and Martin, B.R. (1997). 'What is Research Collaboration?'; *Research Policy*, Vol. 26, 1-18.
- May, R.M (1997). 'The scientific wealth of nations', *Science*, Vol. 275, 793-796.
- Narin, F. (1976). *Evaluative Bibliometrics: The Use of Publication and Citation Analysis in the Evaluation of Scientific Activity*, Cherry Hill, NJ, CHI.
- Nederof, A.J., Zwaan, R.A., Debruin, R.E., Dekker, P.J. (1989). "Assessing the Usefulness of Bibliometric Indicators for the Humanities and the Social and Behavioral Sciences: A Comparative Study," *Scientometrics*, 15, 5-6, 423-435.
- Pestaña, A., Gómex, M.T., Ferenández, M.A., Zulueta, A., Méndez, A. (1995). 'Scientific evaluation of R&D activities in medium-size institutions: A case study on the Spanish Scientific Research Council (CSIC)', in *The Proceedings of the Fifth International Conference of the International Society for Scientometrics and Informatics*, Koenig M. and Bookstein A (Eds), 425-434.
- Schoepflin, U. (1990). 'Problems of representativity in the Social Science Citation Index, in: *Representations of Science and Technology*, Proceedings of the International Conference on Science and Technology Indicators, Bielefeld, Germany, 10-12 June, P. Weingart, R. Sehringer and M. Winterhager (Eds.), 1992 DSWO Press 177-188.
- ISI, (1999). 'Citations reveal concentrated influence: some fields have it, but what does it mean?' *Science Watch* January/February p1-2.
- Tijssen, R.J.W., Van Leeuwen Th. N., Verspagen B., Slabbers M., (1996). *Wetenschappen Technologie-Indicatoren 1996*, Het Nederlands Observatorium van Wetenschap en Technologie: Centrum voor Wetenschappen - en Technologie-Studies (CWTS) en Maastricht Economic Research Institute on Innovation and Technology (MERIT) in opdracht van het Ministeries van Onderwijs, Cultuur en Wetenschappen, Zoetermeer, (ISBN 90-75023-03-0).
- Van der Meulen, B., Keydesdorff, L., (1991). 'Has the study of philosophy at Dutch universities changed under economic and political pressures?' *Science, Technology, & Human Values*, 16, 3, 228-321.

Appendex A

National Science Indicators: Social Science & Behavioural Science Fields

The following is a description of the research fields that ISI covers in the Social Science & Behavioural Science categories contained on the NSIOD

Communication category includes journals that study the verbal and non-verbal exchange of information, including areas such as communication theory, practice and policy; mass media; public opinion and public relations; speech; technical writing; and marketing and advertising.

Economics category includes journals in a broad range of specialties, including theoretical, political, agricultural, macroeconomical, developmental, and econometrical economics. Also included are business and finance journals.

Education category contains journals on both theoretical and practical educational issues. The category also contains journals on special education.

Environmental Studies, Geography & Development category contains journals that examine the relationship between humans and the environment, both natural and fabricated. Subjects covered include environmental behaviour, leisure studies, regional studies, urban planning, human and political geography, cartography, resource development, disaster planning, and cultural change.

Law category includes the law reviews from the major universities, as well as some material concerning interdisciplinary subjects of interest to social scientists. Journals concerned with the relationship between law and another social science discipline (such as economics or psychology) are covered in that discipline's category.

Library & Information Sciences category covers journals on all areas of information and library science, from the academic to the professional, including online services, CD-ROM, and Internet information sources and computerised methods. Material on serials, librarianship, cataloguing and bibliography, special libraries and library automation, and documentation studies are also included.

Management category covers journals on management and organisational science, strategic planning and decision-making methods, industrial relations and labour.

Political Science & Public Administration category includes journals on all aspects of political science, both domestic and international, and public administration.

Psychiatry category includes journals involving the origins, diagnosis, and treatment of persons with mental and emotional disorders.

Psychology category covers journals on all areas of psychology, including applied, biological, clinical, developmental, educational, mathematical, organisational, and personal and social.

Public Health & Health Care Science category includes journals on public health, nursing, health services, hospital administration, health care management, biomedical ethics, geriatrics and gerontology, and substance abuse.

Rehabilitation category includes journals dealing with all therapeutic approaches to developmental disabilities: mental, speech, hearing, visual and other physical disorders. Studies in music, art, and dance, and occupational therapy are also included here.

Social Work & Social Policy category includes journals from a variety of areas such as criminology, penology, social issues, and social work.

Sociology & Anthropology category includes journals that focus on how human behaviour is shaped by social forces and the study of the history of human civilisations. Areas covered include demography, ethnic studies, family studies, women's studies, and area studies.