

# India's Research Output and Collaboration (2005-14): A Bibliometric Study (Phase-II)



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National Science and Technology Management Information System (NSTMIS)  
Department of Science & Technology (DST)  
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## CHAPTER 1. EXECUTIVE SUMMARY

This report was commissioned by the Department of Science and Technology (DST), Government of India and produced by Thomson Reuters. It presents the findings of the second phase of an evaluation of India's research and collaboration. This report analyses Indian research published between 2005 and 2014, whereas the Phase I report, completed in 2011, analysed research published between 1981 and 2010.

The purpose of this report is to provide DST with an understanding of India's volume of research activity, research quality and international collaboration in an internationally comparative context. The strengths and weaknesses of the Indian research system are collectively identified by using multiple bibliometric indicators across different research areas, in order to facilitate a further understanding of India's disciplinary focus.

### KEY FINDINGS

**India's number of papers:** India's output of research papers doubled from 24,998 in 2005 to 52,337 in 2014, while China's total output has grown rapidly and is now second only to the USA. All selected research economies had increased output of research papers between 2005 and 2014 (see Figure 4.1.1-1 and 4.1.1-2). In 2005, India's research output was highest in Chemistry (6,102), Physics (3,268), Engineering (2,071), Clinical Medicine (1,982) and Materials Science (1,887). By 2014, its output was highest in Chemistry (12,000), Physics (5,605), Engineering (5,196), Materials Science (4,713) and Clinical Medicine (4,347), being quite stable in terms of overall research activity. The most significant increases were in Psychiatry/Psychology (220%), Economics & Business (188%), Pharmacology & Toxicology (179%), Molecular Biology & Genetics (174%) and Environment/Ecology (165%). More details are provided in CHAPTER 4 and ANNEX 1.

**India's share of world output:** India's share of world output was 4.05% in 2014, nearly double its share in 2005 (2.65%). The USA had the highest share of world output; however, its share has been decreasing from 32.09% in 2005 to 27.64% in 2014. China had the largest increase in the share of world output, more than doubled from 7.64% in 2005 to 18.09% in 2014. The share of world output for most established research economies decreased except for Australia, Italy, the Netherlands, and Switzerland. All the emerging research economies had increased their share of world output except Russia (see Figure 4.1.2-1 and 4.1.2-2). In 2005, India's share of world output was highest in Agricultural Sciences (6.09%), Chemistry (5.34%), Materials Science (4.21%), Physics (3.52%) and Geosciences (3.39%). By 2014, India's share of world output was highest in Chemistry (8.07%), Agricultural Sciences (6.79%), Materials Science (6.52%), Pharmacology & Toxicology (6.37%) and Physics (5.54%), reflecting a slight shift in the research base. The most significant increases were in Computer Science (136%), Biology & Biochemistry (123%), Space Science (104%), Pharmacology & Toxicology (99%) and Psychiatry/Psychology (99%). More details are provided in CHAPTER 4 and ANNEX 1.

**India's citation impact:** India's citation impact remained at around three-quarters of the world average (0.74) from 2005 to 2013. India is relatively low compared with the established research economies; all but Japan had a citation impact above the world average of 1.0. Spain stands out as an emerging research economy that has maintained its citation impact (1.14) above the world average between 2005 and 2013 (see Figure 4.1.3-1 and 4.1.3-2). In 2005, India's citation impact was highest in Materials Science (0.98), Psychiatry/Psychology (0.96), Physics (0.85), Environment/Ecology (0.83), and Chemistry (0.82). By 2013, India's highest citation impact was in Economics & Business (0.96), Physics (0.94), Chemistry (0.81), Engineering (0.81) and Materials Science (0.79). The greatest increases were in Economics & Business (+116%), Neuroscience & Behaviour (23%), Social Sciences (23%), Geosciences (15%), and Plant & Animal Science (14%). More details are provided in CHAPTER 4 and ANNEX 1.

**India's highly-cited papers:** Overall, India's proportion of highly-cited papers was below the world average for all three time periods, and at each threshold – Top 1%, 5%, 10%, 25%. India was relatively low compared with established research economies; all but Japan had above world average proportion of highly-cited papers at four thresholds. Spain, again, out-performed all the other emerging research economies whose

percentage of highly-cited papers consistently maintained above the world average in all time periods (see Table 4.1.4-1). During 2005 to 2008, India's highest percentage of top 1% papers by field was in Economics & Business (1.08% – higher than world average), Engineering (0.91%), Computer Science (0.57%), Social Sciences (0.56%) and Environment/Ecology (0.56%). Between 2009 and 2012, 1.37% of papers on Materials Science were in the world top 1% and 5.33% in the top 5%, and Computer Science had 1.05% papers in the top 1%, these being the only two fields whose proportion of highly-cited papers was greater than the world average. By 2013-2014, India's highest percentage of top 1% of papers was in Materials Science (0.90%), Computer Science (0.86), Clinical Medicine (0.80%), Physics (0.72%) and Social Sciences (0.71%). More details are provided in CHAPTER 4 and ANNEX 1.

**India's international collaboration:** India's international collaboration increased in the 10-year time frame. India's rates of international collaboration were lower than observed for most selected comparators in many fields. In 2005, its rate of international collaboration was highest in Psychiatry/Psychology (53%), Space Science (46%), Materials Science (36%), Immunology (31%), and Physics (31%). Collaboration with the USA, India's most frequent collaborating country, increased from 6.67% of India's total research output in 2005-2008 to 7.74% in 2013-2014. Germany is its second most frequent collaborator, and England comes after it as the third most frequent collaborator. Collaboration with Saudi Arabia increased dramatically from 0.1% in 2005-2008 to 1.25% in 2013-2014. Many Saudi Arabian institutions now rank among India's top 10 most frequently collaborating institutions. More details are provided in CHAPTER 4, CHAPTER 8, ANNEX 1 and ANNEX 2.

**India's cross-institutional collaboration:** Of all the 288 selected Indian research institutions, the Indian Institute of Technology Kharagpur has the broadest connection (highest betweenness centrality) with other Indian institutions. The University of Delhi, Banaras Hindu University, University of Hyderabad, Panjab University and University of Calcutta are the top five universities that have broader connections with other Indian research institutions. More details are provided in CHAPTER 8.

**India's disciplinary focus:** From 2005 to 2014, India published more papers in Chemistry, Clinical Medicine, Physics, Engineering, and Materials Science than in any other fields. This disciplinary focus is different to that of the established research economies, where Clinical Medicine is always the largest field of publications. Brazil has more varied research focus, with most research output focusing on Clinical Medicine, Agricultural Sciences, and Plant & Animal Science. The disciplinary focus did not change significantly between the time periods. Detailed analyses are provided in CHAPTER 5.

**India's relative strengths, weaknesses, opportunities and threats:** In all the three time periods analysed, Chemistry (CHE), Physics (PHY), Engineering (ENG) and Materials Science (MTS) were always India's relative Strengths, while Agricultural Sciences (AGS) was always a threat since it formed a substantial part of India's total research output but with relatively lower citation impact. Mathematics became an opportunity after 2009 and so did Economics & Business in 2013, since both fields had increased citation impact during the time period analysed. More details are provided in CHAPTER 6.

**India's funding acknowledgement:** The acknowledgement of funding has increased over the time period analysed, from 47.7% of papers that acknowledged funding in 2009-2012 to 55.6% in 2013-2014. Of the top 100 highly-cited papers, the top 5 most frequent funders are from India and the USA, and these top 5 organizations partially funded 76% of these highly-cited papers. Detailed findings are provided in CHAPTER 7.



## CHAPTER 2. INTRODUCTION

### 2.1 OVERVIEW

In 2011, the Department of Science and Technology (DST), India, commissioned *Evidence*, Thomson Reuters to provide a high-level analysis of India's volume of research activity, research quality and international collaboration in an internationally comparative context, in order to inform a more focused analysis by identifying disciplinary or functional areas where further work may be beneficial.

As the second Phase of this evaluation, Thomson Reuters has been commissioned by DST, India to expand the previous analyses, and show India's competitive strengths and weaknesses in science and technology, and key areas in which India is well placed to leverage its strengths whilst tackling its weaknesses.

The outcome of this report will feed into the Indian Government's Science and Technology policy formulation and strategy for continued growth.

### 2.2 DEPARTMENT OF SCIENCE AND TECHNOLOGY (DST), INDIA

The Department of Science and Technology India was established in May 1971 to promote new areas of science and technology and to play the role of a nodal department for organising, coordinating and promoting Scientific and Technological activities in India. It has wide-ranging activities from promoting high-end basic research and the development of cutting-edge technologies on the one hand, to servicing the technological requirements of the common person through the development of appropriate skills and technologies on the other<sup>1</sup>.

- DST India has responsibilities for specific projects and programmes, such as:
  - The formulation of policies relating to science and technology
  - Matters relating to the Scientific Advisory Committee of the Cabinet (SACC)
  - Promotion of new areas of science and technology with special emphasis on emerging areas
  - Futurology
  - Coordination and integration of areas of science and technology having cross-sectoral linkages in which a number of institutions and departments have interests and capabilities
  - Undertaking or financially sponsoring scientific and technological surveys, research design and development
  - Support and grants-in-aid to Scientific Research Institutions, Scientific Associations and Bodies
  - All matters concerning:
    - Science and Engineering Research Council
    - Technology Development Board and related Acts
    - National Council for Science and Technology Communication
    - National Science and Technology Entrepreneurship Development Board
    - International Science and Technology Cooperation
    - Autonomous Science and Technology Institutions
    - Professional Science Academies
    - The Survey of India and National Atlas and Thematic Mapping Organisation
    - National Spatial Data Infrastructure
    - National Innovation Foundation (Ahmedabad)

### 2.3 THOMSON REUTERS

Thomson Reuters is the world's leading source of intelligent information for business and professionals. We combine industry expertise with innovative technology to deliver critical information to leading decision

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<sup>1</sup> [www.dst.gov.in](http://www.dst.gov.in)

makers in the financial, legal, tax and accounting, healthcare, science and media markets, powered by the world's most trusted news organisation. Visit our [WEBPAGE](#) for more information.

#### **2.4 THOMSON REUTERS RESEARCH ANALYTICS**

Thomson Reuters Research Analytics is a suite of products, services and tools that provide comprehensive research analysis, evaluation and management. For over half a century we have pioneered the world of citation indexing and analysis, helping to connect scientific and scholarly thought around the world. Today, academic and research institutions, governments, not-for-profits, funding agencies, and all others with a stake in research need reliable, objective methods for managing and measuring performance. Visit our [WEBPAGE](#) for more information.

#### **2.5 THOMSON REUTERS RESEARCH DATA & SERVICES TEAM**

Thomson Reuters Research Data & Services team provides reporting and consultancy services within Research Analytics using customized analyses to bring together several indicators of research performance in such a way as to enable customers to rapidly make sense of and interpret a wide-range of data points to facilitate research strategy decision-making. We have extensive experience with databases on research inputs, activity and outputs and have developed innovative analytical approaches for benchmarking, interpreting and visualization of international, national and institutional research impact.

Our consultants have up to 20 years of experience in research performance analysis and interpretation. In addition, the Thomson Reuters regional Sales team will provide effective project management and on-site support to maximize values of our projects and meet the expectations of Department of Science and Technology India.

## CHAPTER 3. DATA SOURCES, INDICATORS AND INTERPRETATION

This Chapter outlines key concepts and methodology. A description of the bibliometric methodology used by Thomson Reuters is provided in ANNEX 9. This report is based upon analysis of indicators for whole countries and by the fields used in Thomson Reuters InCites: Essential Science Indicators<sup>SM</sup>.

- **Comparative analysis of India's research against 19 selected countries** (CHAPTER 4). This chapter analyses numbers of papers, share of world output, citation impact, highly-cited papers at four thresholds (1%, 5%, 10% and 25%), percentage of international collaborative papers and average Journal Impact Factor in a ten-year time frame (2005-2014). The analyses are further split into three time periods: 2005-2008, 2009-2012 and 2013-2014. India is compared with a selection of established research economies (Australia, Canada, Switzerland, England, France, Germany, Italy, Japan, Netherlands, Sweden, USA), as well as BRICS and other emerging research economies (Brazil, China, Spain, South Korea, Taiwan, Russia, Turkey, South Africa). The top 10 Essential Science Indicators fields<sup>2</sup> are reported in the main body, while the data for the other 12 Essential Science Indicators fields are supplemented in ANNEX 1.
- **Research Footprint® analysis** (CHAPTER 5). This chapter contains graphical representations of the research focus of India and each of the selected comparator countries. The Research Footprints reveal the number of papers in each Essential Science Indicators field for 2005-2014 in aggregate, and 2005-2008, 2009-2012, 2013-2014.
- **SWOT analysis** (CHAPTER 6). This chapter analyses India's research output and performance in each of the 22 Essential Science Indicators fields and, based on this analysis, classifies them as strengths, weaknesses, opportunities or threats. The analysis is provided separately for each of the time periods 2005-2008, 2009-2012 and 2013.
- **Funding acknowledgement analysis** (CHAPTER 7). This chapter provides an analysis of the funding received by Indian researchers. It covers all the Indian papers between 2005 and 2014, but only has funding acknowledgement data available from 2008 to 2014. This chapter also identifies the 25 most frequently acknowledged funders within India's 100 most highly-cited papers.
- **Collaboration analysis** (CHAPTER 8). This chapter analyses India's internationally collaborative papers. It identifies the 10 countries and 10 institutions which co-author most papers with India in each of the top 10 Essential Science Indicators fields. The data for the other 12 Essential Science Indicators fields are provided in ANNEX 2. This Chapter also analyses inter-institutional collaboration between 288 selected Indian institutions and identifies those which are central to intra-Indian collaborative networks.

ANNEX 4 to ANNEX 6 provide analyses of:

- India's top 10 most highly-cited papers in each Essential Science Indicators field during 2005-2014 (ANNEX 4).
- India's top 50 prolific institutions during 2005-2014 (ANNEX 5).
- The number and proportion of papers published in India-originated journals for each country during 2005-2014 (ANNEX 6).

<sup>2</sup> The top 10 Essential Science Indicators fields are filtered by India's total productivity between 2005-2014.

### 3.1 BIBLIOMETRIC DATA AND CITATION ANALYSIS

Research evaluation is increasingly making wider use of bibliometric data and analyses. Bibliometrics is the analysis of data derived from publications and their citations. Publication of research outcomes is an integral part of the research process and is a universal activity. Consequently, bibliometric data have a currency across subjects, time and location that are found in few other sources of research-relevant data. The use of bibliometric analysis, allied to informed review by experts, increases the objectivity of and confidence in evaluation.

Research publications accumulate citation counts when they are referred to by more recent publications. Citations to prior work are a normal part of publication, and reflect the value placed on a work by later researchers. Some papers get cited frequently and many remain uncited. Highly cited work is recognised as having a greater impact and Thomson Reuters has shown that high citation rates are correlated with other qualitative evaluations of research performance, such as peer review.<sup>3</sup> This relationship holds across most science and technology areas and, to a limited extent, in social sciences and even in some humanities subjects.

Indicators derived from publication and citation data should always be used with caution. Some fields publish at faster rates than others and citation rates also vary. Citation counts must be carefully normalised to account for such variations by field. Because citation counts naturally grow over time, it is essential to account for growth by year. Normalisation is usually done by reference to the relevant global average for the field and for the year of publication.

Bibliometric indicators have been found to be more informative for core natural sciences, especially for basic science, than they are for applied and professional areas and for social sciences. In professional areas the range of publication modes used by leading researchers is likely to be diverse as they target a diverse, non-academic audience. In social sciences there is also a diversity of publication modes and citation rates are typically much lower than in natural sciences.

Bibliometrics work best with large data samples. As the data are disaggregated, so the relationship weakens. Average indicator values (e.g. of citation impact) for small numbers of publications can be skewed by single outlier values. At a finer scale, when analysing the specific outcome for individual departments, the statistical relationship is rarely a sufficient guide by itself. For this reason, bibliometrics are best used in support of, but not as a substitute for, expert decision processes. Well-founded analyses can enable conclusions to be reached more rapidly and with greater certainty, and are therefore an aid to management and to increased confidence among stakeholders, but they cannot substitute for review by well-informed and experienced peers.

### 3.2 PUBLICATION AND CITATION DATA SOURCES

For this project, citation data have been sourced from Thomson Reuters databases underlying the Web of Science™, which gives access to conference proceedings, patents, websites, and chemical structures, compounds and reactions in addition to journals. It has a unified structure that integrates all data and search terms and therefore provides a level of comparability not found in other databases. It is widely acknowledged to be the world's leading source of citation and bibliometric data. The Thomson Reuters Web of Science™ Core Collection is part of the Web of Science and focuses on research published in journals and conferences in science, medicine, arts, humanities and social sciences. The authoritative, multidisciplinary content covers over 12,000 of the highest impact journals worldwide, including Open Access journals and over 150,000 conference proceedings. Coverage is both current and retrospective in the sciences, social sciences, arts and humanities, in some cases back to 1900. Within the research community these data are often still referred to by the acronym 'ISI'<sup>4</sup>. Thomson Reuters has extensive experience with databases on

<sup>3</sup> Evidence Ltd. (2002) Maintaining Research Excellence and Volume: A report by Evidence Ltd to the Higher Education Funding Councils for England, Scotland and Wales and to Universities UK. (Adams J, et al.) 48pp.

<sup>4</sup> The origins of citation analysis as a tool that could be applied to research performance can be traced to the mid-1950s, when Eugene Garfield proposed the concept of citation indexing and introduced the Science Citation Index, the Social Sciences Citation Index and the Arts & Humanities Citation Index, produced by the Institute of Scientific Information – ISI (now the Intellectual Property & Science business of Thomson Reuters).

research inputs, activity and outputs and has developed innovative analytical approaches for benchmarking and interpreting international, national and institutional research impact.

Granularity of analysis is an important issue. Unduly fine analysis at the level of research groups provides little comparability or connectedness, while coarse analysis may miss spikes of excellence in key areas.

Journals are mapped to one or more subject categories, and every article within that journal is subsequently assigned to that category. Thomson Reuters uses these categories as the basis for bibliometric analyses because they are well established and informed by extensive work with the research community since inception. Papers from prestigious, 'multidisciplinary' and general 'biomedical' journals such as *Nature*, *Science*, *The BMJ*, *The Lancet*, *New England Journal of Medicine* and the *Proceedings of the National Academy of Sciences* (PNAS) are assigned to specific categories based on the journal categories of the citing and cited references in each article. Further information about the journals included in the citation databases and how they are selected is available here: <http://scientific.thomsonreuters.com/mjl/>.

ANNEX 9 provides the standard methodology and data definitions used in bibliometric and citation analyses.

### 3.2.1 COUNTRY COVERAGE

In order to benchmark India's performance against other countries, CHAPTER 4 comprises analyses comparing India's research performance to two comparator groups selected by DST, India. The first group is termed the 'established research economies', which includes Australia, Canada, England, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, and USA. The second group is termed the 'emerging research economies', and includes the BRICS countries (Brazil, Russia, India, China, South Korea and South Africa) as well as Spain, Taiwan and Turkey.

In order to simplify the visual presentation of this information, 3-letter UN abbreviations<sup>5</sup> have been used in this report. India (IND) is compared with both groups and compared within both sets of Figures.

Established research economies

Code	Country
AUS	Australia
CAN	Canada
ENG	England
FRA	France
DEU	Germany
ITA	Italy
JPN	Japan
NLD	Netherlands
SWE	Sweden
CHE	Switzerland
USA	USA

BRICS and other emerging research economies

Code	Country
BRA	Brazil
CHN	China
IND	India
RUS	Russia
ZAF	South Africa
KOR	South Korea
ESP	Spain
TWN	Taiwan
TUR	Turkey

In addition to this comparative benchmarking, CHAPTER 8 of the report analyses India's collaboration with other countries. This Chapter analyses the 20 countries which co-authored most papers with Indian researchers during 2005-2014, which may differ from the countries listed above.

### 3.2.2 TIME COVERAGE

Several time periods are used in this report. CHAPTER 4 analyses the 10 years 2005 to 2014, and further splits into three periods: 2005-2008, 2009-2012, and 2013-2014. Note these time periods are not of equal length.

With the absence of 2014 baseline data, Normalised Citation Impact will not be reported individually for 2014 nor as part of the 2013-2014 aggregation.

<sup>5</sup> <http://unstats.un.org/unsd/methods/m49/m49alpha.htm>

### 3.2.3 RESEARCH FIELDS

Standard bibliometric methodology uses journal categories as a proxy for research fields or areas. Thomson Reuters assigns all journals to one or more subject areas and these are used to indicate the subject matter of papers in those journals. We have used one such classification scheme in this report to assign published research to research areas. These are the Thomson Reuters InCites: Essential Science Indicators<sup>SM</sup> fields, which aggregate data at a higher level than the Web of Science journal categories. The Essential Science Indicators fields and Web of Science Journal Subject Categories do not map directly but complement each other to provide both a high level and detailed analysis of research. The 22 Essential Science Indicators fields are:

Category Code	Full Description
AGS	Agricultural Sciences
BBI	Biology & Biochemistry
CHE	Chemistry
CLM	Clinical Medicine
CPS	Computer Science
ECB	Economics & Business
ENG	Engineering
ENE	Environment/Ecology
GSC	Geosciences
IMU	Immunology
MTS	Materials Science
MAT	Mathematics
MIC	Microbiology
MOL	Molecular Biology & Genetics
MUL	Multidisciplinary
NEB	Neuroscience & Behaviour
PHT	Pharmacology & Toxicology
PHY	Physics
PLA	Plant & Animal Science
PSS	Psychiatry/Psychology
SPA	Space Sciences
SSS	Social Sciences, general

### 3.2.4 DATA COLLECTION

In this report, all the publication data was collected in January 2015, by using country name searches of the address affiliation data provided by authors and indexed in SCI-EXPANDED, SSCI and A&HCI of *Web of Science™ Core Collection*.

More specifically, only the publications with document types of articles and reviews are included in the analyses, and editorials, meeting abstracts or other types of publications are not included. More details on methodology can be found in the following Section 3.3.

## 3.3 BIBLIOMETRIC AND CITATION DATA DEFINITIONS AND INDICATORS

**Citations:** The citation count is the number of times that a citation has been recorded for a given publication since it was published. Not all citations are necessarily recorded since not all publications are indexed. However, the material indexed by Thomson Reuters is estimated to attract about 95% of global citations.

**Citation impact:** ‘Citations per paper’ is an index of academic or research impact (as compared with economic or social impact). It is calculated by dividing the sum of citations by the total number of papers in any given dataset (so, for a single paper, raw impact is the same as its citation count). Impact can be calculated for papers within a specific research field such as Clinical Neurology, or for a specific institution or group of institutions, or a specific country. Citation count declines in the most recent years of any time period

as papers have had less time to accumulate citations (papers published in 2009 will typically have more citations than papers published in 2013).

**Field-Normalised citation impact (NCI<sub>F</sub>):** Citation rates vary between research fields and with time, consequently, analyses must take both field and year into account. In addition, the type of publication will influence the citation count. For this reason, only citation counts of papers (as defined above) are used in calculations of citation impact. The standard normalisation factor is the world average citations per paper for the year and journal category in which the paper was published. This normalisation is also referred to as 'rebasings' the citation count.

**Journal Impact Factor (JIF):** In the same way that citation impact can be used as an index of research quality, the average number of citations per paper can be used to indicate the impact and/or importance of a journal. The Impact Factor for a journal is calculated using data for a three-year period. For example, the 2012 Impact Factor for a given journal is calculated by Thomson Reuters as the average number of times which articles from the journal published in the past two years (2010 and 2011) were cited in 2012. Thus, a Journal Impact Factor of 2.0 means that, on average, the articles published in 2010 or 2011 have been cited twice. Citing articles may be from the same journal; however, most citing articles are from other journals.

For the journal *Fertility and Sterility*, the 2012 Journal Impact Factor would be calculated as follows:

Cites in 2012 to items published in 2010 =	3 259	Number of items published in 2010 =	744
Cites in 2012 to items published in 2011 =	2 556	Number of items published in 2011 =	649
<b>Total</b>	<b>5 815</b>		<b>1 393</b>

$$\frac{\text{Number of citations}}{\text{Number of items}} = \frac{5\,815}{1\,393} = 4.174$$

The calculation of the Journal Impact Factor is fully described on the Thomson Reuters website at: [http://thomsonreuters.com/products\\_services/science/free/essays/impact\\_factor/](http://thomsonreuters.com/products_services/science/free/essays/impact_factor/).

When looking at Journal Impact Factor data it is important to remember that, as citation rates vary between research fields and publication type, these will affect the Journal Impact Factor. That is, a Journal Impact Factor of 4.174 ranks the journal *Fertility and Sterility* fourth out of 77 journals in the Obstetrics & Gynaecology journal category and therefore in the top quartile. However, *Journal of Alzheimer's Disease* with the same Journal Impact Factor of 4.174 is ranked in the second quartile (64 out of 251 journals) in the journal category Neurosciences.

**Mean Normalised citation impact (mNCI):** The mean NCI indicator for any specific dataset is calculated as the mean of the field-Normalised citation impact (NCI<sub>F</sub>) of all papers within that dataset.

**Papers/publications:** Thomson Reuters abstracts publications including editorials, meeting abstracts and book reviews as well as research journal articles. The terms 'paper' and 'publication' are often used interchangeably to refer to printed and electronic outputs of many types. In this report, the term 'paper' has been used exclusively to refer to substantive journal articles, reviews and some proceedings papers, and excludes editorials, meeting abstracts or other types of publications. **Papers** are the subset of publications for which citation data are most informative and which are used in calculation of citation impact. Furthermore, papers tend to be those that report research findings and they are peer-reviewed, whereas other publication types often cover other materials and are not reviewed in the same way, which also explains why they are most often used in research evaluations as an internationally accepted best practice.

**Percentage of highly-cited papers:** For the purpose of this report, highly-cited papers have been defined as those articles and reviews which belong to the world's top 1%, 5%, 10% or 25% of papers in that journal category and year of publication, when ranked by number of citations received. A percentage that is above 1, 5, 10 or 25 indicates above-average performance.

**Research field:** Standard bibliometric methodology uses journal category as a proxy for research field. Journals are assigned to one or more categories, and every article within that journal is subsequently assigned to that category. Publications from prestigious, 'multidisciplinary' and general medical journals such as *Nature*, *Science*, *The Lancet*, *The BMJ*, *The New England Journal of Medicine* and *the Proceedings of the National Academy of Sciences* (PNAS) are assigned to specific categories based on the journal categories



of the references cited in the article. The selection procedures for the journals included in the citation databases are documented here <http://scientific.thomsonreuters.com/mjl/>. For this evaluation, the standard classification of Web of Science journal categories has been used.

### 3.4 INTERPRETATION OF BIBLIOMETRIC INDICATORS AND CITATION ANALYSES

The following points should be borne in mind when considering the results of these analyses.

- Bibliometrics work best with large data samples. As the data are disaggregated, so the relationship weakens. Average indicator values (e.g. of citation impact) for small numbers of publications can be skewed by single outlier values. At a finer scale, when analysing the specific outcome for individual departments, the statistical relationship is rarely a sufficient guide by itself. For this reason, bibliometrics are best used in support of, but not as a substitute for, expert decision processes. Well-founded analyses can enable conclusions to be reached more rapidly and with greater certainty, and are therefore an aid to management and to increased confidence among stakeholders, but they cannot substitute for review by well-informed and experienced peers.
- Publications accumulate citations over time and it may take years until a given publication is cited. While citation counts in early years have been shown to reflect long-term citation performance,<sup>6</sup> indicators based on citation counts may be relatively more volatile in the years immediately following publication.
- Citation rates vary between disciplines and fields. For example, for the UK science base as a whole, 10 years produces a general plateau beyond which few additional citations would be expected. On the whole, citations accumulate more rapidly and plateau at a higher level in biomedical sciences than physical sciences, and natural sciences generally cite at a higher rate than social sciences.

#### INDICATOR THRESHOLDS

- **Papers:** The minimum number of papers suitable as a sample for quantitative research evaluation is the subject of widespread discussion. Larger samples are always more reliable, but a very high minimum may defeat the scope and specificity of analysis. Experience has indicated that a threshold between 20 and 50 papers can generally be deemed appropriate. For work that is likely to be published with little contextual information, the upper boundary ( $\geq 50$ ) is a desirable starting point. For work that will be used primarily by an expert, in-house group then the lower boundary ( $\geq 20$ ) may be approached. Because comparisons for in-house evaluation often involve smaller, more specific research groups (compared to broad institutional comparisons), a high volume threshold is self-defeating. Smaller samples may be used but outcomes must be interpreted with caution and expert review should draw on multiple information sources before reaching any conclusions.
- **Field Normalised citation impact:** Such values for individual papers vary widely and it is more useful to consider the average for a set of papers. This average can be at several granularities: field (either journal category or field), annual and overall (total output under consideration). When considering such average data points, care must be taken to understand that these data are highly skewed and the average can be driven by a single, highly-cited paper (this would be highlighted in accompanying text though not apparent from Tables and Figures). The world average is 1.0, so any value higher than this indicates a paper, or set of papers, which are cited more than average for similar research worldwide. For research management purposes, experience suggests that values between 1.0 and 2.0 should be considered to be indicative of research which is influential at a national level whilst that cited more than twice the world average has international recognition.

**Research field:** A problem frequently encountered in the analysis of data about the research process is that of 'mapping'. For example, a funding body allocates money for chemistry but this goes to researchers in biology and engineering as well as to chemistry departments. Clinicians publish in mathematics and

<sup>6</sup> Adams, J. *et al.* (2002) Maintaining Research Excellence and Volume: A report by *Evidence Ltd* to the Higher Education Funding Councils for England, Scotland and Wales and to Universities UK, [http://www.hefce.ac.uk/pubs/rereports/2002/rd08\\_02/rd08\\_02.pdf](http://www.hefce.ac.uk/pubs/rereports/2002/rd08_02/rd08_02.pdf)

education journals. Publications in environmental journals come from a diversity of disciplines. This creates a problem when we try to define, for example, 'Parasitology research'. Is this the work funded under Parasitology programmes, the work of researchers in Parasitology units or the work published in Parasitology journals? For the first two options we need to track individual grants and researchers to their outputs, which is feasible but not within the scope of this study or for every comparator institution. Therefore, to create a simple and transparent dataset of equal validity across time and geography, we rely on the set of journals associated with Parasitology as a proxy for the body of research reflecting the field.

## 3.5 DATA PRESENTATION

### 3.5.1 DATA DESCRIPTIONS AND ROUNDING

All Figure titles are fully described with:

- Indicator name
- Field
- Country/Countries
- Time period
- Special notes (if applicable) on ordering or methodology

Data are rounded to two decimal places for both percentages and indices of citation impact.

### 3.5.2 PRESENTATION OF AXES AND SCALING OF FIGURES

Axes may be set at different scales for the established economies and for the emerging economies (CHAPTER 4), as well as for different aggregation of time periods (CHAPTER 5), in order to reflect different levels of research output and citation impact.

## CHAPTER 4. COMPARATIVE ANALYSIS OF INDIA'S RESEARCH OUTPUT AND CITATION IMPACT

This Chapter analyses research paper output, share of world output, citation impact, highly-cited papers, international collaboration and average Journal Impact Factor:

- for India and a set of comparator countries (established and emerging research economies);
- over a 10-year time frame, split into three periods: 2005-2008, 2009-2012, 2013-2014;
- disaggregated by the research fields used in Essential Science Indicators. The top 10 Essential Science Indicators fields<sup>7</sup> are reported in the main body, while the data for other 12 Essential Science Indicators fields are supplemented in ANNEX 1.

Each analysis is presented in six indicators: number of papers, share of world output, Normalised citation impact, highly-cited papers, international collaborative papers, and average Journal Impact Factor; each comprises two Figures for 10-year time frame, one Table for three time periods and interpretative commentaries.

The time series data for total output and each Essential Science Indicators field was provided in ANNEX 10 along with this report.

**Number of papers:** the total number of papers (articles and reviews) for each country in order to reflect the overall research activity in each country.

**Share of world output:** the percentage share of world output for each country in order to show the relative proportion of research output for each country given the growing total world volume and expanding database coverage.

**Normalised citation impact:** the citation impact for each country relative to the world average (1.0), taking both publication year and subject category into account. The Normalised citation impact for 2014 papers are not included in this report because of the absence of 2014 baseline data.

**Highly-cited papers at four thresholds:** the proportion of papers being in the top 1%, 5%, 10% and 25% based on percentile ranking. For the purpose of better representation, only tables for three time periods are shown in the report.

**Percentage of internationally collaborative papers:** the percentage of papers collaborated between two or more countries for each country's papers.

**Average Journal Impact Factor:** the average Impact Factor of journals where each country published their papers. Journal Impact Factor is not typically used as the metric for assessment of academic impact of research work, as it is intended to be an indicator for the purpose of journal assessment and is not an indicator of the performance of an individual research paper. Thus, limited commentaries are made for the results in this indicator.

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<sup>7</sup> The top 10 Essential Science Indicators fields are filtered by India's total productivity between 2005 and 2014.

**SUMMARY – OVERALL RESEARCH OUTPUT AND CITATION IMPACT****Table 4-1 Volume of papers and share of world output; All fields; All countries.**  
Time period: 2005-2014 in aggregate, Source: Web of Science

Country	Number of Papers	Share of World Output
<b>INDIA</b>	407,276	3.43%
<b>Established Research Economies</b>		
AUSTRALIA	406,072	3.42%
CANADA	549,054	4.62%
SWITZERLAND	224,406	1.89%
GERMANY	893,200	7.52%
ENGLAND	815,565	6.87%
FRANCE	634,752	5.35%
ITALY	518,695	4.37%
JAPAN	766,552	6.46%
NETHERLANDS	308,669	2.60%
SWEDEN	204,975	1.73%
USA	3,442,062	28.99%
<b>BRICS and other emerging Research Economies</b>		
BRAZIL	303,875	2.56%
CHINA	1,432,712	12.07%
SPAIN	445,330	3.75%
SOUTH KOREA	395,345	3.33%
RUSSIA	272,694	2.30%
TURKEY	211,372	1.78%
TAIWAN	233,049	1.96%
SOUTH AFRICA	79,659	0.67%

India's output of research papers published between 2005 and 2014 (407,276) is greater than that of the following established research economies: Australia, Switzerland, the Netherlands, and Sweden. Furthermore, India's output of papers is greater than five of the emerging research economies. India's output of papers increased every year between 2005 and 2014.

Overall, India accounts for 3.4% of the world total research output, and it is ranked eighth among the 11 established research economies and third among the eight emerging research economies. China came second (after the USA) in terms of total output and share; no other country accounted for more than 10% of world total research output.

**Table 4-2 Average Normalised Citation Impact; All fields, All countries.**  
 Time period: 2005-2013 in aggregate; Source: Web of Science

Country	Normalized Citation Impact
INDIA	0.72
<b>Established Research Economies</b>	
AUSTRALIA	1.30
CANADA	1.27
SWITZERLAND	1.61
GERMANY	1.29
ENGLAND	1.50
FRANCE	1.26
ITALY	1.27
JAPAN	0.88
NETHERLANDS	1.49
SWEDEN	1.30
USA	1.56
<b>BRICS and other emerging Research Economies</b>	
BRAZIL	0.64
CHINA	0.88
SPAIN	1.14
SOUTH KOREA	0.79
RUSSIA	0.52
TURKEY	0.65
TAIWAN	0.85
SOUTH AFRICA	0.97

The citation impact of India papers published between 2005 and 2013 was lower than the world average. It was also lower than the citation impact of any of the established research economies. When compared with the BRICS and other emerging research economies, India's citation impact was greater than that of Brazil, Russia, and Turkey.

**SUMMARY BY FIELD – RESEARCH OUTPUT**

- **Chemistry:** India's output of Chemistry papers nearly doubled (96% growth) from 6,012 in 2005 to 12,000 in 2014. In 2006, India's output of Chemistry papers was fourth, behind the USA, Japan, and Germany, and by 2013 it was second only to the USA. Compared with the emerging economies, India's output of Chemistry papers between 2005 and 2014 was second only to China.
- **Physics:** India published 72% more Physics papers in 2014 (5,605 papers) than it did in 2005 (3,268 papers). India's output of papers in Physics was greater than that of Australia, Canada, the Netherlands, Sweden, and Switzerland. By 2014, India's output of papers in Physics was the third highest of the emerging economies, behind China, and Russia.
- **Clinical Medicine:** India doubled its output of Clinical Medicine papers in 2014 (4,347 papers) as it did in 2005 (1,982 papers). India's increase (119%) was greater than that of any of the established research economies.
- **Engineering:** India published 151% more Engineering papers in 2014 (5,196 papers) than it did in 2005 (2,071 papers). India's increase in output of Engineering papers was greater than that of any established research economy.
- **Materials Science:** India published 150% more Materials Science papers in 2014 (4,713 papers) than it had in 2005 (1,887 papers). Since 2007, India's output of papers in Materials Science has been higher than that of the majority of established research economies, and by 2013 India's output of papers in this field was second only to the USA. Compared with emerging research economies, India's output of papers in Materials Science was third highest, following China and South Korea.
- **Biology & Biochemistry:** India published 85% more Biology & Biochemistry papers in 2014 (3,404 papers) than it did in 2005 (1,298 papers). By 2014, India's output of papers in Biology & Biochemistry was greater than the majority (7 out of 11) of the established research economies. After 2007, India's output of papers in Biology & Biochemistry was second only to China.
- **Agricultural Sciences:** India published 73% more Agricultural Sciences papers in 2014 (2,359 papers) than it did in 2005 (1,364 papers). Since 2006, India's output of papers in Agricultural Sciences has been greater than most of the established research economies, with the USA being the only exception.
- **Plant & Animal Sciences:** India published 40% more Plant & Animal Sciences papers in 2014 (1,943 papers) than it did in 2005 (1,385 papers). India's output of papers in Plant & Animal Sciences was greater than that of the Netherlands and Sweden.
- **Pharmacology & Toxicology:** India nearly tripled its Pharmacology & Toxicology papers in 2014 (2,108 papers) compared with its output in 2005 (755 papers). Since 2010, India's output in Pharmacology & Toxicology was greater than most of the established research economies, with Japan and the USA being exceptions. Since 2006, India has had the second highest output of papers in Pharmacology & Toxicology when compared with the emerging research economies.
- **Geosciences:** India published 70% more Geosciences papers in 2014 (1,519 papers) than it had in 2005 (891 papers). India's output of papers in Geosciences was greater than that of the Netherlands, Sweden, and Switzerland.

***SUMMARY BY FIELD – CITATION IMPACT***

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- **Chemistry:** Between 2005 and 2013 India's citation impact in Chemistry remained below the world average at around 0.8. Generally, India's citation impact in Chemistry was higher than that of South Africa, Turkey, Brazil, and Russia.
- **Physics:** India's citation impact in Physics remained around 0.8 until 2012 when it peaked at 1.06. Although China and Russia produced more papers in Physics than India, the citation impact of their Physics papers was lower.
- **Clinical Medicine:** India's citation impact in Clinical medicine remained below the world average at approximately 0.6 between 2005 and 2010, but between 2011 and 2013 it increased to 0.7. Generally, India's citation impact in Clinical Medicine was higher than that of Russia and Turkey.
- **Engineering:** India's citation impact in Engineering remained around 0.8 between 2005 and 2013, was higher than that of Japan during that same time period. During the period 2006 to 2012, India's citation impact in Engineering was higher than that of Brazil, South Korea, Russia, and South Africa.
- **Materials Science:** India's citation impact in Materials Science decreased from 0.98 in 2005 to 0.79 in 2013. This was a common trend which was also observed for established research economies like Canada, France, Japan, and the USA. India's citation impact in Materials Science was higher than that of Russia, Brazil, Turkey, and South Africa
- **Biology & Biochemistry:** India's citation impact in Biology & Biochemistry decreased from 0.78 in 2006 to 0.62 in 2013. India's citation impact in Biology & Biochemistry was higher than that of Brazil, Russia, and Turkey
- **Agricultural Sciences:** India's citation impact in Agricultural Sciences fluctuated at around half the world average (0.5) between 2005 and 2013. India's citation impact in Agricultural Sciences was generally higher than that of Brazil and Russia.
- **Plant & Animal Sciences:** India's citation impact in Plant & Animal Science fluctuated at around half the world average (0.5) between 2005 and 2013. India's citation impact in Plant & Animal Science was higher than that of Russia (2005-2012), Turkey, and Brazil (after 2009).
- **Pharmacology & Toxicology:** India's citation impact in Pharmacology & Toxicology decreased from 0.86 in 2006 to 0.72 in 2013. Generally, India's citation impact in Pharmacology & Toxicology was higher than that of Russia and Turkey.
- **Geosciences:** India's citation impact in Geosciences increased from 0.58 in 2005 to 0.67 in 2013. Generally, India's citation impact in Geosciences was higher than that of Russia.



4.1 COMPARATIVE ANALYSIS, ALL FIELDS

4.1.1 NUMBER OF PAPERS, ALL FIELDS

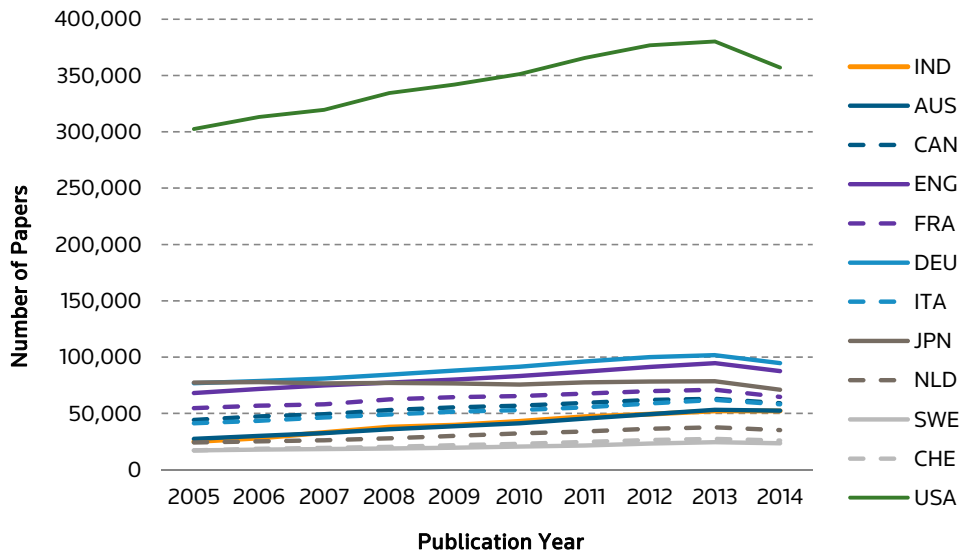


Figure 4.1.1-1 Number of papers; All fields; Established research economies. Time period: 2005-2014. Source: Web of Science

India’s total output of papers increased from 24,998 in 2005 to 52,337 in 2014. The output of papers from all the established research economies increased between 2005 and 2013. The decrease in output of papers in 2014 should be treated with caution and is actually slightly lower than they should be, as Thomson Reuters had yet to complete the indexing of 2014 publications by the start of the project.

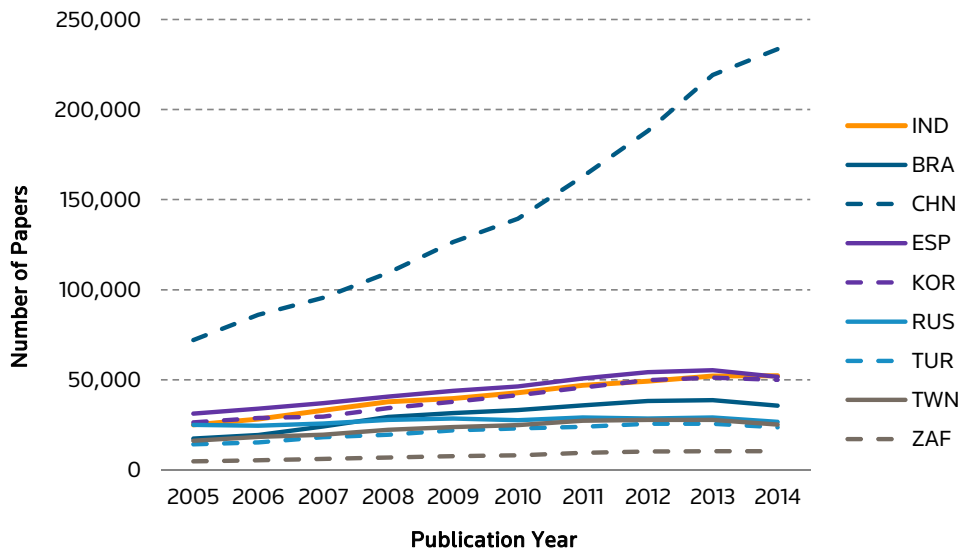


Figure 4.1.1-2 Number of papers, All fields, BRICS and other emerging research economies Time period: 2005-2014, Source: Web of Science

The output of papers from all the emerging research economies increased between 2005 and 2013. China’s output of papers was the highest of the emerging research economies, and has continued to grow rapidly.

Table 4.1.1-1 Number of papers, All fields, All countries.

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate. Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	124,030	178,744	104,502
<b>Established Research Economies</b>			
AUSTRALIA	125,588	174,642	105,842
CANADA	193,630	233,403	122,021
SWITZERLAND	75,297	95,878	53,231
GERMANY	321,230	375,594	196,376
ENGLAND	291,795	341,420	182,350
FRANCE	231,944	267,134	135,674
ITALY	179,963	218,680	120,052
JAPAN	309,109	307,909	149,534
NETHERLANDS	103,190	132,781	72,698
SWEDEN	72,116	85,024	47,835
USA	1,269,377	1,435,440	737,245
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	90,437	139,079	74,359
CHINA	363,157	616,857	452,698
SPAIN	143,088	195,298	106,944
SOUTH KOREA	119,224	174,759	101,362
RUSSIA	103,192	113,743	55,759
TURKEY	67,262	94,682	49,428
TAIWAN	76,465	103,708	52,876
SOUTH AFRICA	23,327	35,522	20,810

4.1.2 SHARE OF WORLD OUTPUT, ALL FIELDS

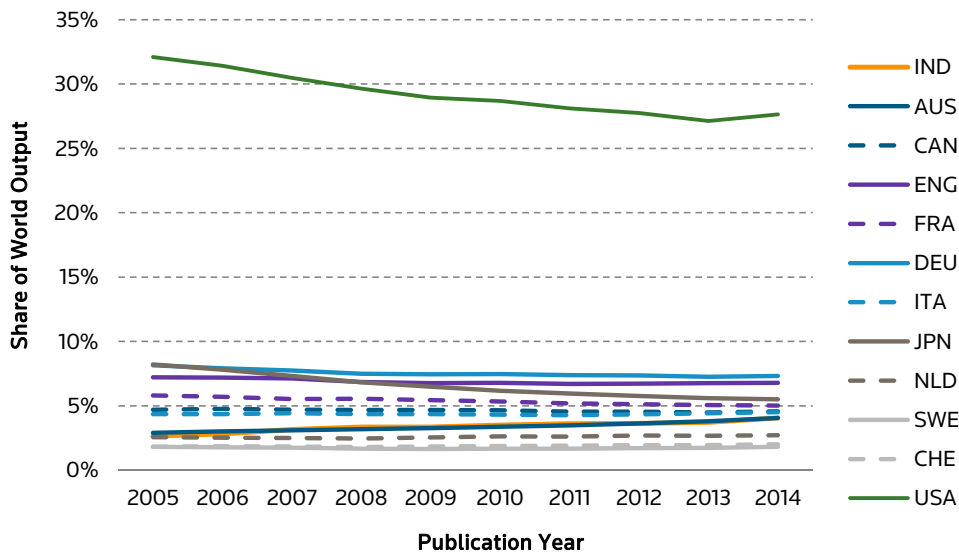


Figure 4.1.2-1 Share of world output, All fields, Established research economies  
Time period: 2005-2014, Source: Web of Science

India’s share of world output increased from 2.65% in 2005 to 4.05% in 2014. This increase was greater than for any of the established research economies. The share of the world output for Australia, Italy, the Netherlands, and Switzerland increased from 2005 to 2014, while the share for other established research economies, including the USA decreased.

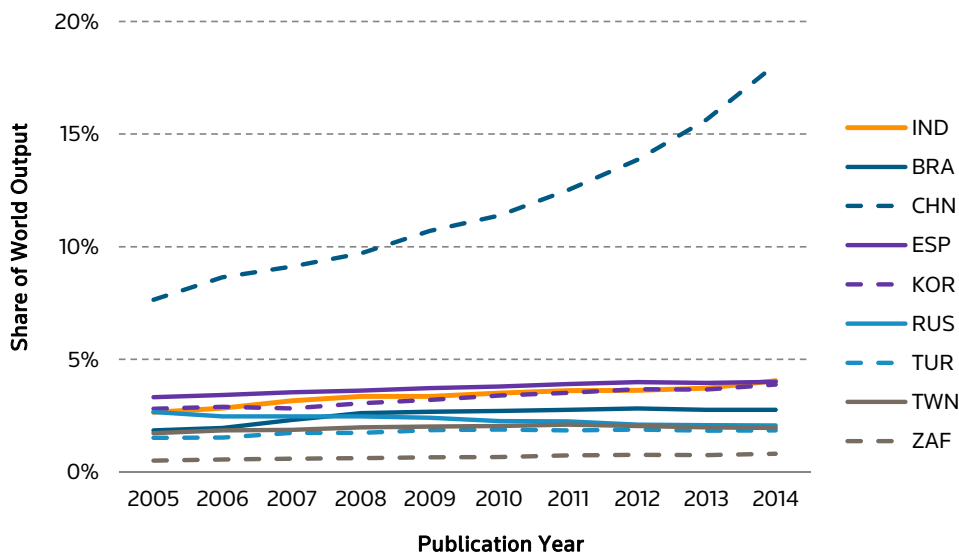


Figure 4.1.2-2 Share of world output; All fields; BRICS and other emerging research economies  
Time period: 2005-2014. Source: Web of Science

India’s share of output between 2005 and 2014 was greater than most of the emerging economies, with China and Spain being the exceptions. India’s percentage change in share of world output between 2005 and 2014 (52%), was greater than the majority of emerging research economies, with China and South Africa being the exceptions. China’s share of world output in 2005 was 7.64% and 18.09% in 2014, and South Africa’s share of world output was 0.51% in 2005 and 0.80% in 2014.

**Table 4.1.2-1 Share of world output, All fields, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Share of World Output			
Country	2005-2008	2009-2012	2013-14
<b>INDIA</b>	3.01%	3.53%	3.88%
<b>Established Research Economies</b>			
AUSTRALIA	3.05%	3.45%	3.93%
CANADA	4.70%	4.61%	4.53%
SWITZERLAND	1.83%	1.89%	1.98%
GERMANY	7.81%	7.42%	7.29%
ENGLAND	7.09%	6.74%	6.77%
FRANCE	5.64%	5.27%	5.04%
ITALY	4.37%	4.32%	4.46%
JAPAN	7.51%	6.08%	5.55%
NETHERLANDS	2.51%	2.62%	2.70%
SWEDEN	1.75%	1.68%	1.78%
USA	30.84%	28.34%	27.38%
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	2.20%	2.75%	2.76%
CHINA	8.82%	12.18%	16.81%
SPAIN	3.48%	3.86%	3.97%
SOUTH KOREA	2.90%	3.45%	3.76%
RUSSIA	2.51%	2.25%	2.07%
TURKEY	1.63%	1.87%	1.84%
TAIWAN	1.86%	2.05%	1.96%
SOUTH AFRICA	0.57%	0.70%	0.77%

4.1.3 NORMALISED CITATION IMPACT, ALL FIELDS

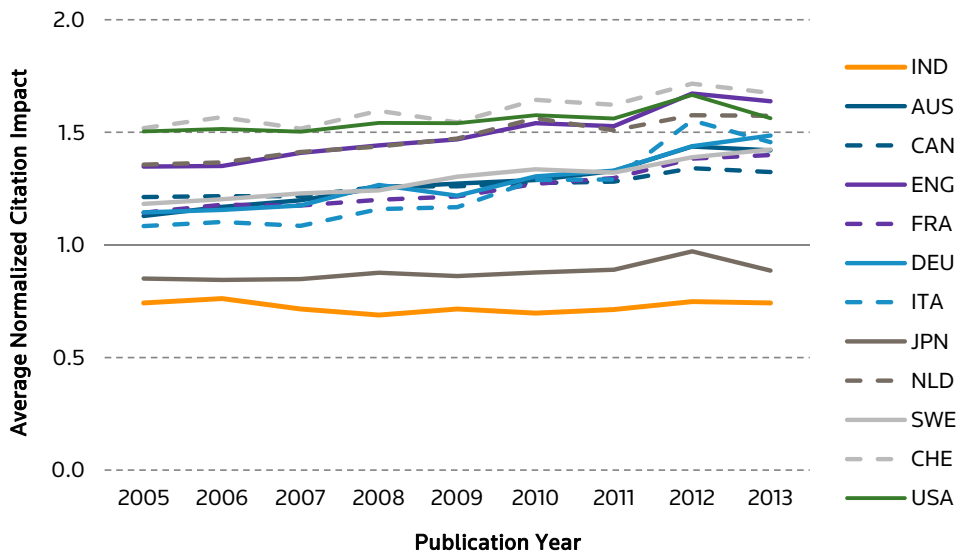


Figure 4.1.3-1 Normalised citation impact, All fields, Established research economies  
Time period: 2005-2013, Source: Web of Science

From 2005 to 2013, India’s citation impact remained below the world average at around 0.74. During this time, the citation impact of all the established research economies increased. The countries with the largest percentage increase were Australia (26%), Germany (30%), and Italy (34%). Aside from Japan, the established research economies all had citation impact higher than the world average.

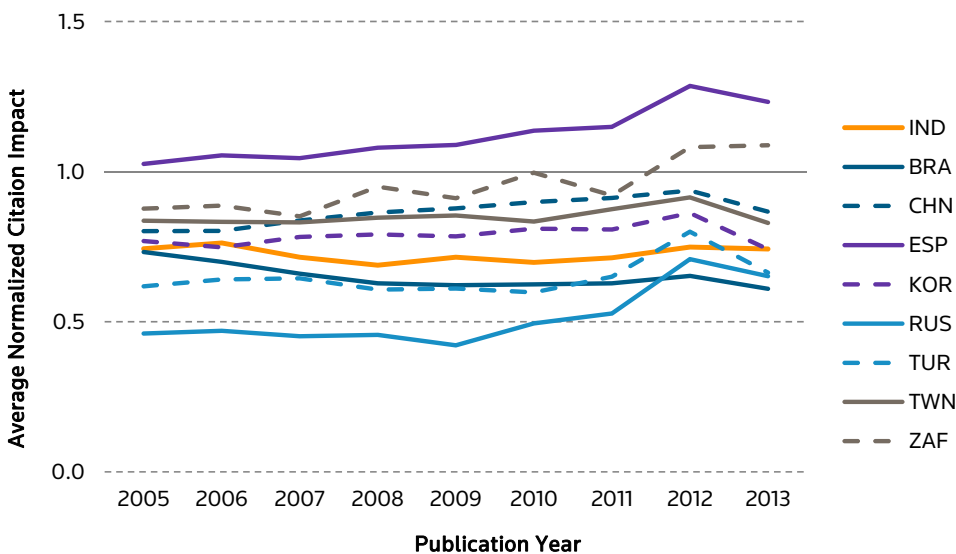


Figure 4.1.3-2 Normalised citation impact, All fields, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

India’s citation impact was higher than that of Brazil, Russia, and Turkey (except in 2012). However, Russia had the greatest percentage increase (41%) from 2005 to 2013. Spain’s citation impact was higher than the world average between 2005 and 2013 and, as of 2012, South Africa’s citation impact was above the world average. South Africa’s citation impact increased by 24%, and Spain’s by 20%.

**Table 4.1.3-1 Normalised citation impact, All fields, Established research economies**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Average Normalized Citation Impact			
Country	2005-2008	2009-2012	2013
<b>INDIA</b>	0.72	0.72	0.74
<b>Established Research Economies</b>			
AUSTRALIA	1.19	1.34	1.42
CANADA	1.23	1.29	1.32
SWITZERLAND	1.55	1.64	1.67
GERMANY	1.19	1.33	1.49
ENGLAND	1.39	1.56	1.64
FRANCE	1.18	1.29	1.40
ITALY	1.11	1.33	1.46
JAPAN	0.86	0.90	0.89
NETHERLANDS	1.40	1.53	1.57
SWEDEN	1.21	1.34	1.42
USA	1.52	1.59	1.56
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.67	0.63	0.61
CHINA	0.83	0.91	0.87
SPAIN	1.05	1.17	1.23
SOUTH KOREA	0.77	0.82	0.74
RUSSIA	0.46	0.54	0.65
TURKEY	0.63	0.67	0.66
TAIWAN	0.84	0.87	0.83
SOUTH AFRICA	0.89	0.98	1.09

## 4.1.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, ALL FIELDS

Table 4.1.4-1 Highly-cited papers, All fields, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.44%	2.57%	5.57%	16.08%	0.50%	2.58%	5.53%	15.99%	0.54%	2.88%	5.78%	14.57%
<b>Established Research Economies</b>												
AUSTRALIA	1.43%	6.26%	12.15%	29.16%	1.67%	7.02%	13.07%	30.01%	1.68%	6.38%	11.38%	23.76%
CANADA	1.47%	6.63%	12.56%	29.56%	1.72%	6.97%	12.86%	29.42%	1.56%	6.28%	10.99%	22.59%
SWITZERLAND	2.26%	9.39%	17.08%	36.36%	2.63%	10.23%	17.95%	37.50%	2.38%	9.05%	15.03%	28.38%
GERMANY	1.38%	6.38%	12.29%	28.84%	1.64%	7.19%	13.38%	30.28%	1.67%	6.78%	11.82%	24.15%
ENGLAND	1.71%	7.42%	13.88%	31.43%	1.99%	8.16%	14.75%	32.35%	1.91%	7.34%	12.61%	25.26%
FRANCE	1.27%	5.87%	11.49%	27.75%	1.50%	6.55%	12.37%	28.99%	1.60%	6.35%	10.85%	22.90%
ITALY	1.18%	5.53%	10.80%	26.87%	1.39%	6.25%	11.92%	28.85%	1.47%	6.27%	11.28%	23.45%
JAPAN	0.71%	3.68%	7.56%	19.89%	0.81%	3.94%	7.80%	20.30%	0.86%	3.81%	7.14%	16.26%
NETHERLANDS	2.01%	8.40%	15.79%	35.42%	2.30%	9.39%	17.06%	37.04%	2.09%	8.18%	14.19%	27.15%
SWEDEN	1.50%	6.62%	12.81%	30.66%	1.86%	7.76%	14.18%	32.11%	1.87%	7.02%	12.20%	24.64%
USA	1.75%	7.69%	14.26%	31.86%	1.80%	7.70%	14.12%	31.42%	1.57%	6.56%	11.60%	23.42%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.47%	2.32%	4.89%	14.61%	0.47%	2.19%	4.62%	13.30%	0.54%	2.38%	4.58%	11.83%
CHINA	0.73%	4.07%	8.31%	20.92%	0.95%	4.79%	9.33%	22.97%	0.94%	4.31%	7.79%	17.28%
SPAIN	1.08%	5.14%	10.49%	26.61%	1.35%	5.90%	11.34%	27.50%	1.35%	5.59%	10.08%	22.15%
SOUTH KOREA	0.65%	3.42%	7.05%	18.79%	0.81%	3.78%	7.48%	19.69%	0.79%	3.44%	6.50%	15.11%
RUSSIA	0.37%	1.60%	3.25%	8.96%	0.42%	1.78%	3.50%	9.22%	0.59%	2.22%	3.77%	9.26%
TURKEY	0.38%	2.13%	4.54%	12.94%	0.56%	2.23%	4.28%	11.57%	0.53%	2.27%	4.38%	10.34%
TAIWAN	0.56%	3.42%	7.48%	21.00%	0.65%	3.59%	7.51%	20.68%	0.65%	3.33%	6.27%	15.06%
SOUTH AFRICA	0.92%	3.92%	7.47%	18.67%	1.21%	4.54%	8.03%	18.85%	1.35%	4.64%	8.01%	17.99%

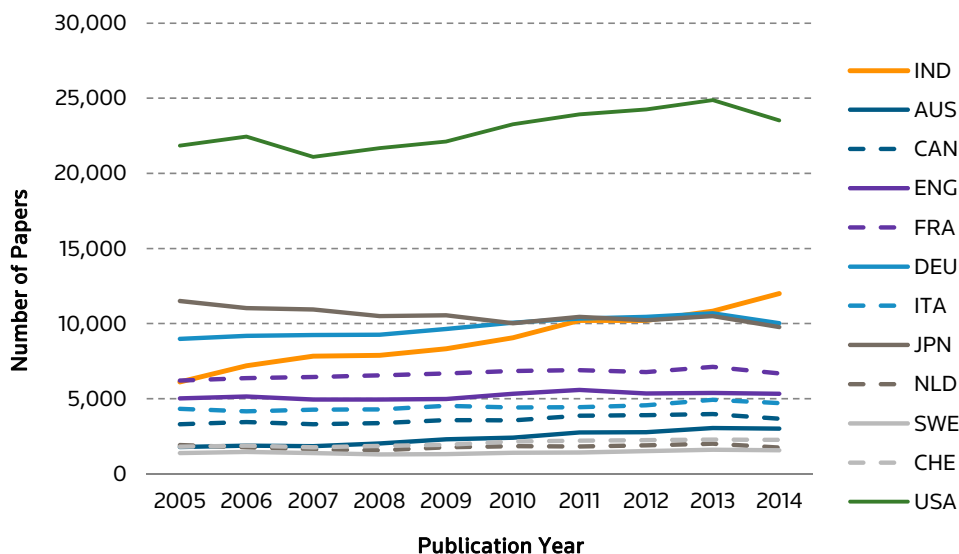
India's percentage of highly-cited papers was below the world average for all three time periods, and for each threshold: top 1%, 5%, 10%, 25%.

The percentages of highly-cited papers for the established research economies were generally higher than the world average for each time period and threshold, with Japan being the notable exception.

Spain was the only emerging research economy whose percentage of highly-cited papers was above the world average. Spain maintained this trend consistently in the three time periods.

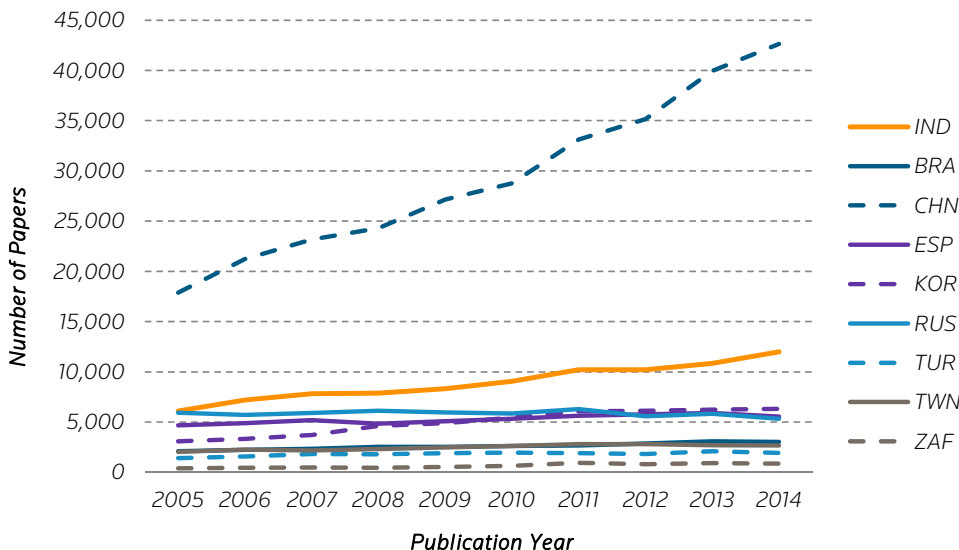
## 4.2 COMPARATIVE ANALYSIS, CHEMISTRY

### 4.2.1 NUMBER OF PAPERS, CHEMISTRY



**Figure 4.2.1-1 Number of papers, Chemistry, Established research economies**  
Time period: 2005-2014, Source: Web of Science

India nearly doubled (1.96) its output of papers in Chemistry from 6,012 papers in 2005 to 12,000 papers in 2014. In 2006, India's output of papers in Chemistry was fourth, behind the USA, Japan, and Germany, and by 2013 it was second only to the USA. The total output of papers in the majority (9 out of 11) of the established research economies increased; the exceptions were Japan and the Netherlands.



**Figure 4.2.1-2 Number of papers, Chemistry, BRICS and other emerging research economies**  
Time period: 2005-2014, Source: Web of Science

Compared to the emerging research economies, India was second only to China in the output of papers published in Chemistry, between 2005 and 2014. India produced 1.97 times as many papers in Chemistry in 2014 as it did in 2005, and China produced 2.38 times as many papers in 2014 (42,620 papers) as it did in 2005 (17,874 papers). The majority of the emerging research economies increased their output of papers in Chemistry, with Russia being the exception.



Table 4.2.1-1 Number of papers, Chemistry, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	28,988	37,779	22,831
<i>Established Research Economies</i>			
AUSTRALIA	7,513	10,210	6,057
CANADA	13,399	14,873	7,629
SWITZERLAND	7,275	8,498	4,531
GERMANY	36,633	40,456	20,701
ENGLAND	20,044	21,224	10,711
FRANCE	25,576	27,176	13,793
ITALY	17,025	17,903	9,619
JAPAN	43,948	41,217	20,262
NETHERLANDS	6,849	7,294	3,747
SWEDEN	5,475	5,627	3,142
USA	87,052	93,582	48,414
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	9,197	10,668	6,111
CHINA	86,566	124,170	82,578
SPAIN	19,570	21,835	11,460
SOUTH KOREA	14,704	22,494	12,550
RUSSIA	23,687	23,655	11,143
TURKEY	6,592	7,596	4,034
TAIWAN	8,783	10,719	5,383
SOUTH AFRICA	1,757	2,923	1,754

4.2.2 SHARE OF WORLD OUTPUT, CHEMISTRY

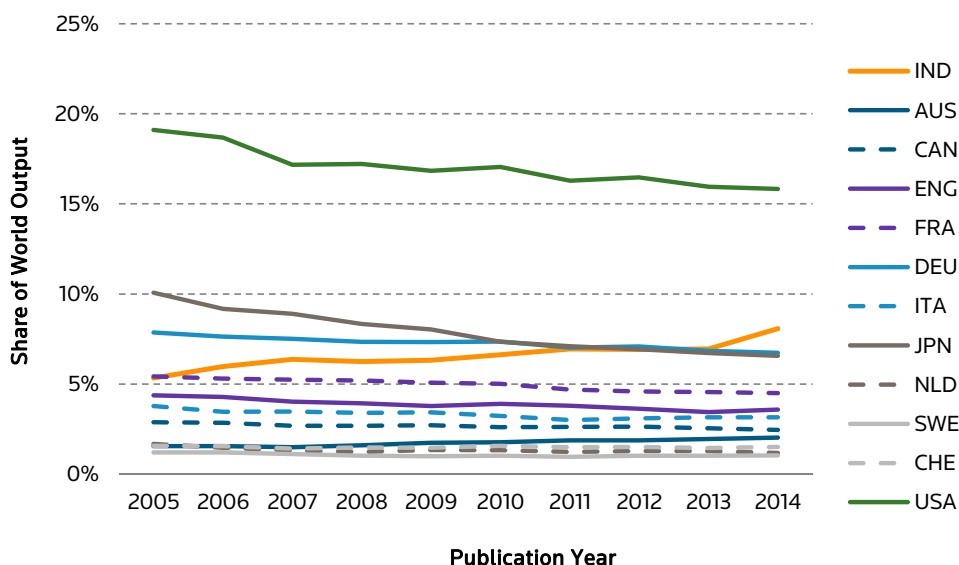


Figure 4.2.2-1 Share of world output, Chemistry, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Chemistry increased from 5.34% in 2005 to 8.07% in 2014. Furthermore, between 2005 and 2013 its share of world output remained higher than most of the established research economies. By 2014, India's share was second only to the USA. The share of world output in Chemistry for the majority (10 out of 11) of the established research economies decreased, with Australia the exception.

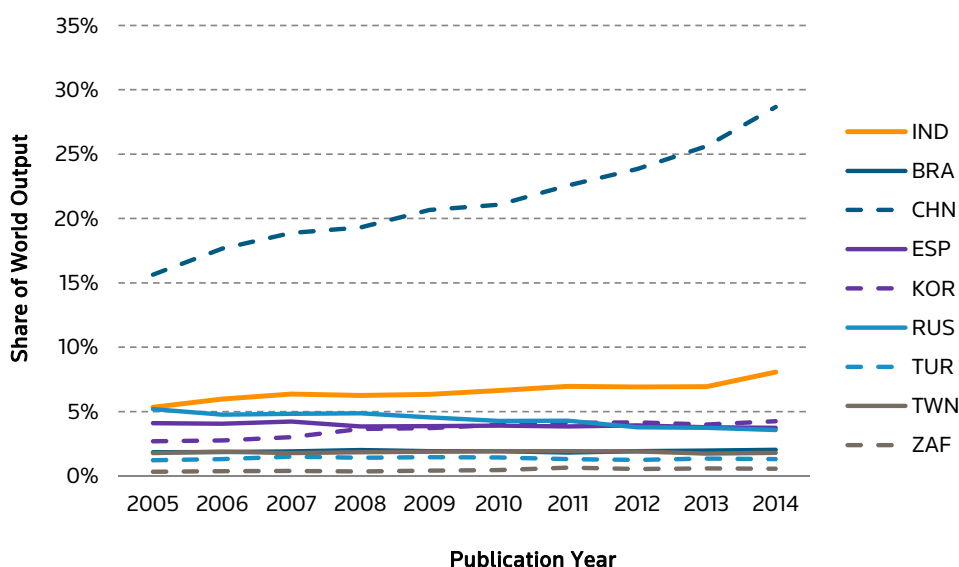


Figure 4.2.2-2 Share of world output, Chemistry, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Chemistry was greater than the majority of the emerging economies, with China being the exception. China had the greatest increase in share of output from 15.64% in 2005 to 28.67% in 2014. The share of world output in Chemistry for the majority of emerging research economies increased, with Spain and Russia being the exceptions.

Table 4.2.2-1 Share of world output, Chemistry, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Share of World Output			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	6.00%	6.72%	7.49%
<i>Established Research Economies</i>			
AUSTRALIA	1.55%	1.82%	1.99%
CANADA	2.77%	2.65%	2.50%
SWITZERLAND	1.51%	1.51%	1.49%
GERMANY	7.58%	7.20%	6.79%
ENGLAND	4.15%	3.78%	3.52%
FRANCE	5.29%	4.83%	4.53%
ITALY	3.52%	3.18%	3.16%
JAPAN	9.09%	7.33%	6.65%
NETHERLANDS	1.42%	1.30%	1.23%
SWEDEN	1.13%	1.00%	1.03%
USA	18.01%	16.65%	15.89%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	1.90%	1.90%	2.01%
CHINA	17.91%	22.09%	27.10%
SPAIN	4.05%	3.88%	3.76%
SOUTH KOREA	3.04%	4.00%	4.12%
RUSSIA	4.90%	4.21%	3.66%
TURKEY	1.36%	1.35%	1.32%
TAIWAN	1.82%	1.91%	1.77%
SOUTH AFRICA	0.36%	0.52%	0.58%

4.2.3 NORMALISED CITATION IMPACT, CHEMISTRY

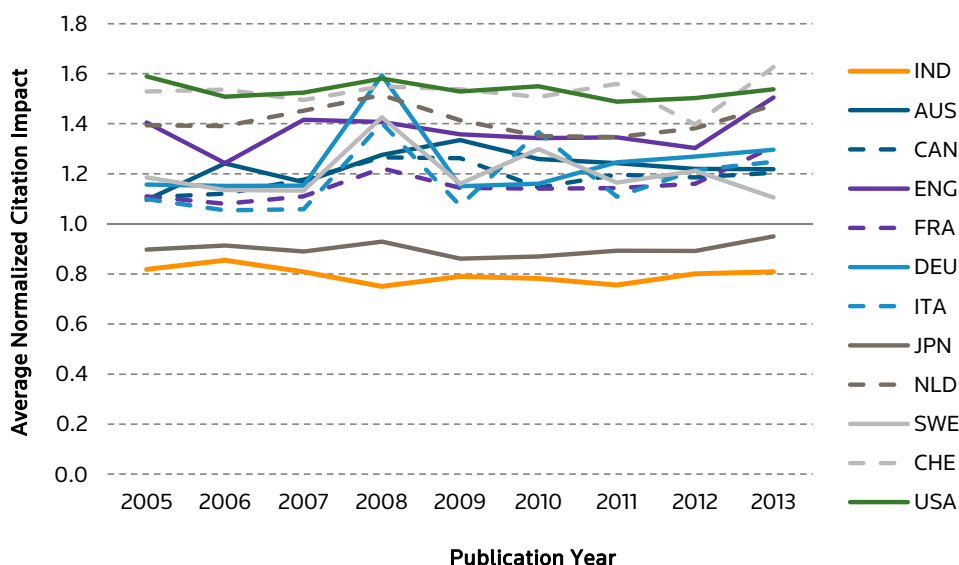


Figure 4.2.3-1 Normalised citation impact, Chemistry, Established research economies  
Time period: 2005-2013, Source: Web of Science

Between 2005 and 2013, India's citation impact in Chemistry remained below the world average at 0.8. With the exception of Japan, all of the established research economies had citation impact higher than the world average. Of the established research economies, the USA had the highest citation impact in Chemistry except in 2008 when Germany had the highest and in 2011 and 2014 when Switzerland had the highest.

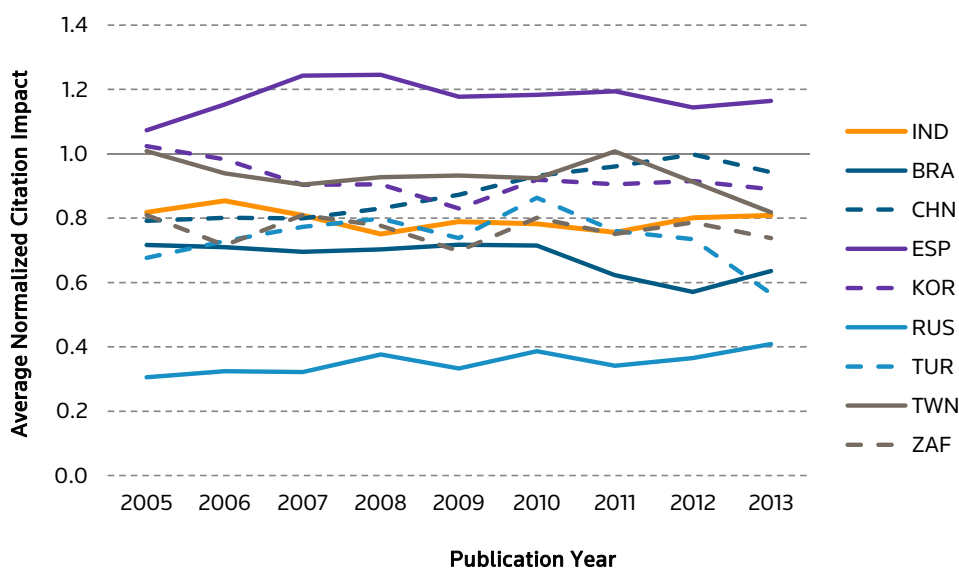


Figure 4.2.3-2 Normalised citation impact, Chemistry, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

Generally, India's citation impact in Chemistry was higher than that of South Africa, Turkey, Brazil, and Russia. Spain had the highest citation impact amongst the emerging research economies. Spain was also the only emerging research economy whose citation impact was higher than the world average in Chemistry.

**Table 4.2.3-1 Normalised citation impact, Chemistry, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.81	0.78	0.81
<b>Established Research Economies</b>			
AUSTRALIA	1.20	1.26	1.22
CANADA	1.17	1.20	1.20
SWITZERLAND	1.53	1.50	1.63
GERMANY	1.27	1.21	1.30
ENGLAND	1.37	1.34	1.51
FRANCE	1.13	1.15	1.31
ITALY	1.16	1.19	1.25
JAPAN	0.91	0.88	0.95
NETHERLANDS	1.43	1.37	1.47
SWEDEN	1.21	1.21	1.11
USA	1.55	1.52	1.54
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.71	0.65	0.64
CHINA	0.81	0.95	0.94
SPAIN	1.18	1.17	1.16
SOUTH KOREA	0.95	0.90	0.89
RUSSIA	0.33	0.36	0.41
TURKEY	0.75	0.78	0.57
TAIWAN	0.94	0.94	0.82
SOUTH AFRICA	0.78	0.76	0.74

## 4.2.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, CHEMISTRY

**Table 4.2.4-1 Highly-cited papers, Chemistry, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.39%	2.64%	5.97%	18.06%	0.34%	2.32%	5.61%	17.86%	0.49%	3.38%	6.95%	16.39%
<b>Established Research Economies</b>												
AUSTRALIA	1.42%	6.20%	12.26%	31.11%	1.60%	6.86%	13.32%	32.12%	1.16%	5.89%	11.33%	24.10%
CANADA	1.16%	6.43%	12.77%	31.41%	1.39%	6.02%	12.14%	30.34%	1.15%	5.73%	10.59%	22.40%
SWITZERLAND	2.01%	8.89%	17.02%	38.61%	1.65%	8.48%	16.70%	39.14%	1.99%	8.06%	14.19%	28.10%
GERMANY	1.38%	6.38%	12.43%	30.27%	1.32%	6.70%	12.80%	31.68%	1.55%	6.44%	11.50%	24.07%
ENGLAND	1.71%	7.32%	13.88%	33.52%	1.69%	7.88%	14.67%	34.37%	1.85%	7.68%	13.05%	26.14%
FRANCE	0.99%	5.15%	11.03%	29.73%	0.92%	5.14%	10.86%	29.69%	1.11%	5.33%	9.55%	21.66%
ITALY	1.05%	5.04%	10.41%	29.01%	0.87%	4.44%	9.71%	28.94%	0.86%	4.77%	9.41%	22.77%
JAPAN	0.81%	4.63%	9.47%	24.30%	0.79%	4.40%	8.91%	23.63%	0.82%	4.36%	7.98%	17.92%
NETHERLANDS	1.71%	8.45%	17.23%	38.46%	1.77%	8.80%	16.73%	38.50%	1.73%	7.74%	13.24%	26.63%
SWEDEN	1.19%	5.75%	12.42%	32.44%	1.19%	6.26%	12.30%	32.56%	1.02%	5.19%	9.90%	22.12%
USA	2.26%	9.42%	17.00%	37.27%	2.26%	9.34%	16.75%	36.90%	1.99%	7.96%	13.61%	26.44%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.30%	2.11%	5.13%	17.46%	0.20%	1.32%	3.90%	15.20%	0.18%	1.57%	3.27%	9.92%
CHINA	0.69%	4.12%	8.28%	20.20%	1.05%	5.31%	10.20%	24.13%	1.19%	5.54%	9.73%	19.42%
SPAIN	1.07%	5.10%	11.03%	30.36%	1.13%	5.43%	11.28%	31.38%	1.20%	5.31%	10.18%	22.71%
SOUTH KOREA	1.07%	5.11%	10.00%	24.96%	1.18%	5.04%	9.38%	23.86%	1.20%	5.06%	8.79%	17.94%
RUSSIA	0.16%	0.69%	1.62%	5.57%	0.11%	0.65%	1.57%	5.83%	0.13%	1.01%	2.20%	5.88%
TURKEY	0.36%	2.11%	5.05%	15.47%	0.22%	1.66%	4.48%	16.39%	0.20%	1.81%	3.99%	12.12%
TAIWAN	0.58%	3.93%	8.79%	24.93%	0.66%	3.77%	8.07%	24.24%	0.74%	3.60%	6.85%	16.98%
SOUTH AFRICA	0.28%	2.90%	6.89%	19.86%	0.21%	1.74%	5.17%	18.30%	0.34%	3.02%	6.04%	13.68%

India's percentage of highly-cited papers in Chemistry was below the world average for all three time periods, and each threshold: Top 1%, 5%, 10%, 25%.

The percentage of highly-cited papers for the majority of the established research economies was greater than the world average for each time period and threshold, with Japan and Italy being the exceptions.

Spain, South Korea, and China were the emerging research economies whose proportion of highly-cited papers was above the world average.

4.2.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, CHEMISTRY

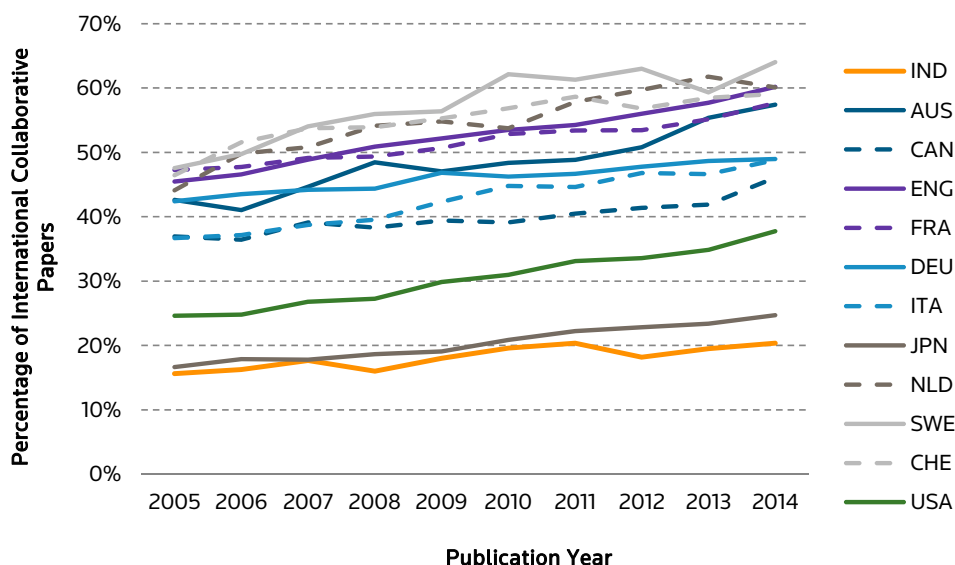


Figure 4.2.5-1 Percentage of internationally collaborative papers, Chemistry, Established research economies, Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers increased from 15.63% in 2005 to 20.34% in 2014. The percentage of internationally collaborative papers for all the established research economies also increased. Most notable was the USA, whose percentage increased from 24.60% to 37.77%. Generally, Sweden had the highest percentage of internationally collaborative papers with 47.56% in 2005 and 64.01% in 2014.

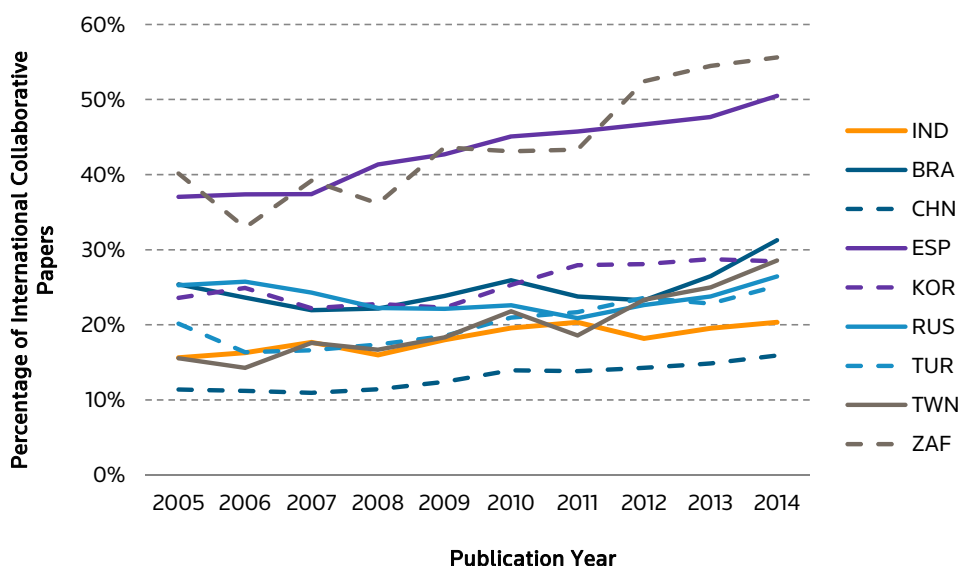


Figure 4.2.5-2 Percentage of internationally collaborative papers, Chemistry, BRICS and other emerging research economies, Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Chemistry was greater than that of China. South Africa and Spain had the highest percentage of internationally collaborative papers, and Taiwan had the greatest increase in its percentage, from 15.65% in 2005 to 28.56% in 2014.

**Table 4.2.5-1 Percentage of internationally collaborative papers, Chemistry, All countries**  
**Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science**

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	16.43%	19.06%	19.95%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	44.28%	48.85%	56.40%
<b>CANADA</b>	37.68%	40.12%	43.89%
<b>SWITZERLAND</b>	51.42%	56.94%	58.77%
<b>GERMANY</b>	43.62%	46.88%	48.81%
<b>ENGLAND</b>	47.93%	54.01%	58.93%
<b>FRANCE</b>	48.38%	52.61%	56.36%
<b>ITALY</b>	38.03%	44.62%	47.68%
<b>JAPAN</b>	17.72%	21.24%	24.01%
<b>NETHERLANDS</b>	49.44%	56.57%	60.98%
<b>SWEDEN</b>	51.73%	60.81%	61.65%
<b>USA</b>	25.84%	31.92%	36.27%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	23.19%	24.18%	28.85%
<b>CHINA</b>	11.22%	13.67%	15.40%
<b>SPAIN</b>	38.28%	45.12%	49.04%
<b>SOUTH KOREA</b>	23.28%	26.11%	28.60%
<b>RUSSIA</b>	24.36%	22.03%	25.04%
<b>TURKEY</b>	17.51%	21.16%	23.95%
<b>TAIWAN</b>	16.03%	20.55%	26.75%
<b>SOUTH AFRICA</b>	37.05%	45.84%	55.02%



4.2.6 AVERAGE JOURNAL IMPACT FACTOR, CHEMISTRY

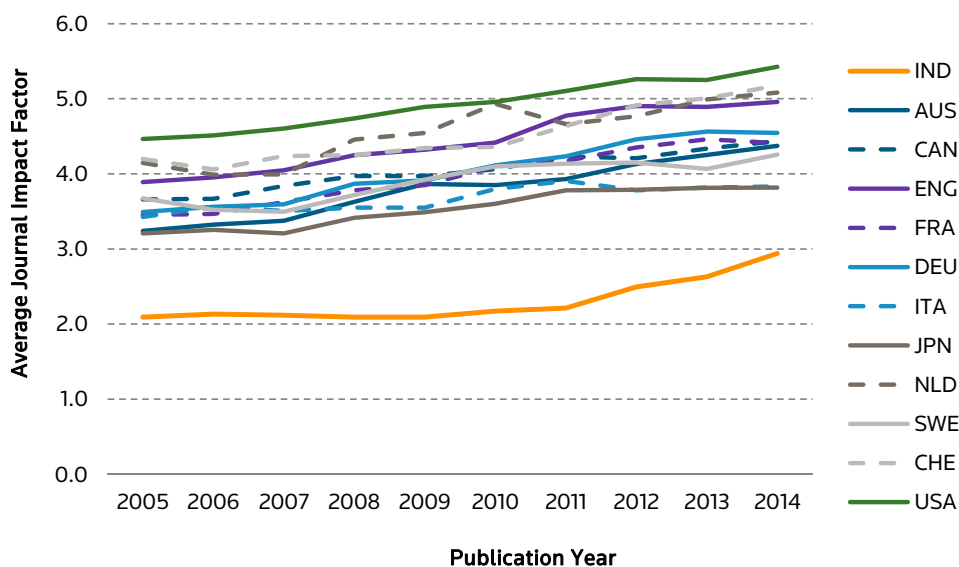


Figure 4.2.6-1 Average Journal Impact Factor, Chemistry, Established research economies  
Time period: 2005-2014. Source: Web of Science

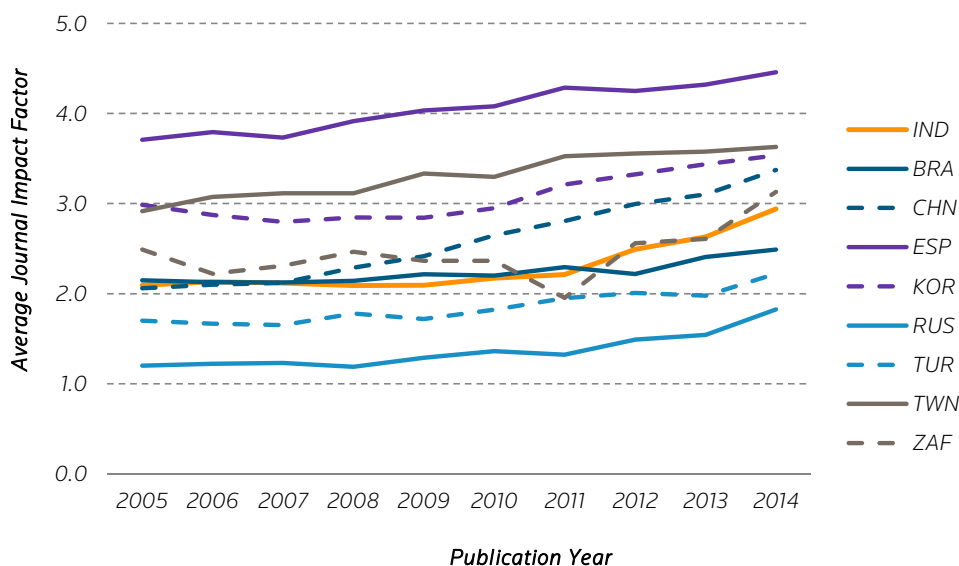


Figure 4.2.6-2 Average Journal Impact Factor, Chemistry, BRICS and other emerging research economies  
Time period: 2005-2014. Source: Web of Science

**Table 4.2.6-1 Average Journal Impact Factor, Chemistry, All countries**

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	2.11	2.25	2.79
<b>Established Research Economies</b>			
AUSTRALIA	3.40	3.95	4.31
CANADA	3.79	4.12	4.38
SWITZERLAND	4.18	4.57	5.09
GERMANY	3.63	4.19	4.55
ENGLAND	4.03	4.61	4.92
FRANCE	3.59	4.12	4.43
ITALY	3.51	3.76	3.82
JAPAN	3.27	3.67	3.82
NETHERLANDS	4.14	4.73	5.04
SWEDEN	3.60	4.08	4.16
USA	4.58	5.06	5.34
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	2.13	2.23	2.45
CHINA	2.15	2.74	3.24
SPAIN	3.79	4.17	4.39
SOUTH KOREA	2.87	3.10	3.49
RUSSIA	1.21	1.36	1.68
TURKEY	1.70	1.88	2.10
TAIWAN	3.06	3.44	3.60
SOUTH AFRICA	2.37	2.28	2.87

India's average Journal Impact Factor in Chemistry was lower than that of the established research economies for all three time periods. However, it was higher than that of Russia and Turkey for all three time periods, and for the periods 2009-2012 and 2013-2014 it was also higher than Brazil's.

4.3 COMPARATIVE ANALYSIS, PHYSICS

4.3.1 NUMBER OF PAPERS, PHYSICS

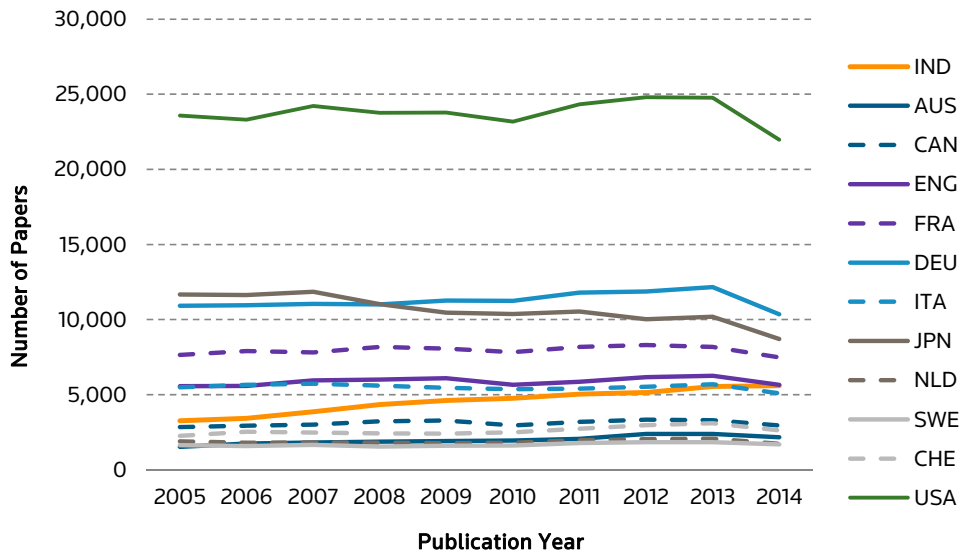


Figure 4.3.1-1 Number of papers, Physics, Established research economies  
Time period: 2005-2014, Source: Web of Science

India published 72% more Physics papers in 2014 (5,605) than in 2005 (3,268). Its output of papers in Physics was greater than that of Australia, Canada, the Netherlands, Sweden, and Switzerland. The output of papers in Physics for France, Germany, Italy, Japan, the Netherlands, and the USA decreased during the period 2005 to 2014.

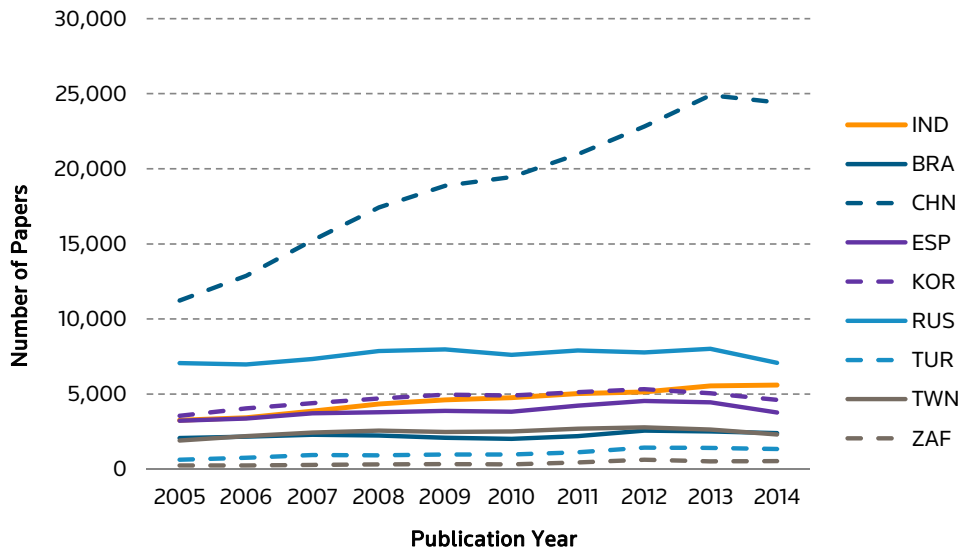


Figure 4.3.1-2 Number of papers, Physics, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

By 2014, India's output of papers in Physics was the third highest of all the emerging research economies, behind China and Russia. The output of papers in Physics from all the emerging economies increased during the period 2005 to 2014. South Africa had 2.19 times as many papers in Physics in 2014 (542 papers) than it did in 2005 (247 papers). This was the largest percentage increase (119%) of all the emerging research economies.

Table 4.3.1-1 Number of papers, Physics, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	14,885	19,547	11,153
<i>Established Research Economies</i>			
AUSTRALIA	6,948	8,295	4,551
CANADA	12,009	12,764	6,248
SWITZERLAND	9,662	10,591	5,710
GERMANY	43,903	46,156	22,515
ENGLAND	23,073	23,764	11,909
FRANCE	31,537	32,374	15,657
ITALY	22,458	21,722	10,779
JAPAN	46,177	41,376	18,891
NETHERLANDS	7,286	7,555	3,789
SWEDEN	6,413	6,836	3,533
USA	94,844	96,095	46,742
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	8,769	8,865	4,896
CHINA	56,755	82,094	49,314
SPAIN	14,116	16,452	8,212
SOUTH KOREA	16,692	20,311	9,657
RUSSIA	29,218	31,258	15,089
TURKEY	3,237	4,484	2,744
TAIWAN	9,103	10,432	4,952
SOUTH AFRICA	1,068	1,728	1,055

4.3.2 SHARE OF WORLD OUTPUT, PHYSICS

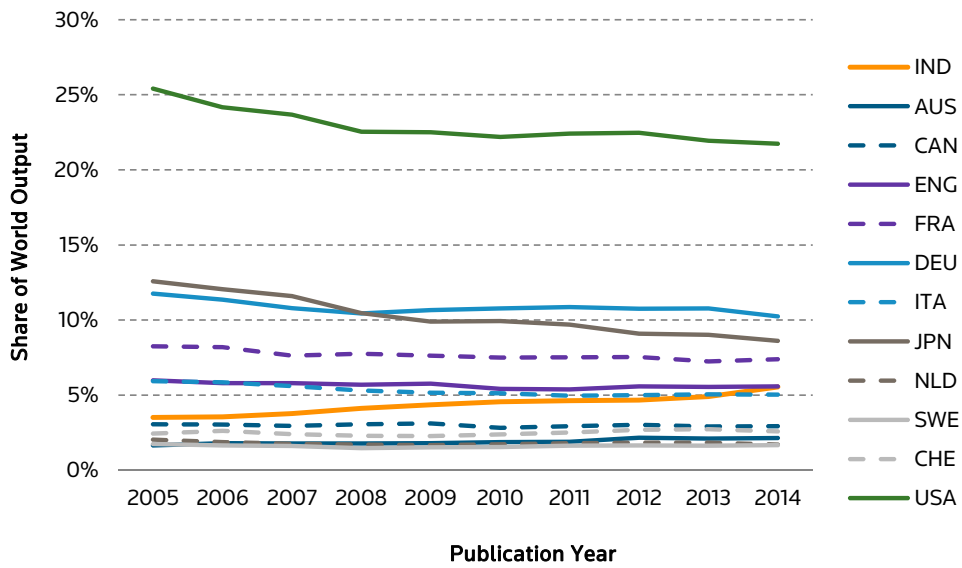


Figure 4.3.2-1 Share of world output, Physics, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Physics increased from 3.52% in 2005 to 5.54% in 2014. It had a higher share of world output in Physics than Australia, Canada, the Netherlands, Sweden, or Switzerland. Share of world output in Physics for the majority of the established research economies decreased, with Australia and Switzerland being the exceptions.

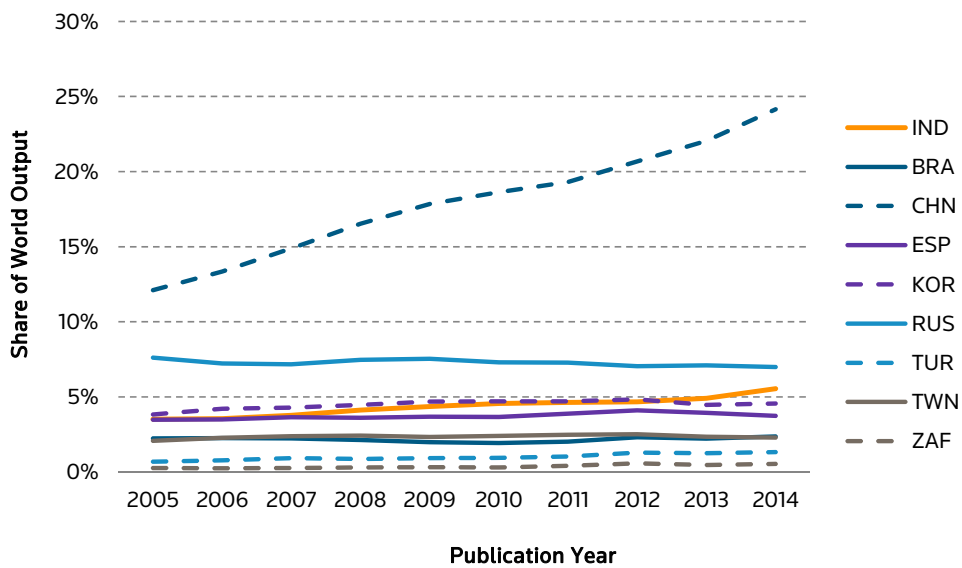


Figure 4.3.2-2 Share of world output, Physics, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

Between 2005 and 2012, India's share of world output was greater than five out of nine emerging research economies, with the exception of China, Russia and South Korea. China's share nearly doubled from 12.11% in 2005 to 24.15% in 2014. For the majority of the emerging research economies, their share of world output in Physics increased, with Russia being the exception dropping from 7.61% in 2005 to 6.99% in 2014.

Table 4.3.2-1 Share of world output, Physics, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Share of World Output		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	3.75%	4.55%	5.21%
<i>Established Research Economies</i>			
AUSTRALIA	1.75%	1.93%	2.13%
CANADA	3.03%	2.97%	2.92%
SWITZERLAND	2.43%	2.47%	2.67%
GERMANY	11.06%	10.75%	10.52%
ENGLAND	5.81%	5.54%	5.56%
FRANCE	7.94%	7.54%	7.31%
ITALY	5.66%	5.06%	5.04%
JAPAN	11.63%	9.64%	8.83%
NETHERLANDS	1.84%	1.76%	1.77%
SWEDEN	1.62%	1.59%	1.65%
USA	23.89%	22.39%	21.84%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	2.21%	2.07%	2.29%
CHINA	14.30%	19.13%	23.04%
SPAIN	3.56%	3.83%	3.84%
SOUTH KOREA	4.20%	4.73%	4.51%
RUSSIA	7.36%	7.28%	7.05%
TURKEY	0.82%	1.04%	1.28%
TAIWAN	2.29%	2.43%	2.31%
SOUTH AFRICA	0.27%	0.40%	0.49%

4.3.3 NORMALISED CITATION IMPACT, PHYSICS

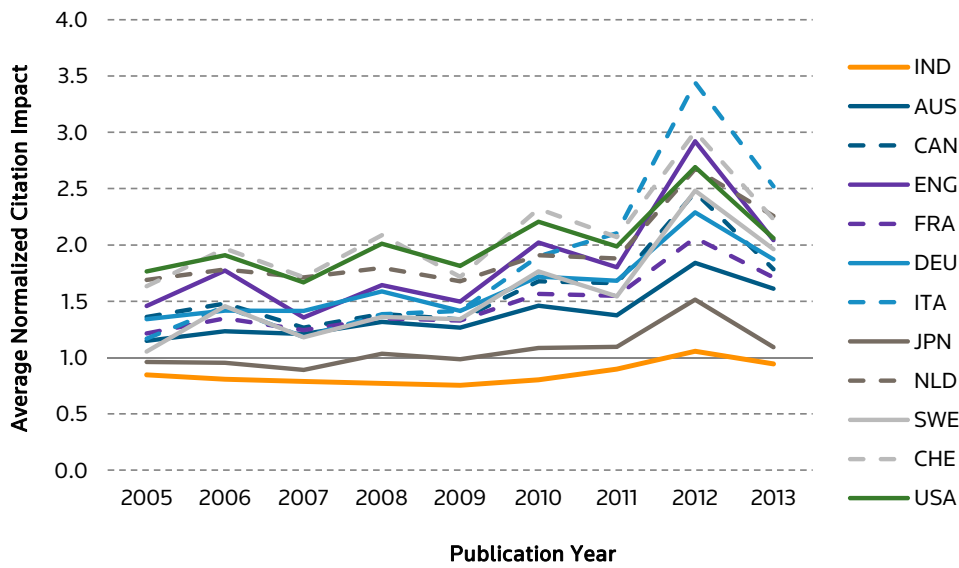


Figure 4.3.3-1 Normalised citation impact, Physics, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Physics fluctuated around 0.8 until 2012 when it peaked at 1.06. In 2013, its citation impact fell back below the world average. As of 2008, the citation impact of all the established research economies in Physics was higher than the world average, except Japan from 2005 to 2009. In general, between 2005 and 2013, the citation impact in Physics of all established research economies increased.

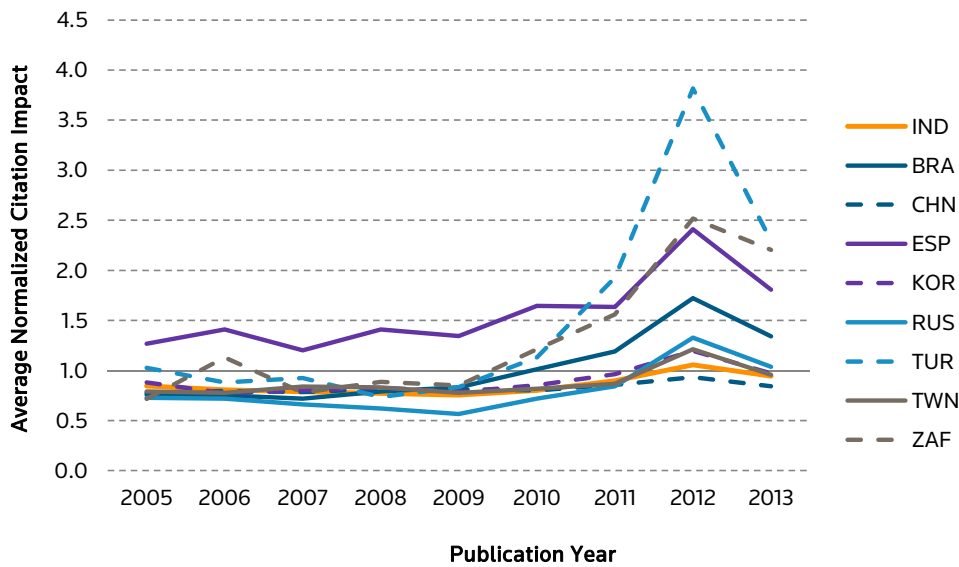


Figure 4.3.3-2 Normalised citation impact, Physics, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

Although China and Russia produced more papers in Physics than India, the citation impact of their papers was lower than India's. Spain's citation impact in Physics was higher than the world average between 2005 and 2013. Since 2010, Turkey and South Africa's citation impact has been higher than the world average.

It is also worth noting that a peak in 2012 was observed for all countries' citation impact for Physics papers, this is likely due to those very highly-cited Higg's Boson papers, which were published in 2012 and collaborated by hundreds of scientists from all over the world.

Table 4.3.3-1 Normalised citation impact, Physics, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.80	0.88	0.94
<b>Established Research Economies</b>			
AUSTRALIA	1.23	1.50	1.61
CANADA	1.37	1.82	1.79
SWITZERLAND	1.85	2.32	2.23
GERMANY	1.44	1.80	1.87
ENGLAND	1.56	2.10	2.04
FRANCE	1.29	1.64	1.71
ITALY	1.30	2.31	2.52
JAPAN	0.96	1.17	1.09
NETHERLANDS	1.74	2.06	2.26
SWEDEN	1.26	1.81	1.96
USA	1.84	2.19	2.06
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.75	1.23	1.34
CHINA	0.80	0.85	0.84
SPAIN	1.32	1.80	1.81
SOUTH KOREA	0.82	0.96	0.97
RUSSIA	0.68	0.87	1.04
TURKEY	0.88	2.32	2.30
TAIWAN	0.81	0.93	0.96
SOUTH AFRICA	0.87	1.73	2.21



## 4.3.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, PHYSICS

Table 4.3.4-1 Highly-cited papers, Physics, All countries  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.53%	2.94%	6.44%	18.90%	0.59%	3.07%	6.47%	19.04%	0.72%	3.36%	5.94%	15.24%
<b>Established Research Economies</b>												
AUSTRALIA	1.02%	6.35%	12.98%	31.81%	1.75%	7.91%	14.65%	32.83%	1.41%	6.88%	11.65%	25.77%
CANADA	1.52%	7.19%	14.18%	32.56%	1.97%	8.51%	15.07%	33.14%	1.84%	8.07%	13.32%	27.06%
SWITZERLAND	2.55%	10.73%	18.66%	38.10%	3.27%	13.29%	22.68%	43.55%	3.42%	12.40%	18.11%	34.26%
GERMANY	1.48%	7.42%	14.52%	33.64%	1.79%	8.24%	15.55%	35.26%	1.64%	7.56%	12.79%	28.01%
ENGLAND	1.78%	7.67%	14.63%	33.51%	2.10%	8.94%	16.34%	35.72%	2.07%	8.88%	14.29%	29.04%
FRANCE	1.23%	5.95%	11.83%	29.26%	1.35%	6.60%	13.06%	30.99%	1.43%	6.57%	10.85%	24.34%
ITALY	1.08%	5.32%	10.41%	26.12%	1.51%	6.88%	13.11%	30.60%	1.64%	6.82%	11.71%	25.87%
JAPAN	0.85%	4.25%	8.67%	21.97%	0.98%	5.06%	9.47%	22.87%	1.07%	4.47%	7.74%	18.75%
NETHERLANDS	2.79%	10.31%	18.41%	38.72%	3.12%	12.40%	21.35%	42.24%	2.80%	10.24%	16.60%	31.70%
SWEDEN	1.31%	6.39%	12.76%	30.63%	2.18%	8.32%	15.23%	34.07%	1.75%	7.76%	12.68%	28.30%
USA	2.26%	9.28%	16.93%	36.05%	2.43%	9.76%	17.26%	36.04%	2.02%	8.20%	13.30%	27.77%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.66%	3.11%	6.68%	18.91%	1.41%	5.49%	10.30%	22.66%	1.45%	5.56%	8.64%	18.67%
CHINA	0.65%	3.73%	7.71%	19.90%	0.83%	4.12%	7.95%	19.66%	0.76%	3.73%	6.50%	15.68%
SPAIN	1.42%	6.35%	12.50%	29.87%	1.82%	8.05%	15.44%	33.69%	1.95%	7.92%	12.76%	27.56%
SOUTH KOREA	0.75%	3.96%	7.85%	19.74%	1.08%	4.72%	8.79%	20.61%	1.25%	4.41%	7.47%	17.08%
RUSSIA	0.63%	2.87%	5.77%	15.16%	0.60%	2.96%	5.83%	14.17%	0.72%	3.12%	5.21%	12.43%
TURKEY	0.31%	2.47%	6.46%	18.91%	1.45%	5.87%	10.73%	24.62%	1.97%	6.23%	9.88%	20.04%
TAIWAN	0.62%	3.80%	7.93%	21.34%	0.97%	4.65%	9.10%	22.23%	1.21%	4.58%	7.49%	16.88%
SOUTH AFRICA	1.03%	3.84%	7.68%	21.16%	2.20%	9.78%	15.97%	31.19%	3.13%	9.95%	15.55%	27.77%

India's percentage of highly-cited papers in Physics was below the world average for all three time periods and thresholds (Top 1%, 5%, 10%, 25%).

Except for Japan, the established research economies' percentage of highly-cited papers in Physics was greater than the world average for all three time periods and thresholds.

Spain was the only emerging research economy for which the percentage of highly-cited papers was above the world average for all three time periods and thresholds. South Africa's percentage of highly-cited papers was below the world average from 2005 to 2008 (except for the Top 1%), but in 2009-2012 and 2013-2014 the percentage was greater than the world average.

4.3.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, PHYSICS

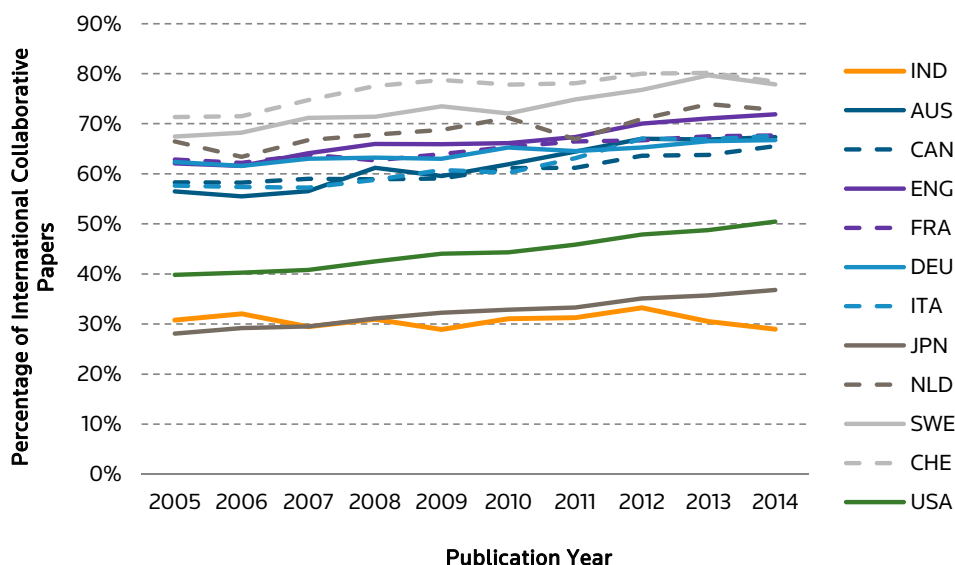


Figure 4.3.5-1 Percentage of internationally collaborative papers, Physics, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Physics decreased from 30.78% in 2005 to 28.97% in 2014. Japan had the greatest increase, from 28.11% in 2005 to 36.82% in 2014. Switzerland had the highest percentage during this time period with 71.34% in 2005 and 78.42% in 2014.

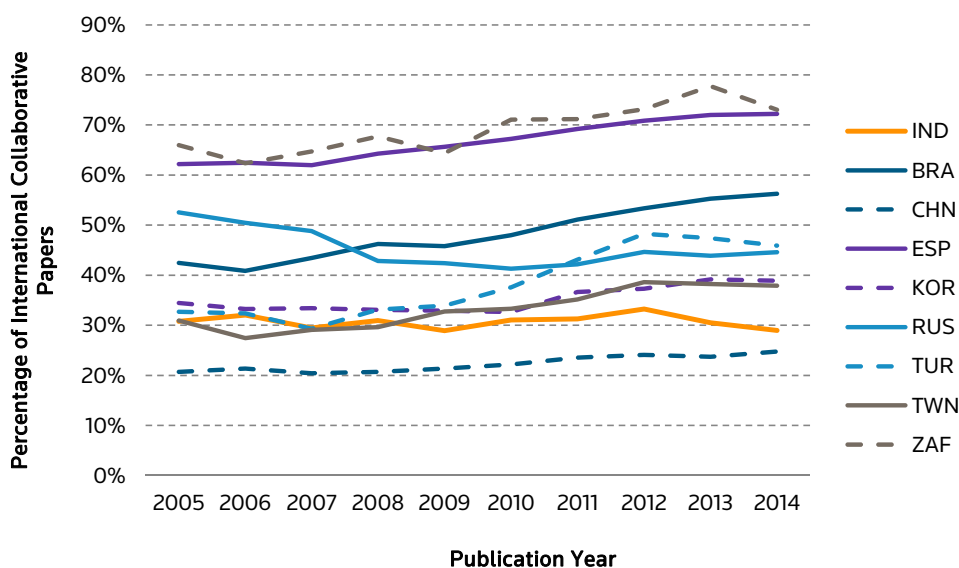


Figure 4.3.5-2 Percentage of internationally collaborative papers, Physics, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Physics was greater than that of China, which had 20.66% in 2005 and 24.75% in 2014. Turkey had the highest increase from 32.70% in 2005 to 45.93% in 2014. Generally, South Africa had the highest percentage of internationally collaborative papers, starting with 65.99% in 2005 and to 73.06% in 2014.

**Table 4.3.5-1 Percentage of internationally collaborative papers, Physics, All countries**  
**Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science**

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	30.78%	31.19%	29.72%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	57.53%	63.46%	67.06%
<b>CANADA</b>	58.62%	61.27%	64.61%
<b>SWITZERLAND</b>	73.80%	78.70%	79.35%
<b>GERMANY</b>	62.54%	64.51%	66.64%
<b>ENGLAND</b>	63.49%	67.40%	71.44%
<b>FRANCE</b>	62.87%	65.62%	67.57%
<b>ITALY</b>	57.75%	62.81%	67.23%
<b>JAPAN</b>	29.46%	33.37%	36.21%
<b>NETHERLANDS</b>	66.11%	69.45%	73.40%
<b>SWEDEN</b>	69.55%	74.37%	78.83%
<b>USA</b>	40.85%	45.56%	49.56%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	43.28%	49.79%	55.76%
<b>CHINA</b>	20.76%	22.86%	24.21%
<b>SPAIN</b>	62.77%	68.36%	72.11%
<b>SOUTH KOREA</b>	33.50%	34.93%	39.04%
<b>RUSSIA</b>	48.49%	42.63%	44.23%
<b>TURKEY</b>	31.76%	41.57%	46.68%
<b>TAIWAN</b>	29.22%	35.07%	38.07%
<b>SOUTH AFRICA</b>	65.36%	70.54%	75.36%

4.3.6 AVERAGE JOURNAL IMPACT FACTOR, PHYSICS

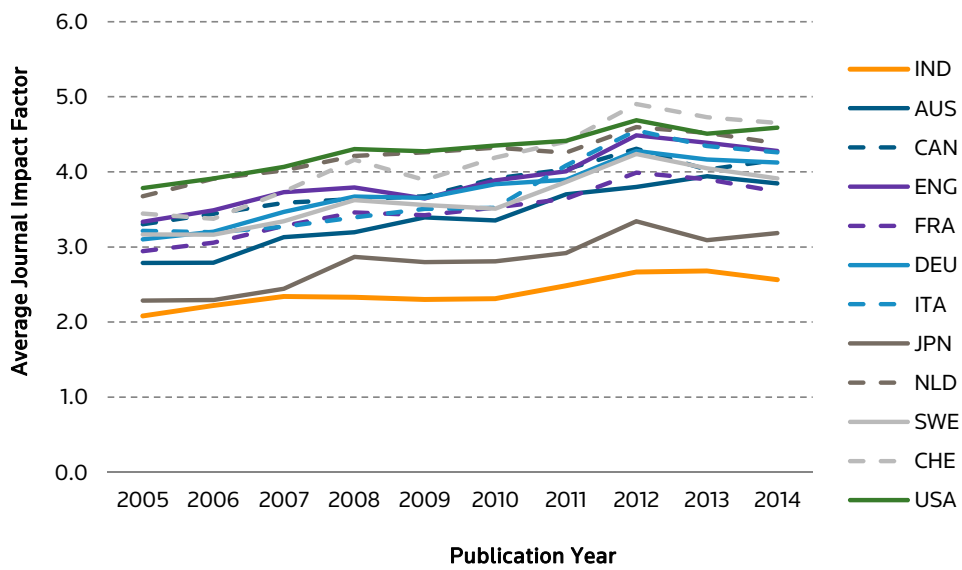


Figure 4.3.6-1 Average Journal Impact Factor, Physics, Established research economies  
Time period: 2005-2014, Source: Web of Science

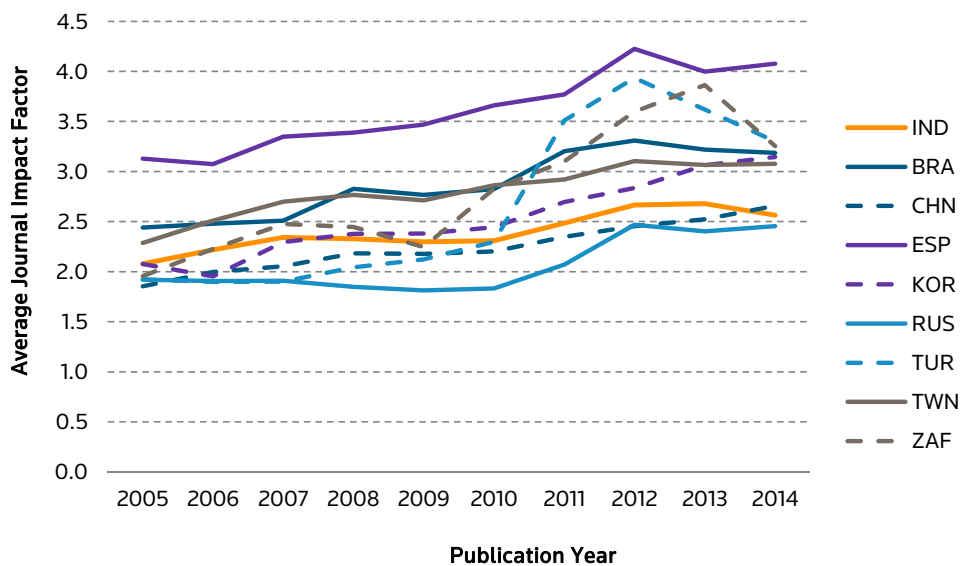


Figure 4.3.6-2 Average Journal Impact Factor, Physics, BRICS and other emerging research economies.  
Time period: 2005-2014, Source: Web of Science

Table 4.3.6-1 Average Journal Impact Factor, Physics, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	2.25	2.45	2.62
<b>Established Research Economies</b>			
AUSTRALIA	2.99	3.57	3.89
CANADA	3.50	4.00	4.10
SWITZERLAND	3.68	4.38	4.69
GERMANY	3.36	3.93	4.14
ENGLAND	3.59	4.03	4.33
FRANCE	3.20	3.66	3.82
ITALY	3.27	3.97	4.30
JAPAN	2.47	2.97	3.14
NETHERLANDS	3.95	4.37	4.45
SWEDEN	3.32	3.82	3.98
USA	4.02	4.44	4.55
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	2.57	3.05	3.20
CHINA	2.04	2.30	2.59
SPAIN	3.25	3.81	4.04
SOUTH KOREA	2.19	2.60	3.10
RUSSIA	1.89	2.06	2.43
TURKEY	1.95	3.22	3.46
TAIWAN	2.59	2.91	3.07
SOUTH AFRICA	2.29	3.08	3.56

India's average Journal Impact Factor in Physics was lower than that of the established research economies for all three time periods. Its average Journal Impact Factor in Physics was higher than that of China and Russia for all three time periods.

#### 4.4 COMPARATIVE ANALYSIS, CLINICAL MEDICINE

##### 4.4.1 NUMBER OF PAPERS, CLINICAL MEDICINE

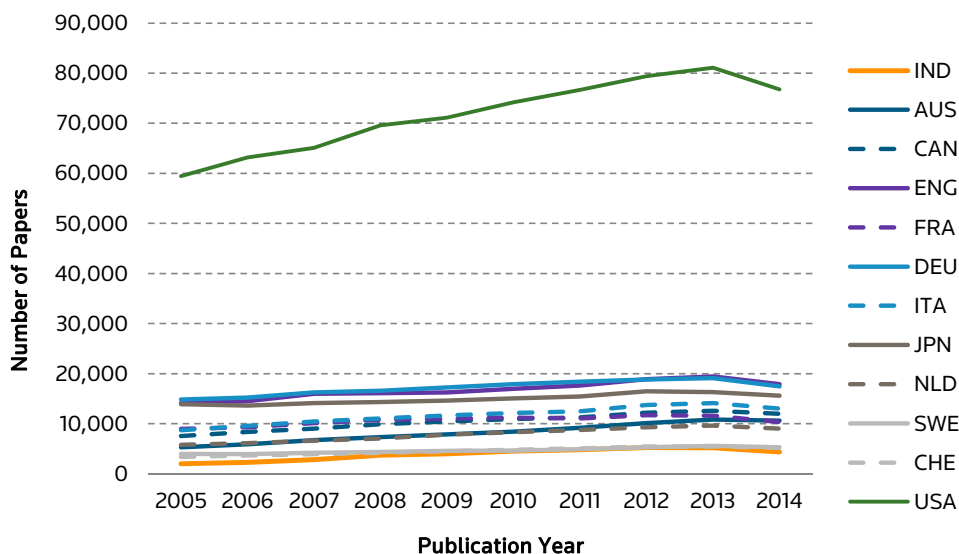


Figure 4.4.1-1 Number of papers, Clinical Medicine, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's output of papers in Clinical Medicine doubled from 1,982 in 2005 to 4,347 in 2014. India's increase (119%) was greater than that of any of the established research economies. In general, the established research economies' output of papers in Clinical Medicine increased between 2005 and 2014.

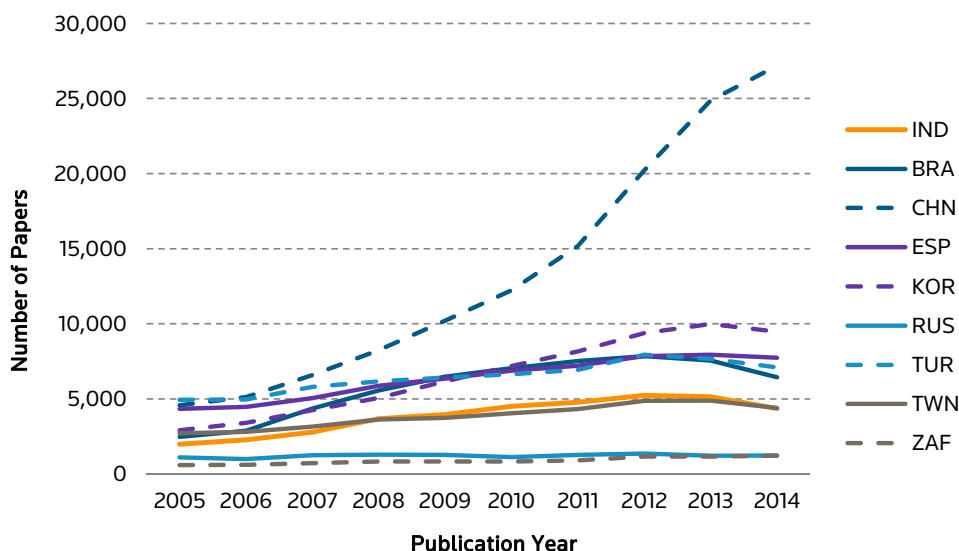


Figure 4.4.1-2 Number of papers, Clinical Medicine, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

The emerging research economies' output of Clinical Medicine papers increased between 2005 and 2014. In particular, China produced 5.93 times as many papers in 2014 (27,175 papers) than it did in 2005 (4,579 papers). Russia had the slowest publishing growth: 1.11 times the output of papers in 2014 (1,225 papers) than it did in 2005 (1,104 papers).

Table 4.4.1-1 Number of papers, Clinical Medicine, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	10,723	18,461	9,494
<i>Established Research Economies</i>			
AUSTRALIA	25,251	35,608	21,454
CANADA	34,716	44,754	24,556
SWITZERLAND	15,072	19,833	10,626
GERMANY	62,862	72,324	36,549
ENGLAND	60,711	69,686	37,307
FRANCE	39,140	44,937	21,902
ITALY	39,756	49,938	27,114
JAPAN	55,905	61,567	31,894
NETHERLANDS	25,551	34,175	18,618
SWEDEN	16,432	19,364	10,811
USA	257,290	301,313	157,875
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	15,273	28,889	13,990
CHINA	24,545	57,832	52,032
SPAIN	19,731	28,283	15,683
SOUTH KOREA	15,633	30,893	19,450
RUSSIA	4,648	5,023	2,442
TURKEY	21,871	27,915	14,759
TAIWAN	12,284	16,963	9,279
SOUTH AFRICA	2,746	3,718	2,368

4.4.2 SHARE OF WORLD OUTPUT, CLINICAL MEDICINE

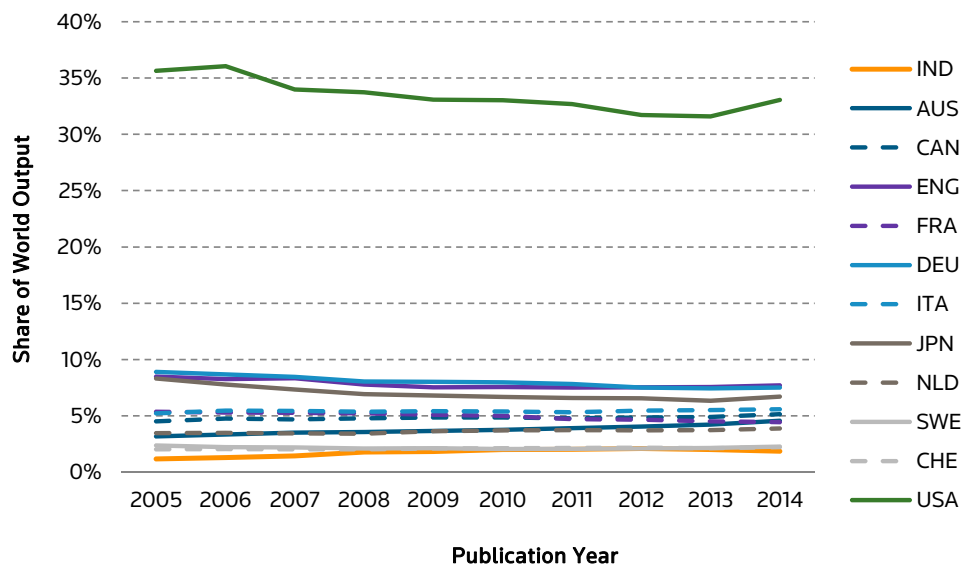


Figure 4.4.2-1 Share of world output, Clinical Medicine, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Clinical Medicine increased from 1.19% in 2005 to 1.87% in 2014. Australia, Canada, Italy, the Netherlands, and Switzerland's share of world output in Clinical Medicine increased, while the other established research economies' share decreased. The USA outpaced the other countries with more than a third of world share in Clinical Medicine during the time period analysed.

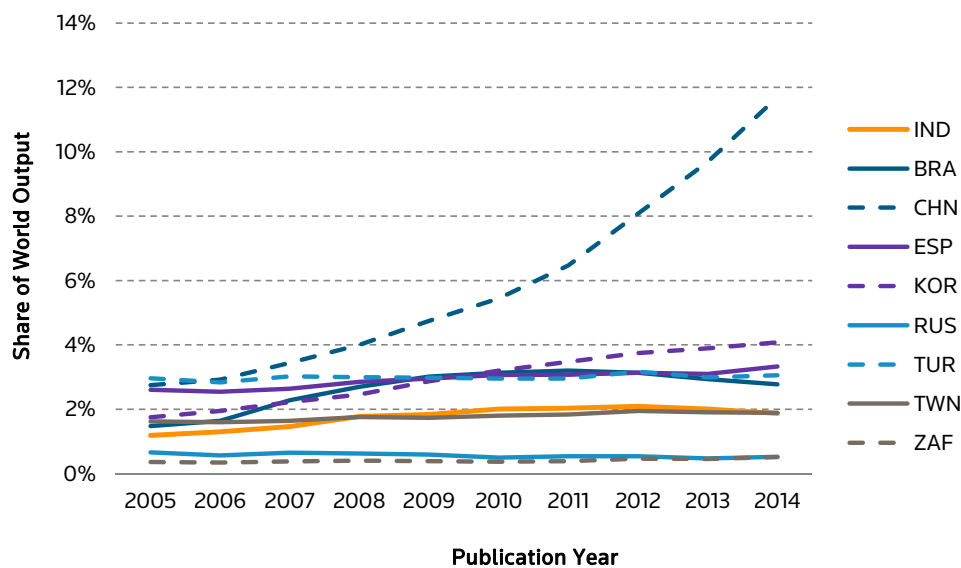


Figure 4.4.2-2 Share of world output, Clinical Medicine, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Clinical Medicine was greater than that of Russia, South Africa and Taiwan (after 2008). China had the largest increase (326%) in share of world output in Clinical Medicine, from 2.75% in 2005 to 11.70% in 2014. Russia was the only emerging economy with a decreasing share of output in this field.



Table 4.4.2-1 Share of world output, Clinical Medicine, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Share of World Output		
	2005-2008	2009-2012	2013-2014
INDIA	1.45%	2.00%	1.94%
<i>Established Research Economies</i>			
AUSTRALIA	3.41%	3.85%	4.39%
CANADA	4.69%	4.84%	5.02%
SWITZERLAND	2.04%	2.14%	2.17%
GERMANY	8.50%	7.82%	7.47%
ENGLAND	8.21%	7.54%	7.63%
FRANCE	5.29%	4.86%	4.48%
ITALY	5.37%	5.40%	5.54%
JAPAN	7.56%	6.66%	6.52%
NETHERLANDS	3.45%	3.70%	3.81%
SWEDEN	2.22%	2.09%	2.21%
USA	34.77%	32.59%	32.28%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	2.06%	3.12%	2.86%
CHINA	3.32%	6.25%	10.64%
SPAIN	2.67%	3.06%	3.21%
SOUTH KOREA	2.11%	3.34%	3.98%
RUSSIA	0.63%	0.54%	0.50%
TURKEY	2.96%	3.02%	3.02%
TAIWAN	1.66%	1.83%	1.90%
SOUTH AFRICA	0.37%	0.40%	0.48%

4.4.3 NORMALISED CITATION IMPACT, CLINICAL MEDICINE

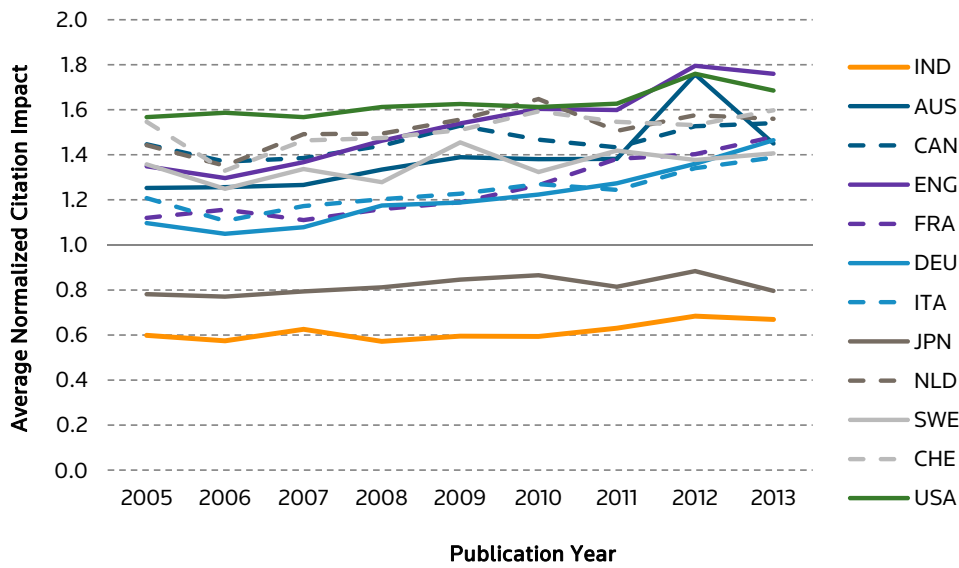


Figure 4.4.3-1 Normalised citation impact, Clinical Medicine, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Clinical Medicine fluctuated below the world average at approximately 0.6 between 2005 and 2010, and between 2011 and 2013, it increased to almost 0.7. The USA had the overall highest citation impact (1.63) in Clinical Medicine. With the exception of Japan, all the established research economies had a citation impact higher than the world average in this field.

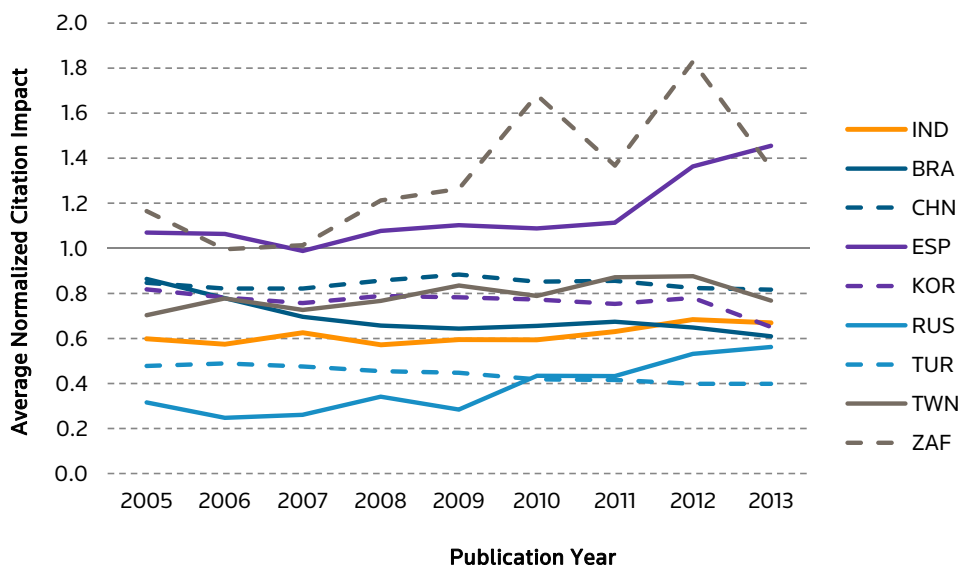


Figure 4.4.3-2 Normalised citation impact; Clinical Medicine; BRICS and other emerging research economies.  
Time period: 2005-2013. Source: Web of Science.

India's citation impact in Clinical Medicine was higher than that of Russia and Turkey. However, Russia had the highest percentage increase (77%) in citation impact of all the emerging research economies. Spain and South Africa were the only emerging economies that had citation impact greater than the world average. China's citation impact in Clinical Medicine was relatively stable over the period analysed.

Table 4.4.3-1 Normalised citation impact, Clinical Medicine, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.59	0.63	0.67
<b>Established Research Economies</b>			
AUSTRALIA	1.28	1.49	1.45
CANADA	1.41	1.49	1.54
SWITZERLAND	1.45	1.55	1.60
GERMANY	1.10	1.26	1.46
ENGLAND	1.37	1.64	1.76
FRANCE	1.14	1.32	1.48
ITALY	1.17	1.27	1.39
JAPAN	0.79	0.85	0.80
NETHERLANDS	1.45	1.57	1.56
SWEDEN	1.31	1.39	1.41
USA	1.58	1.66	1.69
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.72	0.66	0.61
CHINA	0.84	0.85	0.82
SPAIN	1.05	1.18	1.45
SOUTH KOREA	0.78	0.77	0.65
RUSSIA	0.29	0.42	0.56
TURKEY	0.47	0.42	0.40
TAIWAN	0.75	0.85	0.77
SOUTH AFRICA	1.10	1.56	1.36

## 4.4.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, CLINICAL MEDICINE

**Table 4.4.4-1 Highly-cited papers, Clinical Medicine, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.43%	1.86%	3.69%	11.93%	0.75%	2.22%	3.99%	11.97%	0.80%	3.23%	6.38%	10.84%
<b>Established Research Economies</b>												
AUSTRALIA	1.83%	6.88%	12.93%	30.84%	2.08%	7.59%	13.47%	31.13%	2.00%	7.75%	13.84%	21.13%
CANADA	2.33%	8.75%	15.68%	34.53%	2.71%	9.46%	16.05%	34.51%	2.60%	9.37%	15.67%	23.72%
SWITZERLAND	2.60%	9.72%	17.02%	35.12%	3.22%	10.98%	18.07%	37.29%	2.93%	10.88%	18.07%	26.25%
GERMANY	1.46%	6.20%	11.68%	26.48%	2.07%	7.80%	13.68%	29.58%	2.22%	8.54%	14.37%	21.77%
ENGLAND	1.99%	7.97%	14.28%	31.39%	2.66%	9.55%	16.40%	34.67%	2.57%	9.68%	16.43%	24.48%
FRANCE	1.87%	6.67%	11.93%	25.07%	2.52%	8.85%	14.81%	30.19%	2.77%	9.54%	15.63%	22.89%
ITALY	1.93%	7.52%	13.58%	30.00%	2.30%	8.76%	15.03%	33.08%	2.31%	8.89%	15.45%	23.57%
JAPAN	0.56%	3.18%	6.97%	19.40%	0.65%	3.55%	7.41%	21.03%	0.70%	3.94%	8.06%	13.94%
NETHERLANDS	2.54%	9.68%	17.90%	38.94%	2.86%	11.09%	19.42%	41.67%	2.67%	10.64%	18.24%	27.66%
SWEDEN	2.04%	7.93%	14.79%	33.84%	2.40%	9.42%	16.44%	35.63%	2.61%	9.43%	16.11%	24.26%
USA	1.86%	8.12%	15.08%	33.61%	1.95%	8.21%	14.91%	33.71%	1.74%	7.92%	14.26%	22.13%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.73%	2.63%	5.01%	14.99%	0.66%	2.23%	4.41%	12.73%	0.79%	3.05%	5.84%	10.12%
CHINA	0.70%	3.32%	7.12%	20.95%	0.69%	3.63%	7.71%	22.44%	0.53%	3.71%	7.91%	13.85%
SPAIN	1.83%	6.58%	12.00%	26.18%	2.26%	7.60%	13.16%	28.91%	2.38%	8.38%	14.23%	21.41%
SOUTH KOREA	0.46%	2.76%	6.33%	19.26%	0.68%	3.00%	6.35%	18.74%	0.64%	3.00%	6.58%	11.87%
RUSSIA	0.86%	2.24%	3.55%	7.27%	1.91%	3.96%	5.40%	9.72%	2.95%	6.14%	8.19%	10.73%
TURKEY	0.16%	0.78%	1.80%	7.57%	0.25%	0.94%	1.85%	6.99%	0.28%	1.60%	3.58%	6.25%
TAIWAN	0.50%	2.21%	5.06%	16.74%	0.72%	3.03%	6.28%	18.99%	0.78%	3.91%	7.60%	13.01%
SOUTH AFRICA	1.89%	6.74%	11.03%	24.18%	3.50%	9.17%	13.93%	27.81%	3.04%	8.74%	14.23%	19.89%

India's percentage of highly-cited papers in Clinical Medicine was below the world average for all three time periods and thresholds: Top 1%, 5%, 10%, 25%. However, it should be noted that India's percentage of Top 1%, 5%, and 10% of highly-cited papers increased between 2005 and 2014.

The majority of the established research economies' percentage of highly-cited papers was greater than the world average, with Japan and Italy being the exceptions.

Apart from the Top 25% of highly-cited papers in 2013 to 2014, Spain's percentage of highly-cited papers was greater than the world average. Apart from the Top 25% of highly-cited papers in 2005-2008 and 2013-2014, South Africa's percentage of highly-cited papers was greater than the world average.

4.4.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, CLINICAL MEDICINE

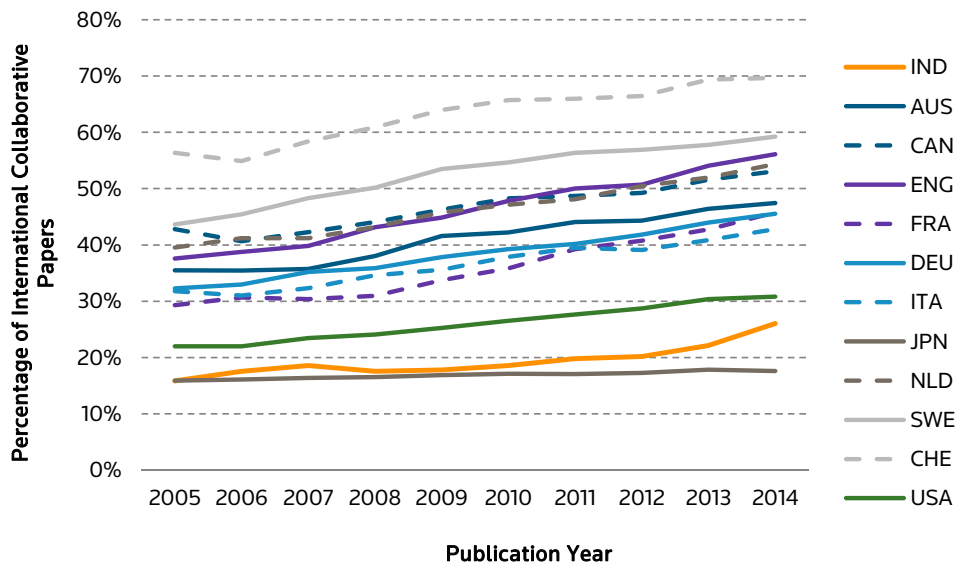


Figure 4.4.5-1 Percentage of internationally collaborative papers, Clinical Medicine, Established research economies  
Time period: 2005-2014; Source: Web of Science

India's percentage of internationally collaborative papers in Clinical Medicine was greater than that of Japan. Furthermore, India had the greatest increase in collaborative papers from 15.84% in 2005 to 26.04% in 2014. In general, all of the established research economies' percentage of internationally collaborative papers increased. Switzerland had the highest percentage of internationally collaborative papers of all the established research economies, rising from 56.33% in 2005 to 69.66% in 2014.

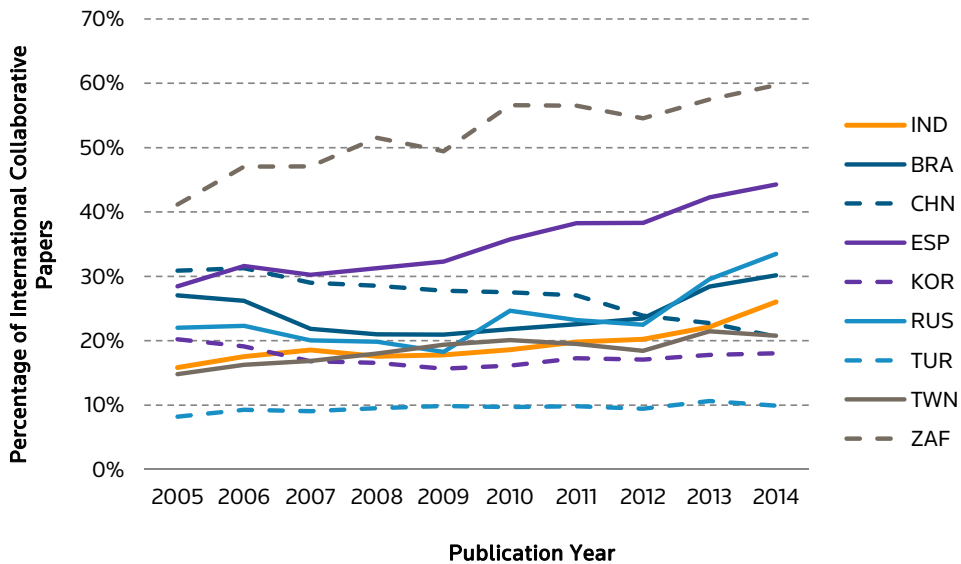


Figure 4.4.5-2 Percentage of internationally collaborative papers, Clinical Medicine, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

After 2007, India's percentage of internationally collaborative papers was greater than that of South Korea and Turkey. China had the greatest decrease, from 30.9% in 2005 to 20.66% in 2014. South Africa maintained the highest percentage of internationally collaborative papers among the emerging research economies, with 41.18% in 2005 and 59.72% in 2014.

**Table 4.4.5-1 Percentage of internationally collaborative papers, Clinical Medicine, All countries**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	17.50%	19.19%	23.92%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	36.28%	43.15%	46.91%
<b>CANADA</b>	42.51%	48.17%	52.31%
<b>SWITZERLAND</b>	57.78%	65.57%	69.51%
<b>GERMANY</b>	34.15%	39.81%	44.71%
<b>ENGLAND</b>	39.92%	48.46%	55.04%
<b>FRANCE</b>	30.36%	37.43%	44.18%
<b>ITALY</b>	32.52%	38.08%	41.80%
<b>JAPAN</b>	16.24%	17.08%	17.75%
<b>NETHERLANDS</b>	41.38%	47.99%	53.12%
<b>SWEDEN</b>	46.99%	55.41%	58.46%
<b>USA</b>	22.93%	27.09%	30.59%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	23.20%	22.26%	29.22%
<b>CHINA</b>	29.68%	26.17%	21.66%
<b>SPAIN</b>	30.47%	36.32%	43.26%
<b>SOUTH KOREA</b>	17.87%	16.63%	17.92%
<b>RUSSIA</b>	20.96%	22.08%	31.53%
<b>TURKEY</b>	9.03%	9.69%	10.27%
<b>TAIWAN</b>	16.61%	19.31%	21.12%
<b>SOUTH AFRICA</b>	47.12%	54.36%	58.61%

4.4.6 AVERAGE JOURNAL IMPACT FACTOR, CLINICAL MEDICINE

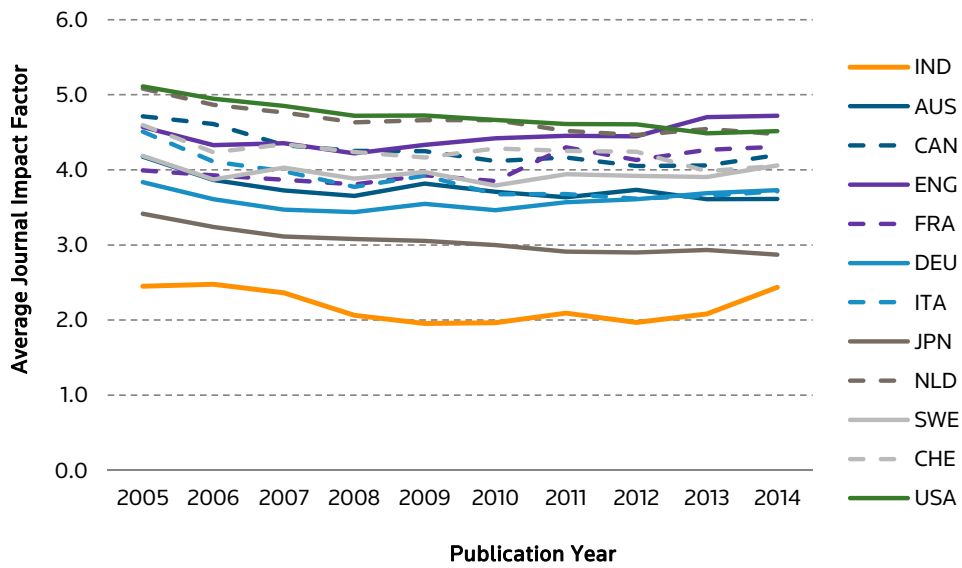


Figure 4.4.6-1 Average Journal Impact Factor, Clinical Medicine, Established research economies  
Time period: 2005-2014, Source: Web of Science

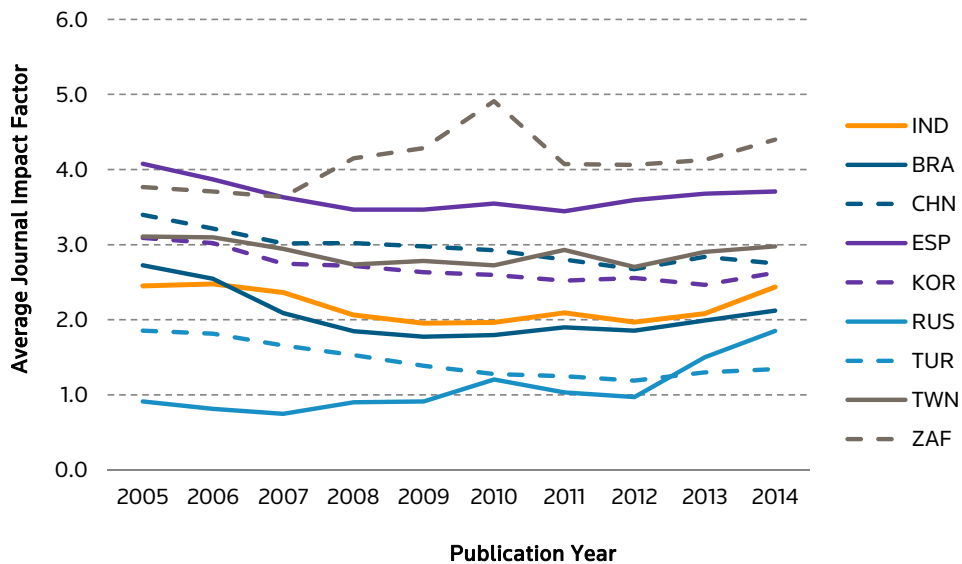


Figure 4.4.6-2 Average Journal Impact Factor, Clinical Medicine, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

**Table 4.4.6-1 Average Journal Impact Factor, Clinical Medicine, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	2.30	2.00	2.26
<b>Established Research Economies</b>			
AUSTRALIA	3.83	3.72	3.61
CANADA	4.46	4.14	4.13
SWITZERLAND	4.34	4.24	4.02
GERMANY	3.58	3.55	3.71
ENGLAND	4.36	4.42	4.71
FRANCE	3.89	4.06	4.29
ITALY	4.07	3.71	3.68
JAPAN	3.21	2.96	2.90
NETHERLANDS	4.82	4.57	4.51
SWEDEN	3.99	3.91	3.98
USA	4.90	4.65	4.50
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	2.18	1.83	2.05
CHINA	3.13	2.81	2.79
SPAIN	3.73	3.52	3.69
SOUTH KOREA	2.86	2.57	2.54
RUSSIA	0.84	1.02	1.67
TURKEY	1.70	1.27	1.32
TAIWAN	2.95	2.78	2.94
SOUTH AFRICA	3.83	4.30	4.26

India's average Journal Impact Factor in Clinical Medicine was lower than that of the established research economies for all three time periods. However, India had a higher average Journal Impact Factor in Clinical Medicine than Brazil, Russia and Turkey for all three time periods.



4.5 COMPARATIVE ANALYSIS, ENGINEERING

4.5.1 NUMBER OF PAPERS, ENGINEERING

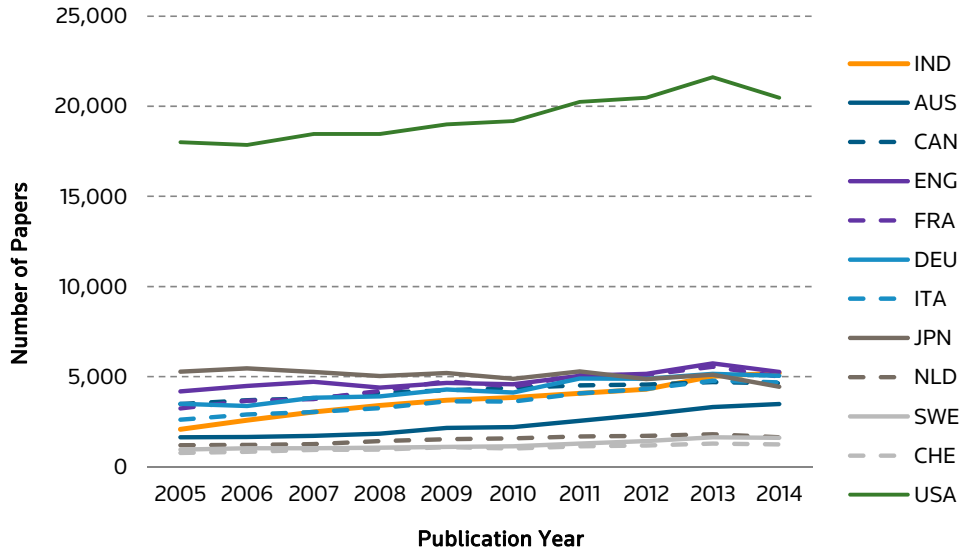


Figure 4.5.1-1 Number of papers, Engineering, Established research economies  
Time period: 2005-2014, Source: Web of Science

India published 151% more Engineering papers in 2014 (5,196 papers) than it did in 2005 (2,071 papers). India's increase in output of Engineering papers was greater than that of the established research economies. India's output of papers in Engineering was greater than that of Australia, Netherlands, Sweden, and Switzerland. With the exception of Japan, all of the established research economies' total output of papers in Engineering increased.

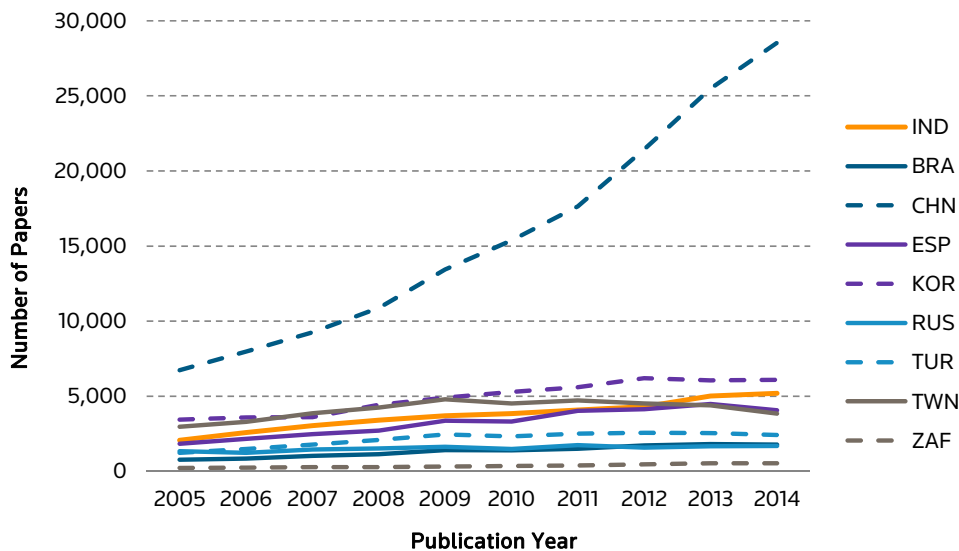


Figure 4.5.1-2 Number of papers, Engineering, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's output of papers in Engineering was greater than five out of nine emerging research economies with China, South Korea, and Taiwan being the exceptions. India's growth was second to China, which published 4.24 times more papers in 2014 (28,528 papers) than it did in 2005 (6,727 papers). In general, the output of all of the emerging research economies in Engineering grew.

Table 4.5.1-1 Number of papers, Engineering, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
INDIA	11,091	15,898	10,213
<i>Established Research Economies</i>			
AUSTRALIA	6,840	9,807	6,788
CANADA	15,061	17,690	9,326
SWITZERLAND	3,467	4,415	2,512
GERMANY	14,596	18,174	10,203
ENGLAND	17,759	19,427	10,989
FRANCE	14,857	19,367	10,534
ITALY	11,791	15,620	9,453
JAPAN	21,010	20,236	9,539
NETHERLANDS	5,083	6,489	3,448
SWEDEN	4,032	4,938	3,235
USA	72,768	78,892	42,087
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	3,781	6,038	3,595
CHINA	34,827	67,906	54,001
SPAIN	9,196	14,855	8,551
SOUTH KOREA	15,058	21,992	12,141
RUSSIA	5,542	6,443	3,356
TURKEY	6,599	9,855	4,967
TAIWAN	14,353	18,530	8,228
SOUTH AFRICA	1,041	1,528	1,071

4.5.2 SHARE OF WORLD OUTPUT, ENGINEERING

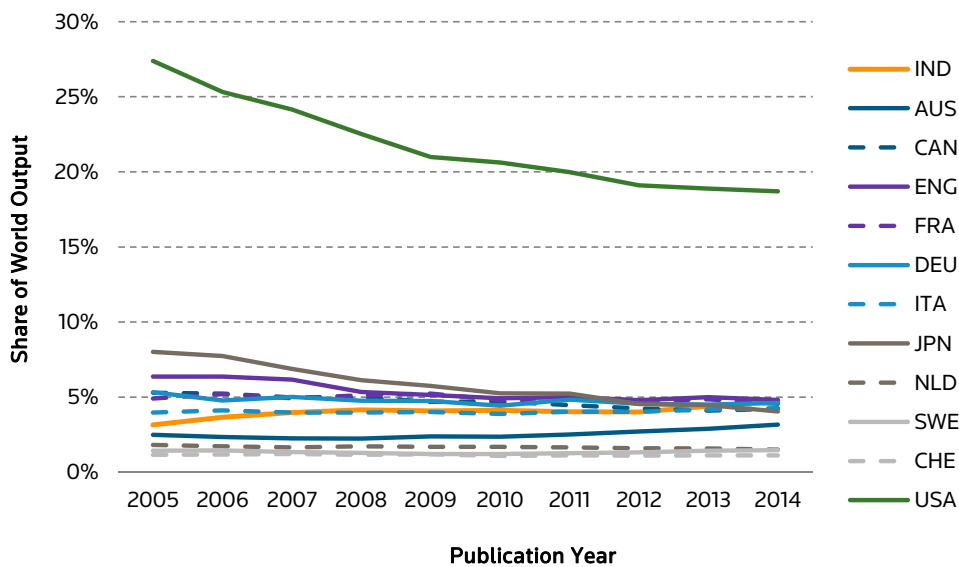


Figure 4.5.2-1 Share of world output, Engineering, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Engineering was greater than that of Australia, the Netherlands, Sweden, and Switzerland. Australia, Italy, and Sweden were the only established research economies whose share of world output in Engineering increased, while the share of world output for the remaining established research economies decreased. The greatest fall was observed for Japan (decreased from 8.02% to 4.05%) and the USA (decreased from 27.38% to 18.7%).

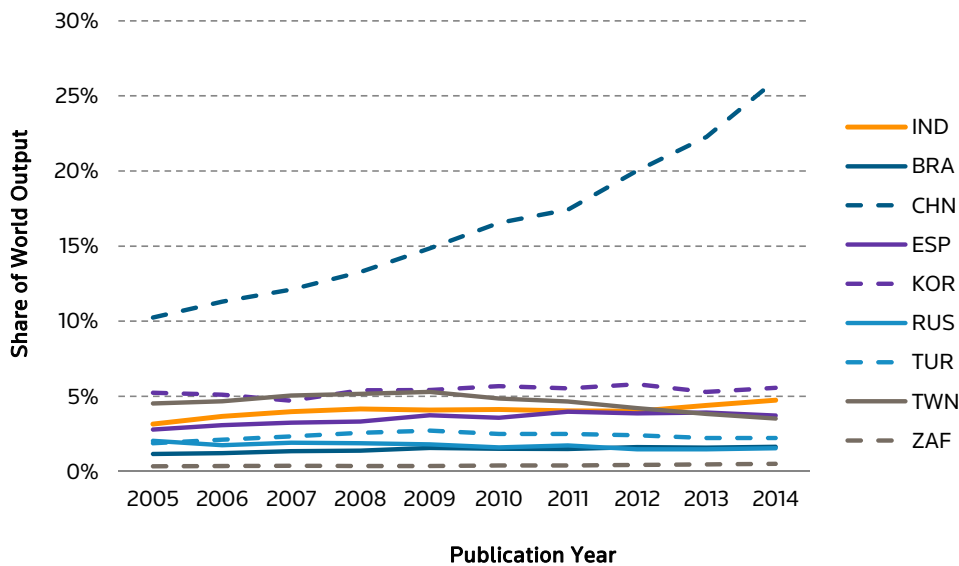


Figure 4.5.2-2 Share of world output, Engineering, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Engineering was greater than that of five out of nine emerging research economies, with China, South Korea, and Taiwan (2005-2012) being the exceptions. The majority of emerging research economies' share of world output in Engineering increased, with Russia and Taiwan being the exceptions.

Table 4.5.2-1 Share of world output, Engineering, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Share of World Output		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	3.76%	4.06%	4.56%
<i>Established Research Economies</i>			
AUSTRALIA	2.32%	2.50%	3.03%
CANADA	5.11%	4.51%	4.16%
SWITZERLAND	1.18%	1.13%	1.12%
GERMANY	4.95%	4.64%	4.56%
ENGLAND	6.03%	4.96%	4.91%
FRANCE	5.04%	4.94%	4.70%
ITALY	4.00%	3.98%	4.22%
JAPAN	7.13%	5.16%	4.26%
NETHERLANDS	1.72%	1.66%	1.54%
SWEDEN	1.37%	1.26%	1.44%
USA	24.69%	20.12%	18.79%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	1.28%	1.54%	1.61%
CHINA	11.82%	17.32%	24.11%
SPAIN	3.12%	3.79%	3.82%
SOUTH KOREA	5.11%	5.61%	5.42%
RUSSIA	1.88%	1.64%	1.50%
TURKEY	2.24%	2.51%	2.22%
TAIWAN	4.87%	4.73%	3.67%
SOUTH AFRICA	0.35%	0.39%	0.48%

4.5.3 NORMALISED CITATION IMPACT, ENGINEERING

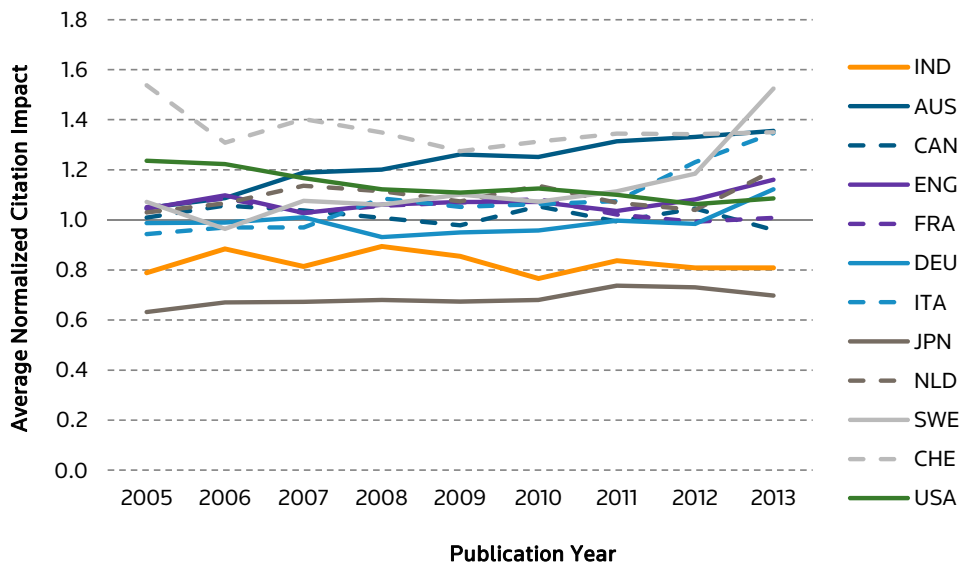


Figure 4.5.3-1 Normalised citation impact, Engineering, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Engineering fluctuated around 0.8, between 2005 and 2013. India's citation impact was higher than that of Japan over this period. Switzerland had the highest citation impact in this field between 2005 and 2012, while Sweden had the highest in 2013. The USA, which had the highest the citation impact in other fields, had a lower citation impact in this field.

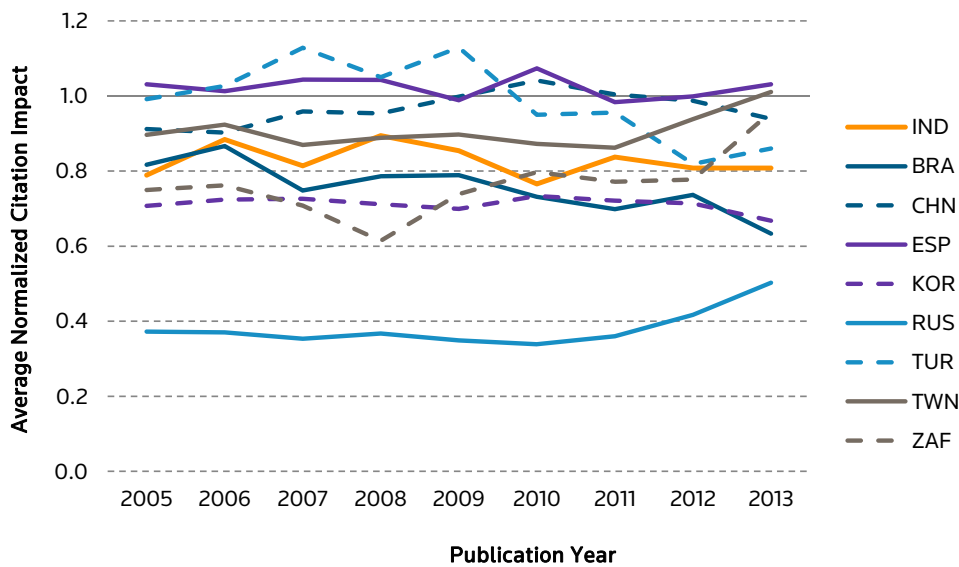


Figure 4.5.3-2 Normalised citation impact, Engineering, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

Between 2006 and 2012, India's citation impact in Engineering was higher than that of Brazil, South Korea, Russia and South Africa. Only between 2010 and 2013 was South Africa's citation impact in this field higher than India. Spain had a citation impact of about the world average, while Turkey's citation impact has fallen from above world average in 2009 to below this level in recent years.

**Table 4.5.3-1 Normalised citation impact, Engineering, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	0.85	0.82	0.81
<b>Established Research Economies</b>			
AUSTRALIA	1.13	1.29	1.36
CANADA	1.03	1.02	0.96
SWITZERLAND	1.39	1.32	1.35
GERMANY	0.98	0.97	1.12
ENGLAND	1.06	1.07	1.16
FRANCE	1.05	1.04	1.01
ITALY	1.00	1.11	1.35
JAPAN	0.66	0.71	0.70
NETHERLANDS	1.09	1.08	1.20
SWEDEN	1.04	1.12	1.52
USA	1.19	1.10	1.09
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.80	0.74	0.63
CHINA	0.94	1.01	0.94
SPAIN	1.03	1.01	1.03
SOUTH KOREA	0.72	0.72	0.67
RUSSIA	0.37	0.37	0.50
TURKEY	1.05	0.96	0.86
TAIWAN	0.89	0.89	1.01
SOUTH AFRICA	0.70	0.77	0.96

## 4.5.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, ENGINEERING

**Table 4.5.4-1 Highly-cited papers, Engineering, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.91%	4.72%	9.30%	22.36%	0.82%	4.22%	8.68%	22.35%	0.61%	3.31%	7.25%	18.10%
<b>Established Research Economies</b>												
AUSTRALIA	1.54%	6.92%	13.08%	30.58%	2.18%	8.08%	15.06%	32.96%	1.64%	6.01%	11.93%	26.78%
CANADA	1.30%	6.21%	11.60%	28.04%	1.27%	5.47%	10.76%	26.73%	0.79%	4.18%	8.28%	21.02%
SWITZERLAND	1.96%	8.83%	16.41%	36.57%	2.04%	8.04%	14.52%	33.64%	1.31%	5.85%	12.46%	27.35%
GERMANY	1.08%	4.86%	9.63%	24.52%	1.08%	4.77%	9.61%	23.90%	1.24%	5.07%	9.63%	22.05%
ENGLAND	1.01%	5.53%	10.97%	26.98%	1.13%	5.35%	10.57%	26.80%	0.82%	4.40%	8.82%	23.33%
FRANCE	1.06%	5.69%	11.21%	27.93%	0.81%	4.70%	9.94%	26.41%	0.81%	4.15%	8.66%	21.41%
ITALY	0.86%	5.01%	10.53%	28.24%	1.03%	5.67%	11.68%	30.27%	1.23%	5.85%	11.94%	27.52%
JAPAN	0.50%	3.10%	6.20%	17.07%	0.68%	3.09%	6.43%	17.10%	0.63%	3.11%	6.24%	16.53%
NETHERLANDS	1.67%	6.81%	12.59%	30.16%	1.34%	5.32%	11.64%	28.02%	0.99%	5.37%	10.90%	24.71%
SWEDEN	1.02%	6.35%	12.35%	30.36%	1.32%	6.89%	13.30%	30.56%	1.39%	5.56%	11.38%	26.40%
USA	1.57%	6.58%	12.38%	28.51%	1.43%	5.96%	11.10%	26.15%	1.07%	4.41%	9.00%	21.88%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.77%	4.36%	9.02%	23.75%	0.48%	3.78%	8.36%	21.99%	0.22%	2.42%	5.90%	16.88%
CHINA	1.10%	5.60%	10.69%	25.13%	1.36%	6.30%	11.90%	27.51%	1.29%	4.75%	9.00%	20.45%
SPAIN	1.20%	6.05%	11.71%	28.98%	0.99%	5.91%	11.57%	28.76%	0.87%	4.78%	9.69%	24.28%
SOUTH KOREA	0.48%	3.27%	7.09%	19.56%	0.55%	3.17%	6.70%	18.49%	0.51%	3.06%	6.15%	16.37%
RUSSIA	0.13%	1.14%	2.56%	7.56%	0.16%	1.12%	2.36%	6.92%	0.24%	1.01%	2.86%	8.85%
TURKEY	1.29%	7.26%	13.65%	30.02%	1.44%	6.24%	11.29%	25.98%	0.81%	3.36%	7.01%	17.19%
TAIWAN	0.64%	4.08%	9.19%	24.89%	0.58%	3.75%	8.22%	23.05%	0.60%	3.50%	6.84%	17.39%
SOUTH AFRICA	0.38%	2.79%	7.01%	20.17%	0.85%	3.47%	7.66%	20.09%	1.21%	4.01%	7.10%	19.79%

India's percentage of highly-cited papers in Engineering was below the world average for all three time periods and thresholds: 1%, 5%, 10%, 25%. Furthermore, India's percentage of highly-cited paper in each threshold decreased from 2005 to 2014.

Japan's percentage of highly-cited papers was also lower than the world average for all three time periods, and thresholds. England and Canada's percentage of highly-cited papers was greater than the world average for 2005-2012, but dropped below the world average for the years 2013 and 2014.

China, Spain and Turkey generally had percentage of highly-cited papers than the world average from 2005 to 2012. However, for 2013 to 2014, China and Turkey's percentage of highly-cited papers was only greater than the world average for the Top 1% threshold.

4.5.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, ENGINEERING

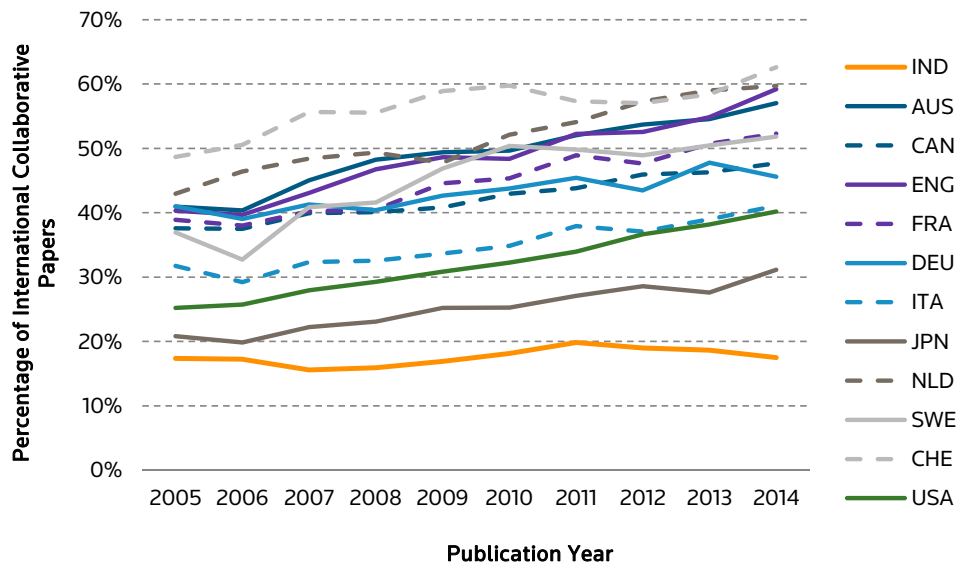


Figure 4.5.5-1 Percentage of internationally collaborative papers, Engineering, Established research economies Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Engineering fluctuated between 16% and 18% between 2005 and 2014, and was lower than that of the established research economies. The USA had the greatest increase in internationally collaborative papers from 25.22% in 2005 to 40.2% in 2014. Switzerland had the highest percentage of collaborative papers, with 48.68% in 2005 and 62.61% in 2014.

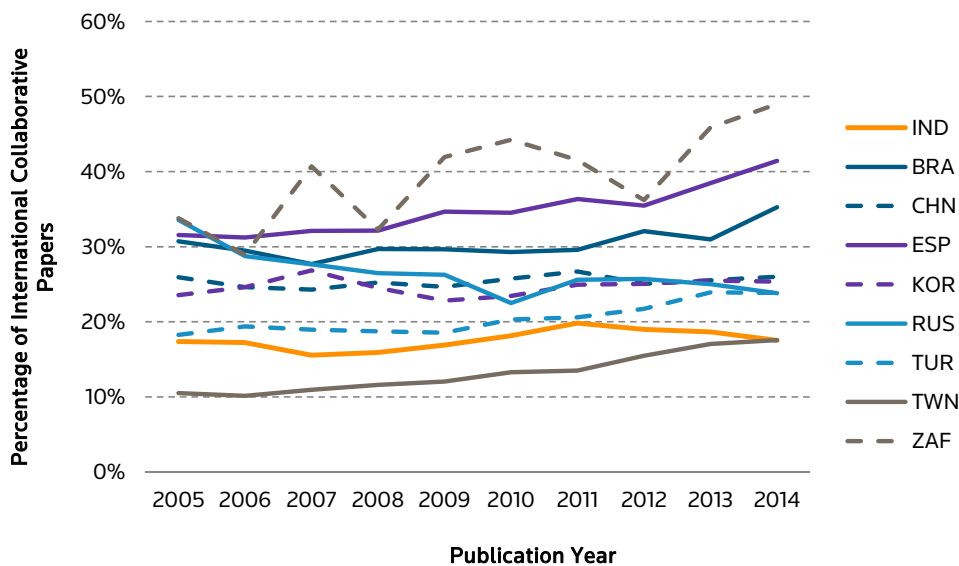


Figure 4.5.5-2 Percentage of internationally collaborative papers, Engineering, BRICS and other emerging research economies Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers was only higher than that of Taiwan. Generally, South Africa had the highest percentage of internationally collaborative papers, with 33.79% in 2005 and 48.98% in 2014. Taiwan's 67% increase in the percentage of internationally collaborative papers was the highest of all the emerging research economies.



**Table 4.5.5-1 Percentage of internally collaborative papers, Engineering, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	16.40%	18.51%	18.07%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	43.77%	51.41%	55.80%
<b>CANADA</b>	38.84%	43.43%	46.97%
<b>SWITZERLAND</b>	52.87%	58.19%	60.47%
<b>GERMANY</b>	40.45%	43.87%	46.70%
<b>ENGLAND</b>	42.47%	50.54%	56.93%
<b>FRANCE</b>	39.46%	46.69%	51.46%
<b>ITALY</b>	31.49%	35.99%	40.02%
<b>JAPAN</b>	21.46%	26.53%	29.25%
<b>NETHERLANDS</b>	46.92%	52.95%	59.34%
<b>SWEDEN</b>	38.07%	49.03%	51.13%
<b>USA</b>	27.06%	33.48%	39.16%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	29.30%	30.24%	33.10%
<b>CHINA</b>	24.97%	25.56%	25.79%
<b>SPAIN</b>	31.81%	35.31%	39.87%
<b>SOUTH KOREA</b>	24.87%	24.13%	25.42%
<b>RUSSIA</b>	28.98%	25.08%	24.40%
<b>TURKEY</b>	18.85%	20.30%	23.88%
<b>TAIWAN</b>	10.86%	13.55%	17.28%
<b>SOUTH AFRICA</b>	34.10%	40.64%	47.43%

4.5.6 AVERAGE JOURNAL IMPACT FACTOR, ENGINEERING

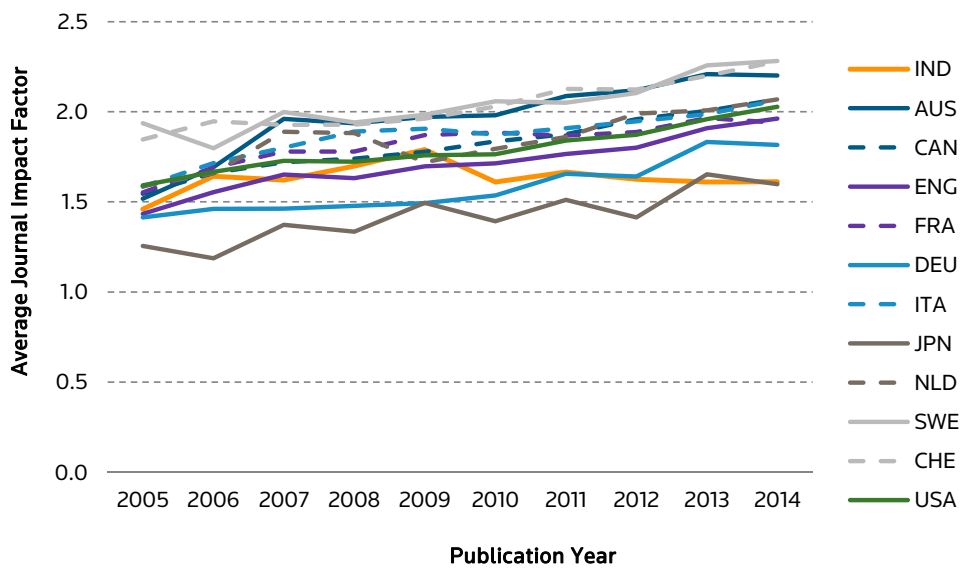


Figure 4.5.6-1 Average Journal Impact factor, Engineering, Established research economies  
Time period: 2005-2014, Source: Web of Science

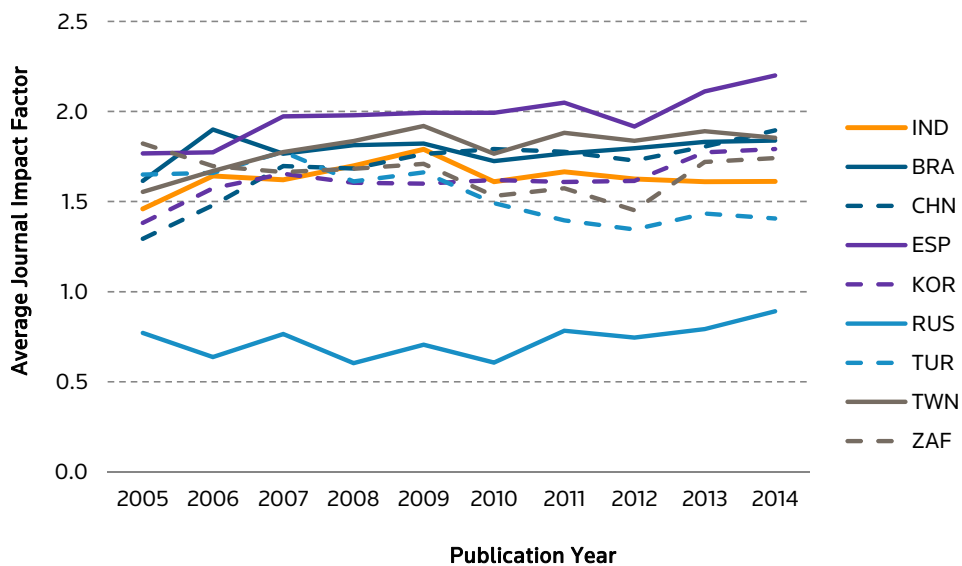


Figure 4.5.6-2 Average Journal Impact factor, Engineering, BRICS and other emerging research economies,  
Time period: 2005-2014, Source: Web of Science

Table 4.5.6-1 Average Journal Impact Factor, Engineering, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	1.62	1.67	1.61
<b>Established Research Economies</b>			
AUSTRALIA	1.78	2.05	2.20
CANADA	1.67	1.86	2.04
SWITZERLAND	1.91	2.06	2.24
GERMANY	1.45	1.59	1.82
ENGLAND	1.57	1.75	1.93
FRANCE	1.71	1.88	1.95
ITALY	1.76	1.91	2.03
JAPAN	1.29	1.46	1.62
NETHERLANDS	1.76	1.84	2.04
SWEDEN	1.92	2.05	2.27
USA	1.68	1.81	1.99
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	1.78	1.78	1.84
CHINA	1.57	1.76	1.85
SPAIN	1.89	1.99	2.16
SOUTH KOREA	1.56	1.61	1.78
RUSSIA	0.69	0.71	0.84
TURKEY	1.67	1.47	1.42
TAIWAN	1.72	1.85	1.87
SOUTH AFRICA	1.71	1.55	1.73

India's average Journal Impact Factor in Engineering was lower than that of most of the established research economies, except for Japan. India's average Journal Impact Factor was greater than Japan's for the 2005-2008 and 2009-2012 time periods. India's average Journal Impact Factor in Engineering was greater than Russia's for all three time periods.

### 4.6 COMPARATIVE ANALYSIS, MATERIALS SCIENCE

#### 4.6.1 NUMBER OF PAPERS, MATERIALS SCIENCE

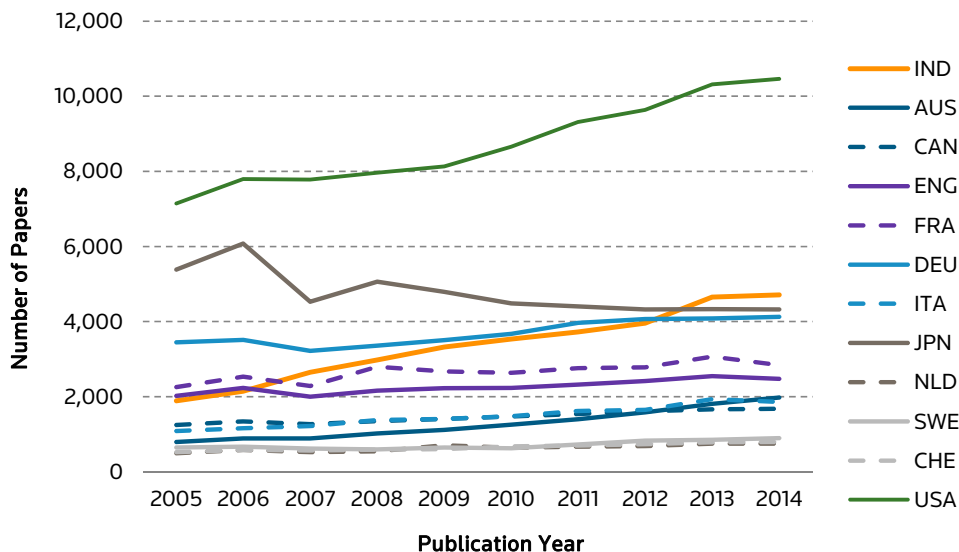


Figure 4.6.1-1 Number of papers, Materials Science, Established research economies  
Time period: 2005-2014, Source: Web of Science

India published 150% more Materials Science papers in 2014 (4,713 papers) than it did in 2005 (1,887 papers). Since 2007, India's output of papers in Materials Science has been greater than the majority of established research economies, and by 2013 India's output of papers in Materials Science was second only to the USA. With the exception of Japan, all of the established research economies' output in Materials Science increased between 2005 and 2014.

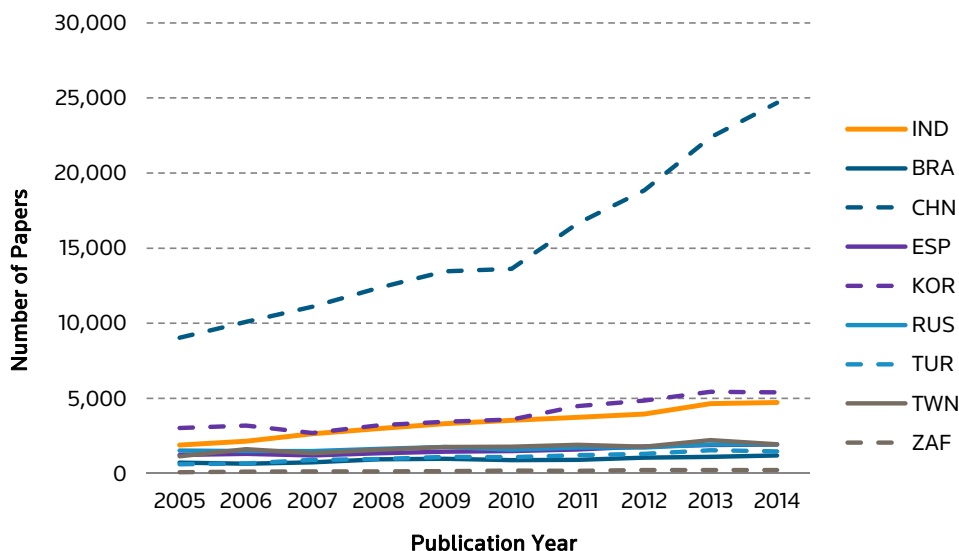


Figure 4.6.1-2 Number of papers, Materials Science, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's output of papers in Materials Science was the third highest, behind China and South Korea. China's output rose from 9,036 in 2005 to 24,675 in 2014, exceeding the other emerging research economies. In general, the emerging research economies' output of papers in Materials Science increased between 2005 and 2014.

Table 4.6.1-1 Number of papers, Materials Science, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	9,656	14,541	9,362
<i>Established Research Economies</i>			
AUSTRALIA	3,590	5,341	3,782
CANADA	5,192	6,032	3,343
SWITZERLAND	2,250	2,709	1,577
GERMANY	13,531	15,213	8,204
ENGLAND	8,407	9,192	5,018
FRANCE	9,869	10,850	5,900
ITALY	4,829	6,148	3,795
JAPAN	21,043	17,995	8,652
NETHERLANDS	2,141	2,693	1,493
SWEDEN	2,524	2,821	1,746
USA	30,680	35,734	20,779
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	3,029	3,801	2,299
CHINA	42,590	62,577	47,045
SPAIN	5,056	6,344	3,814
SOUTH KOREA	12,102	16,353	10,827
RUSSIA	6,135	6,785	3,874
TURKEY	3,134	4,695	3,012
TAIWAN	5,681	7,224	4,158
SOUTH AFRICA	452	746	462

4.6.2 SHARE OF WORLD OUTPUT, MATERIALS SCIENCE

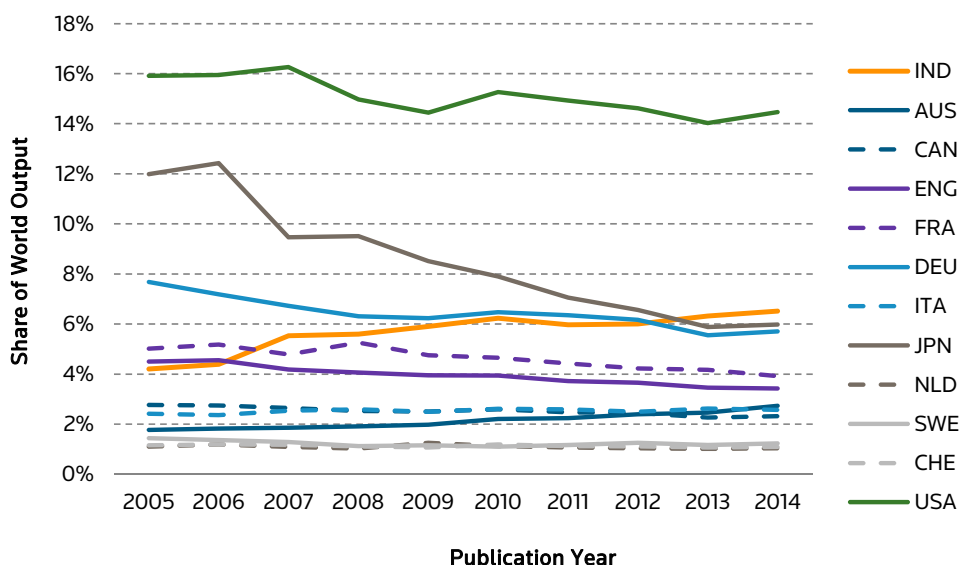


Figure 4.6.2-1 Share of world output, Materials Science, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Materials Science increased from 4.21% in 2005 to 6.52% in 2014. Since 2007, India's share of world output has been greater than that of most established research economies. With the exception of Australia and Italy, all of the established research economies share of world output decreased in this field, most notably for Japan, whose share of world output dropped from 11.99% to 5.98%.

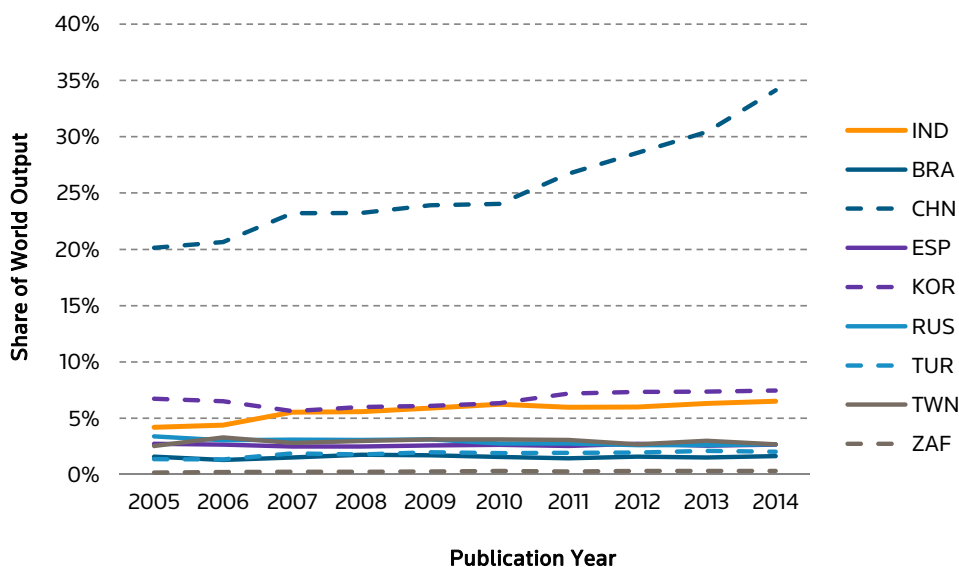


Figure 4.6.2-2 Share of world output, Materials Science, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Materials Science was greater than that of the majority of emerging research economies, with China and South Korea being the exceptions. China had the greatest increase; from 20.14% in 2005 to 34.12% in 2014. The share of world output in Materials Science of all the emerging economies, except Spain and Russia, increased over the 10 years analysed.

**Table 4.6.2-1 Share of world output, Materials Science, All countries**  
**Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science**

Share of World Output			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	4.96%	6.03%	6.42%
<i>Established Research Economies</i>			
AUSTRALIA	1.84%	2.21%	2.59%
CANADA	2.67%	2.50%	2.29%
SWITZERLAND	1.16%	1.12%	1.08%
GERMANY	6.95%	6.30%	5.62%
ENGLAND	4.32%	3.81%	3.44%
FRANCE	5.07%	4.50%	4.04%
ITALY	2.48%	2.55%	2.60%
JAPAN	10.80%	7.46%	5.93%
NETHERLANDS	1.10%	1.12%	1.02%
SWEDEN	1.30%	1.17%	1.20%
USA	15.75%	14.81%	14.24%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	1.56%	1.58%	1.58%
CHINA	21.87%	25.93%	32.25%
SPAIN	2.60%	2.63%	2.61%
SOUTH KOREA	6.21%	6.78%	7.42%
RUSSIA	3.15%	2.81%	2.66%
TURKEY	1.61%	1.95%	2.06%
TAIWAN	2.92%	2.99%	2.85%
SOUTH AFRICA	0.23%	0.31%	0.32%

4.6.3 NORMALISED CITATION IMPACT, MATERIALS SCIENCE

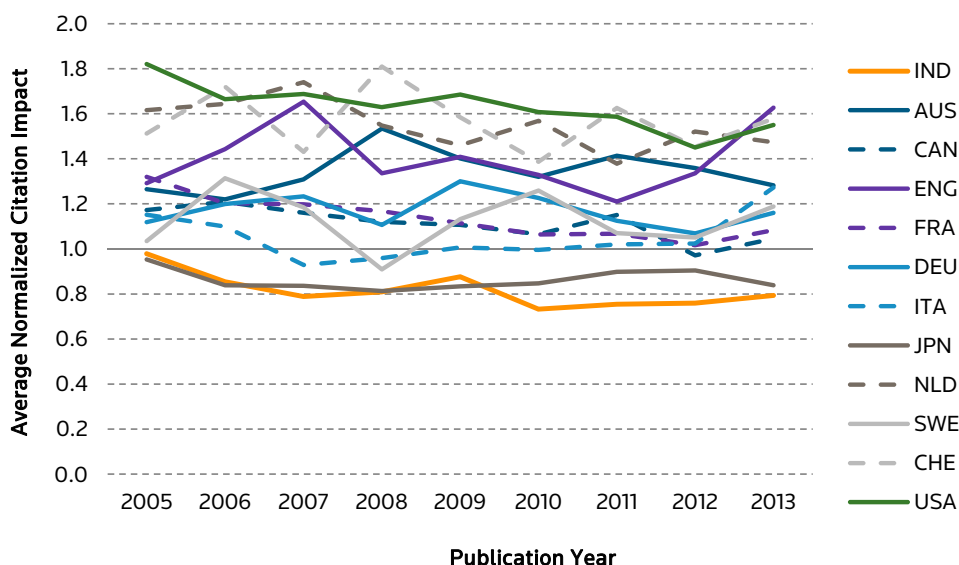


Figure 4.6.3-1 Normalised citation impact, Materials Science, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Materials Science decreased from 0.98 in 2005 to 0.79 in 2013. The citation impact in Materials Science of most of the established research economies also decreased during this time.

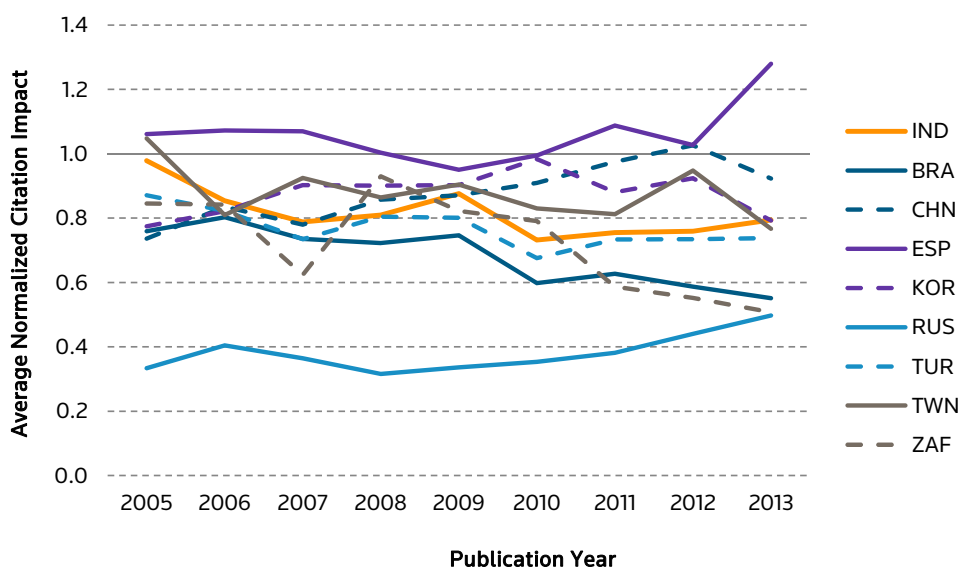


Figure 4.6.3-2 Normalised citation impact, Materials Science, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Materials Science was higher than that of Russia, Brazil, Turkey and South Africa. Russia had the highest increase in citation impact of any emerging research economy, from 0.33 in 2005 to 0.49 in 2013. Spain was the only emerging economy with a citation impact higher than the world average in this field.



Table 4.6.3-1 Normalised citation impact, Materials Science, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.85	0.78	0.79
<b>Established Research Economies</b>			
AUSTRALIA	1.34	1.37	1.28
CANADA	1.16	1.07	1.05
SWITZERLAND	1.62	1.51	1.58
GERMANY	1.16	1.17	1.16
ENGLAND	1.43	1.32	1.63
FRANCE	1.22	1.07	1.08
ITALY	1.03	1.01	1.27
JAPAN	0.86	0.87	0.84
NETHERLANDS	1.64	1.48	1.47
SWEDEN	1.11	1.12	1.19
USA	1.70	1.58	1.55
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.75	0.64	0.55
CHINA	0.81	0.95	0.92
SPAIN	1.05	1.02	1.28
SOUTH KOREA	0.85	0.92	0.79
RUSSIA	0.35	0.38	0.50
TURKEY	0.80	0.74	0.74
TAIWAN	0.90	0.87	0.77
SOUTH AFRICA	0.81	0.67	0.51

## 4.6.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, MATERIALS SCIENCE

Table 4.6.4-1 Highly-cited papers, Materials Science, All countries.

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.35%	2.87%	7.24%	23.04%	0.31%	2.66%	6.55%	20.58%	0.35%	2.57%	6.09%	16.93%
<b>Established Research Economies</b>												
AUSTRALIA	1.31%	7.97%	15.57%	33.57%	1.59%	8.58%	15.91%	35.37%	1.67%	6.00%	10.76%	24.88%
CANADA	1.16%	6.41%	12.60%	30.08%	1.08%	5.37%	10.74%	27.50%	0.84%	4.07%	7.69%	20.58%
SWITZERLAND	2.80%	12.04%	21.11%	40.84%	2.29%	10.04%	17.90%	41.12%	1.97%	7.93%	14.58%	29.04%
GERMANY	1.55%	7.04%	13.21%	29.45%	1.47%	7.01%	13.08%	29.97%	1.15%	5.07%	9.54%	21.83%
ENGLAND	1.94%	7.91%	14.65%	33.85%	1.71%	7.26%	13.95%	32.93%	1.49%	5.20%	10.66%	24.37%
FRANCE	1.06%	5.28%	11.62%	30.14%	0.85%	4.69%	9.64%	27.74%	0.95%	3.42%	7.00%	19.00%
ITALY	0.81%	5.26%	11.49%	30.25%	0.70%	4.54%	9.84%	28.90%	0.95%	4.08%	8.75%	21.77%
JAPAN	0.73%	3.94%	8.09%	20.53%	1.03%	4.24%	8.02%	20.56%	0.66%	2.94%	6.06%	15.20%
NETHERLANDS	3.13%	11.68%	19.66%	40.21%	2.93%	10.06%	17.45%	39.29%	1.94%	8.04%	13.40%	27.93%
SWEDEN	1.39%	5.94%	10.97%	25.44%	1.06%	5.92%	10.99%	29.56%	0.86%	4.18%	8.53%	20.10%
USA	2.64%	10.45%	18.21%	36.75%	2.67%	10.49%	18.17%	37.43%	1.90%	7.41%	12.88%	26.36%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.20%	1.88%	5.48%	19.87%	0.08%	1.76%	4.53%	16.81%	0.13%	1.30%	2.74%	10.44%
CHINA	0.63%	3.83%	8.15%	21.21%	1.09%	5.47%	10.23%	24.77%	1.13%	5.22%	9.23%	19.75%
SPAIN	0.85%	4.96%	11.47%	29.41%	0.91%	4.57%	9.90%	27.44%	0.94%	4.04%	7.60%	20.40%
SOUTH KOREA	0.90%	4.43%	8.79%	22.07%	1.01%	5.47%	10.16%	24.96%	0.85%	3.96%	7.77%	18.68%
RUSSIA	0.13%	0.90%	2.35%	6.93%	0.21%	0.97%	2.02%	7.09%	0.39%	1.24%	2.14%	6.84%
TURKEY	0.13%	2.49%	6.57%	21.67%	0.04%	1.66%	4.24%	16.72%	0.17%	1.49%	3.78%	11.82%
TAIWAN	0.56%	4.22%	8.45%	24.41%	0.69%	4.67%	9.50%	24.67%	0.51%	3.32%	6.88%	17.44%
SOUTH AFRICA	0.66%	3.54%	7.52%	21.02%	0.13%	2.14%	5.09%	16.49%	0.22%	1.95%	3.46%	12.77%

India's percentage of highly-cited papers in Materials Science was below the world average for all three time periods and thresholds: 1%, 5%, 10%, 25%. Furthermore, the percentage of highly-cited papers at each threshold decreased from 2005 to 2014.

Japan's percentage of highly-cited papers was generally lower than the world average for all three time periods, and thresholds. Canada and Sweden's percentage of highly-cited papers was greater than the world average for 2005 -2012, but dropped below the world average from 2013 to 2014.

China, Spain and South Korea were the only emerging countries that had more highly-cited papers in Materials Science than the world average. However, none of these countries maintained this over the time periods or thresholds.

4.6.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, MATERIALS SCIENCE

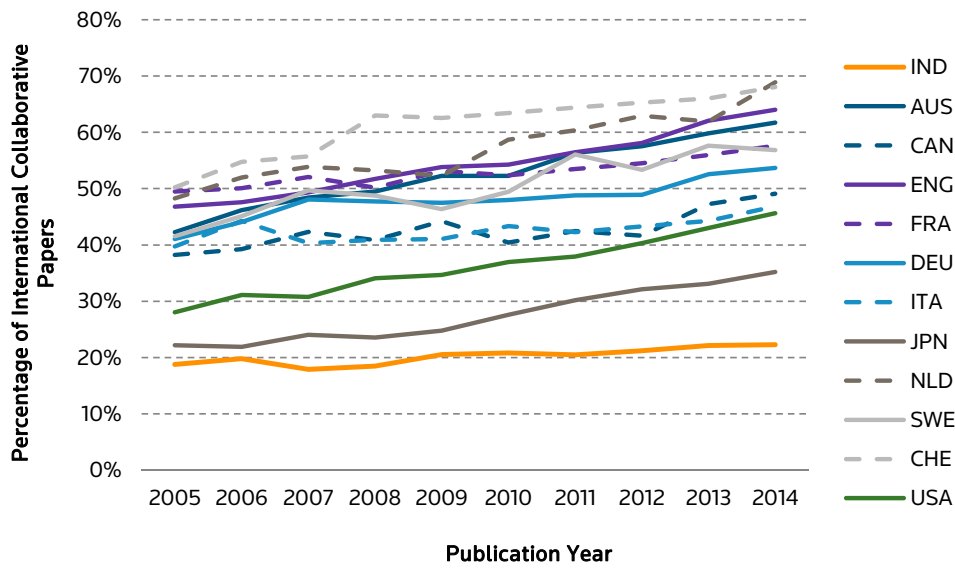


Figure 4.6.5-1 Percentage of internationally collaborative papers, Materials Science, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers increased from 18.76% in 2005 to 22.3% in 2014. The USA had the greatest increase in percentage of collaborative papers from 28.06% in 2005 to 45.65% in 2014. Switzerland had the highest percentage of internationally collaborative papers overall, with 50.19% in 2005 and 68.06% in 2014.

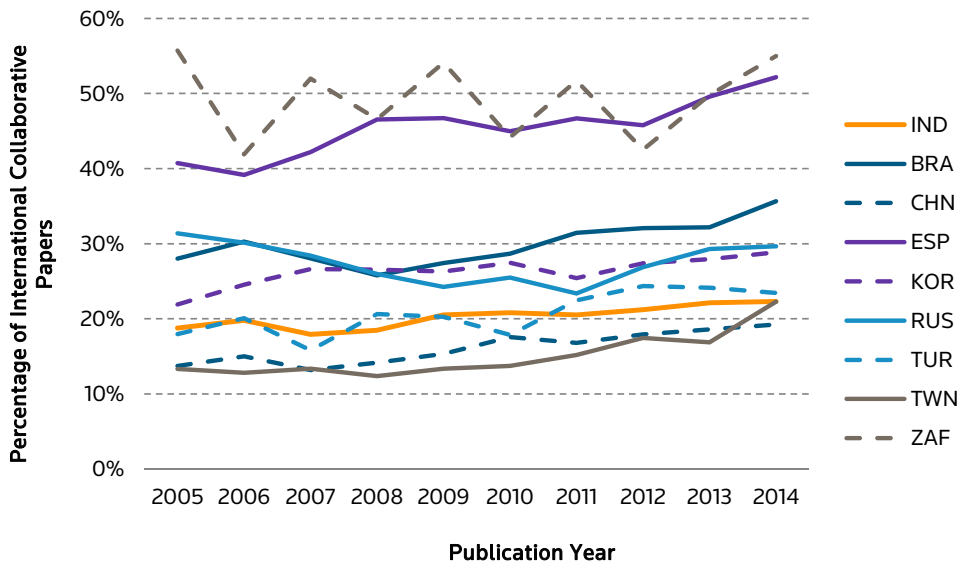


Figure 4.6.5-2 Percentage of internationally collaborative papers, Materials Science, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers was greater than that of China and Taiwan. Taiwan had the greatest increase, from 13.33% in 2005 to 22.27% in 2014, and China had the second largest increase from 13.72% in 2005 to 19.25% in 2014. Although South Africa's percentage of internationally collaborative papers fluctuated, it was generally the highest among the emerging research economies.

**Table 4.6.5-1 Percentage of internationally collaborative papers, Materials Science, All countries**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	18.67%	20.78%	22.22%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	46.80%	54.88%	60.79%
<b>CANADA</b>	40.16%	42.14%	48.16%
<b>SWITZERLAND</b>	56.09%	63.97%	67.03%
<b>GERMANY</b>	45.15%	48.32%	53.13%
<b>ENGLAND</b>	48.88%	55.72%	63.01%
<b>FRANCE</b>	50.42%	53.38%	56.75%
<b>ITALY</b>	41.29%	42.52%	45.53%
<b>JAPAN</b>	22.83%	28.57%	34.15%
<b>NETHERLANDS</b>	51.89%	58.48%	65.37%
<b>SWEDEN</b>	46.16%	51.58%	57.22%
<b>USA</b>	31.08%	37.60%	44.32%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	27.80%	29.94%	33.97%
<b>CHINA</b>	14.02%	16.99%	18.94%
<b>SPAIN</b>	42.19%	46.03%	50.89%
<b>SOUTH KOREA</b>	24.87%	26.64%	28.39%
<b>RUSSIA</b>	28.92%	24.98%	29.48%
<b>TURKEY</b>	18.60%	21.41%	23.80%
<b>TAIWAN</b>	12.92%	14.94%	19.38%
<b>SOUTH AFRICA</b>	48.45%	47.59%	52.38%

4.6.6 AVERAGE JOURNAL IMPACT FACTOR, MATERIALS SCIENCE

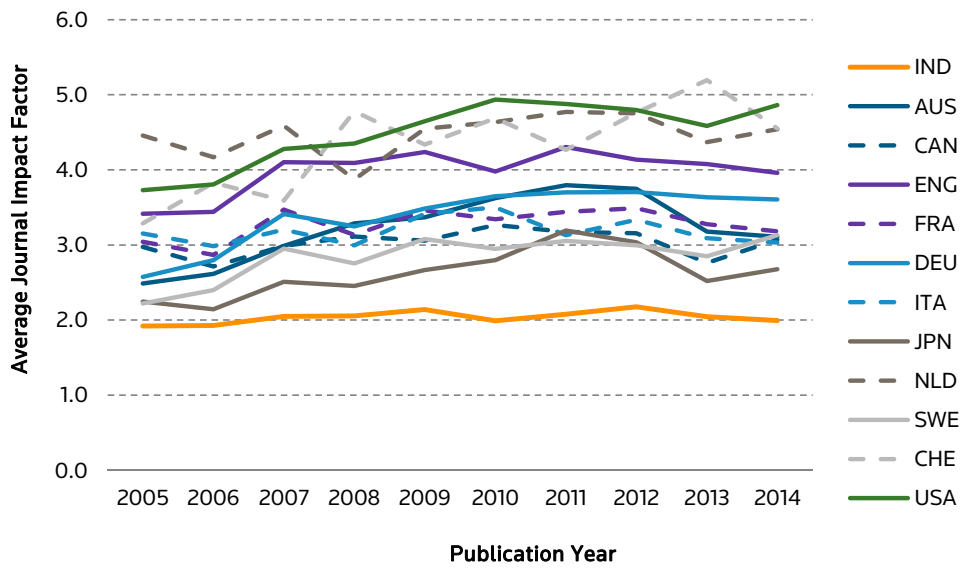


Figure 4.6.6-1 Average Journal Impact Factor, Materials Science, Established research economies. Time period: 2005-2014, Source: Web of Science

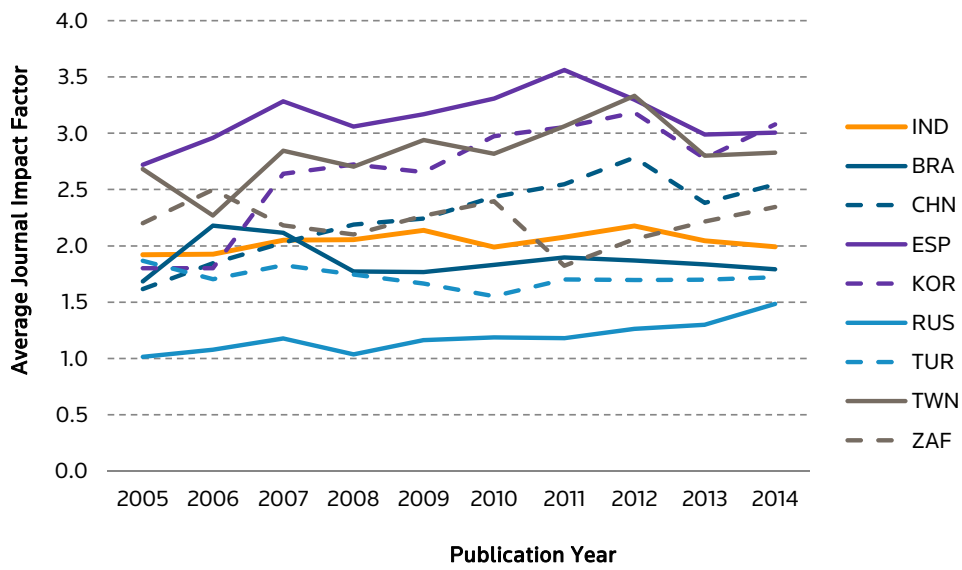


Figure 4.6.6-2 Average Journal Impact Factor, Materials Science, BRICS and other emerging research economies. Time period: 2005-2014, Source: Web of Science

**Table 4.6.6-1 Average Journal Impact Factor, Materials Science, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	2.00	2.10	2.02
<b>Established Research Economies</b>			
AUSTRALIA	2.87	3.65	3.14
CANADA	2.94	3.17	2.91
SWITZERLAND	3.87	4.52	4.87
GERMANY	3.00	3.64	3.62
ENGLAND	3.76	4.16	4.02
FRANCE	3.12	3.43	3.23
ITALY	3.08	3.34	3.06
JAPAN	2.32	2.92	2.60
NETHERLANDS	4.26	4.68	4.45
SWEDEN	2.57	3.02	2.99
USA	4.05	4.82	4.72
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	1.92	1.84	1.81
CHINA	1.95	2.53	2.46
SPAIN	3.01	3.34	3.00
SOUTH KOREA	2.23	2.99	2.93
RUSSIA	1.08	1.20	1.39
TURKEY	1.78	1.66	1.71
TAIWAN	2.61	3.04	2.81
SOUTH AFRICA	2.24	2.13	2.28

India's average Journal Impact Factor in Materials Science was lower than that of the established research economies for all three time periods. India's average Journal Impact Factor in Materials Science was higher than that of Brazil, Russia and Turkey for all three time periods, and China for the 2005-2008 time period.

4.7 COMPARATIVE ANALYSIS, BIOLOGY & BIOCHEMISTRY

4.7.1 NUMBER OF PAPERS, BIOLOGY & BIOCHEMISTRY

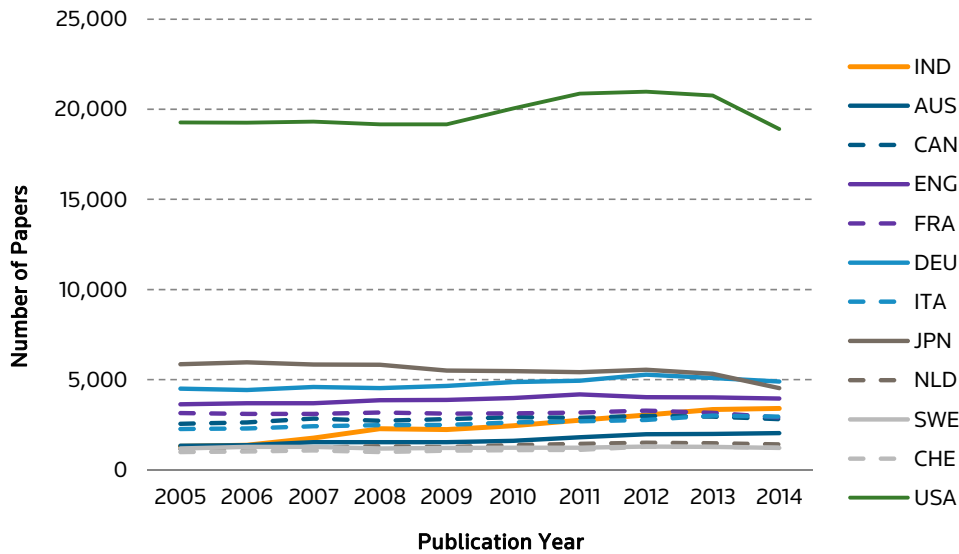


Figure 4.7.1-1 Number of papers, Biology & Biochemistry, Established research economies  
Time period: 2005-2014, Source: Web of Science

India published 162% more Biology & Biochemistry papers in 2014 (3,404 papers) than it did in 2005 (1,298 papers). By 2014, India's output of papers in Biology & Biochemistry was greater than 7 of the 11 established research economies. The output of the majority of the established research economies in Biology & Biochemistry increased between 2005 and 2014, with France, Japan and the USA being exceptions.

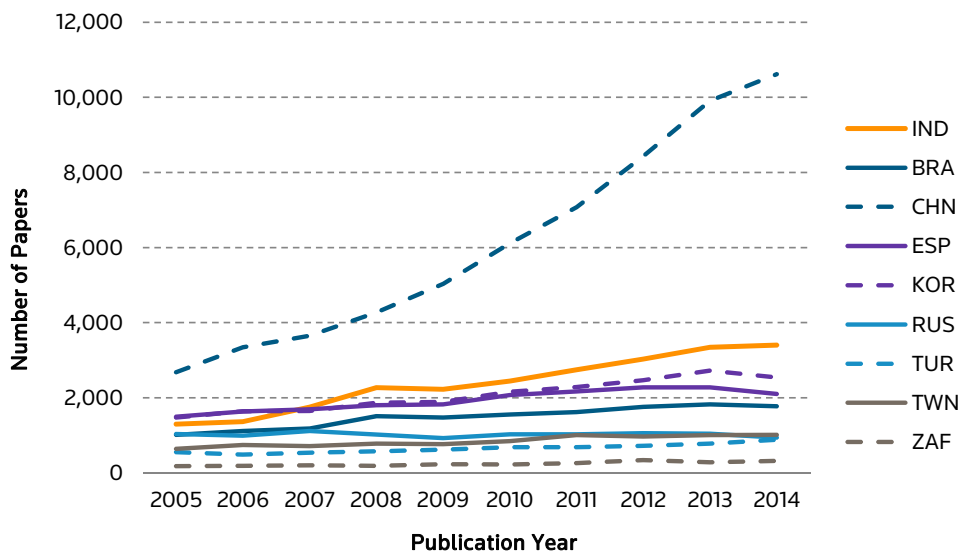


Figure 4.7.1-2 Number of papers, Biology & Biochemistry, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

Since 2007, India's output of papers in Biology & Biochemistry has been second only to China's. China's output of papers increased by 297% from 2005 (2,677 papers) to 2014 (10,617 papers). With the exception of Russia, the output of all of the emerging research economies in Biology & Biochemistry increased.

**Table 4.7.1-1 Number of papers, Biology & Biochemistry, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	6,676	10,435	6,749
<i>Established Research Economies</i>			
AUSTRALIA	5,752	6,900	4,013
CANADA	10,736	11,594	5,744
SWITZERLAND	4,059	4,518	2,485
GERMANY	18,044	19,719	9,994
ENGLAND	14,875	16,056	7,964
FRANCE	12,511	12,681	6,062
ITALY	9,433	10,548	5,957
JAPAN	23,475	21,935	9,844
NETHERLANDS	4,888	5,552	2,864
SWEDEN	4,897	4,946	2,475
USA	77,002	81,054	39,677
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	4,820	6,397	3,596
CHINA	13,941	26,642	20,527
SPAIN	6,612	8,334	4,382
SOUTH KOREA	6,629	8,804	5,261
RUSSIA	4,158	4,035	1,980
TURKEY	2,145	2,701	1,658
TAIWAN	2,870	3,570	2,013
SOUTH AFRICA	747	1,051	601



4.7.2 SHARE OF WORLD OUTPUT, BIOLOGY & BIOCHEMISTRY

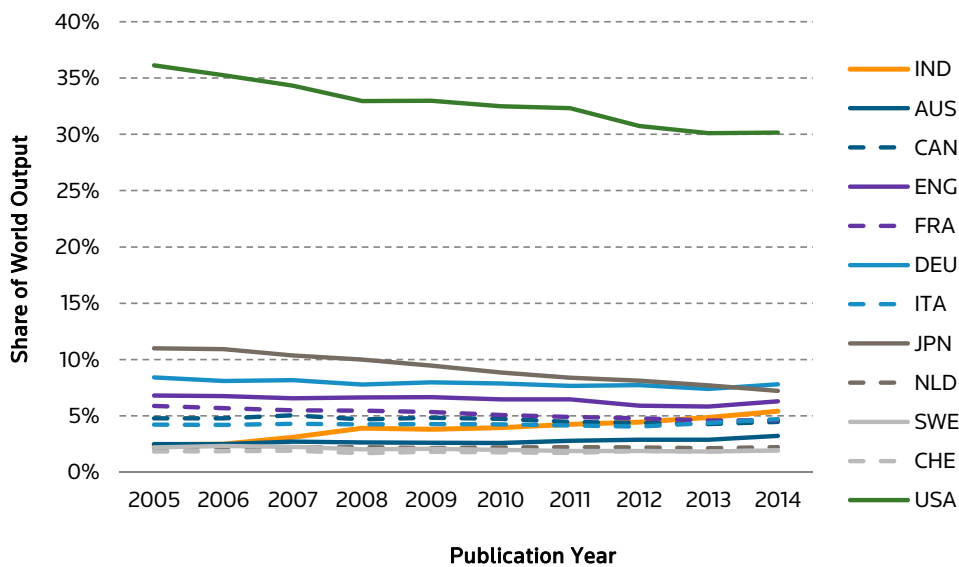


Figure 4.7.2-1 Share of world output, Biology & Biochemistry, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Biology & Biochemistry increased from 2.43% in 2005 to 5.42% in 2014. By 2014, India's share of world output was higher than the majority of established research economies except England, Germany, Japan and the USA. Australia, Italy, the Netherlands, and Switzerland's share of world output in Biology & Biochemistry increased, while the share of other established research economies decreased. Japan had the greatest decrease from 10.99% in 2005 to 7.22% in 2014.

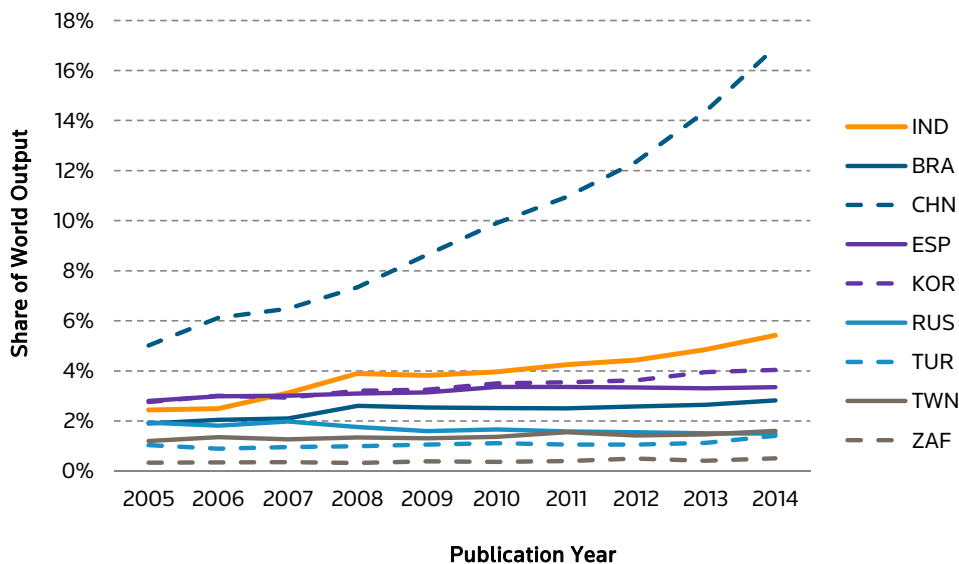


Figure 4.7.2-2 Share of world output, Biology & Biochemistry, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

Since 2007, India's share of world output in Biology & Biochemistry has been second only to China's, whose share increased from 5.02% in 2005 to 16.92% in 2014. The share of output in Biology & Biochemistry for the majority of the emerging research economies increased, with Russia being the only exception, having less than 2% of world output in this field.

Table 4.7.2-1 Share of world output, Biology &amp; Biochemistry, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Share of World Output		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	3.00%	4.13%	5.12%
<i>Established Research Economies</i>			
AUSTRALIA	2.59%	2.73%	3.05%
CANADA	4.83%	4.59%	4.36%
SWITZERLAND	1.83%	1.79%	1.89%
GERMANY	8.11%	7.80%	7.59%
ENGLAND	6.69%	6.35%	6.05%
FRANCE	5.63%	5.02%	4.60%
ITALY	4.24%	4.17%	4.52%
JAPAN	10.56%	8.68%	7.47%
NETHERLANDS	2.20%	2.20%	2.17%
SWEDEN	2.20%	1.96%	1.88%
USA	34.62%	32.08%	30.12%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	2.17%	2.53%	2.73%
CHINA	6.27%	10.54%	15.58%
SPAIN	2.97%	3.30%	3.33%
SOUTH KOREA	2.98%	3.48%	3.99%
RUSSIA	1.87%	1.60%	1.50%
TURKEY	0.96%	1.07%	1.26%
TAIWAN	1.29%	1.41%	1.53%
SOUTH AFRICA	0.34%	0.42%	0.46%

4.7.3 NORMALISED CITATION IMPACT, BIOLOGY & BIOCHEMISTRY

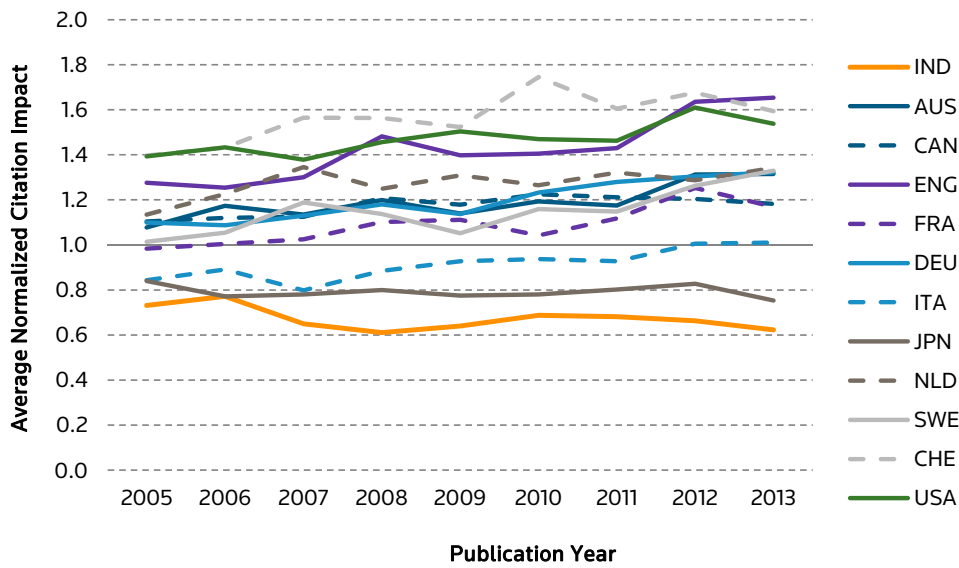


Figure 4.7.3-1 Normalised citation impact, Biology & Biochemistry, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Biology & Biochemistry decreased from 0.78 in 2006 to 0.62 in 2013. The citation impact of the majority of the established research economies in Biology & Biochemistry increased, with Japan being the only exception, remaining below the world average.

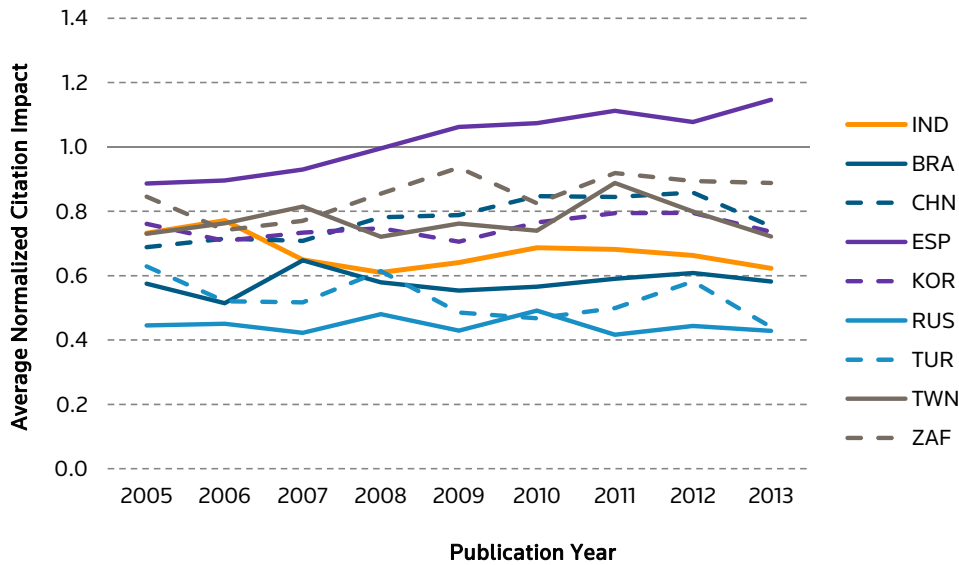


Figure 4.7.3-2 Normalised citation impact, Biology & Biochemistry, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Biology & Biochemistry was higher than that of Brazil, Russia, and Turkey. The majority of the emerging research economies had a citation impact lower than the world average, with Spain being the only exception. Since 2009, Spain's citation impact in Biology & Biochemistry has been higher than the world average.

Table 4.7.3-1 Normalised citation impact, Biology &amp; Biochemistry, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.68	0.67	0.62
<b>Established Research Economies</b>			
AUSTRALIA	1.15	1.21	1.31
CANADA	1.14	1.20	1.18
SWITZERLAND	1.49	1.64	1.59
GERMANY	1.12	1.24	1.32
ENGLAND	1.33	1.47	1.65
FRANCE	1.03	1.13	1.17
ITALY	0.85	0.95	1.01
JAPAN	0.80	0.80	0.75
NETHERLANDS	1.24	1.30	1.34
SWEDEN	1.10	1.16	1.33
USA	1.42	1.51	1.54
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.58	0.58	0.58
CHINA	0.73	0.84	0.75
SPAIN	0.93	1.08	1.15
SOUTH KOREA	0.74	0.77	0.74
RUSSIA	0.45	0.45	0.43
TURKEY	0.57	0.51	0.44
TAIWAN	0.76	0.80	0.72
SOUTH AFRICA	0.80	0.89	0.89

## 4.7.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, BIOLOGY &amp; BIOCHEMISTRY

Table 4.7.4-1 Highly-cited papers, Biology & Biochemistry, All countries  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.27%	2.20%	4.69%	13.68%	0.34%	2.01%	4.34%	13.27%	0.28%	1.67%	3.99%	11.66%
<b>Established Research Economies</b>												
AUSTRALIA	1.30%	6.10%	12.99%	29.85%	1.52%	6.65%	12.52%	30.59%	1.42%	5.71%	10.59%	23.65%
CANADA	1.37%	6.12%	11.48%	28.74%	1.59%	6.24%	11.86%	28.23%	1.38%	5.75%	9.91%	22.72%
SWITZERLAND	2.24%	9.53%	17.34%	36.98%	2.83%	10.51%	18.08%	37.65%	2.54%	8.89%	14.65%	29.26%
GERMANY	1.28%	6.27%	12.45%	29.82%	1.56%	6.98%	12.92%	30.57%	1.62%	5.94%	10.88%	24.72%
ENGLAND	1.79%	7.85%	15.03%	32.95%	1.81%	8.48%	15.33%	33.76%	2.22%	7.68%	13.20%	27.10%
FRANCE	1.01%	5.00%	9.94%	25.54%	1.06%	5.44%	11.10%	27.36%	1.25%	5.16%	9.27%	21.13%
ITALY	0.78%	3.93%	8.28%	22.04%	0.83%	4.12%	8.95%	23.39%	0.97%	4.10%	7.84%	19.22%
JAPAN	0.58%	2.89%	6.42%	17.87%	0.58%	2.83%	5.97%	16.42%	0.51%	2.61%	5.38%	14.14%
NETHERLANDS	1.68%	7.12%	14.28%	33.37%	1.73%	7.60%	15.24%	33.97%	1.64%	6.42%	12.12%	27.30%
SWEDEN	1.16%	5.64%	11.48%	29.20%	1.44%	5.98%	11.65%	28.57%	2.22%	6.95%	11.23%	24.24%
USA	1.77%	8.15%	15.18%	34.23%	1.87%	8.11%	15.03%	33.47%	1.75%	6.91%	11.81%	25.73%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.33%	1.58%	3.57%	11.27%	0.31%	1.67%	3.45%	10.90%	0.17%	1.31%	3.00%	9.04%
CHINA	0.47%	2.66%	6.05%	17.21%	0.54%	3.41%	6.96%	19.59%	0.56%	2.71%	5.37%	14.57%
SPAIN	0.74%	4.22%	8.80%	24.20%	0.94%	4.73%	9.72%	25.33%	1.03%	4.15%	7.85%	19.88%
SOUTH KOREA	0.56%	2.75%	5.88%	16.84%	0.47%	2.58%	5.75%	17.34%	0.49%	2.66%	5.23%	14.88%
RUSSIA	0.72%	2.04%	3.63%	9.45%	0.47%	1.51%	3.17%	8.87%	0.61%	2.07%	3.28%	9.29%
TURKEY	0.28%	1.63%	3.26%	12.45%	0.15%	1.33%	3.22%	9.81%	0.12%	1.45%	2.65%	8.38%
TAIWAN	0.35%	2.54%	5.99%	18.64%	0.42%	2.86%	5.91%	17.96%	0.25%	2.09%	4.67%	13.56%
SOUTH AFRICA	0.67%	4.02%	6.69%	17.54%	1.24%	5.33%	7.80%	17.51%	1.16%	3.33%	6.99%	15.64%

India's percentage of highly-cited papers in Biology & Biochemistry was below the world average for all three time periods and thresholds: 1%, 5%, 10%, and 25%.

Italy and Japan's percentage of highly-cited papers was generally lower than the world average for all three time periods and four thresholds.

The majority of the emerging research economies did not have a percentage of highly-cited papers greater than the world average. Spain's percentage of the Top 25% highly-cited papers from 2009-2012, and its percentage of the Top 1% from 2013-2014, was greater than the world average. South Africa's percentage of the Top 1% in 2009-2012, and 2013-2014, and its percentage of the Top 5% in 2009-2012, were greater than the world average.

4.7.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, BIOLOGY & BIOCHEMISTRY

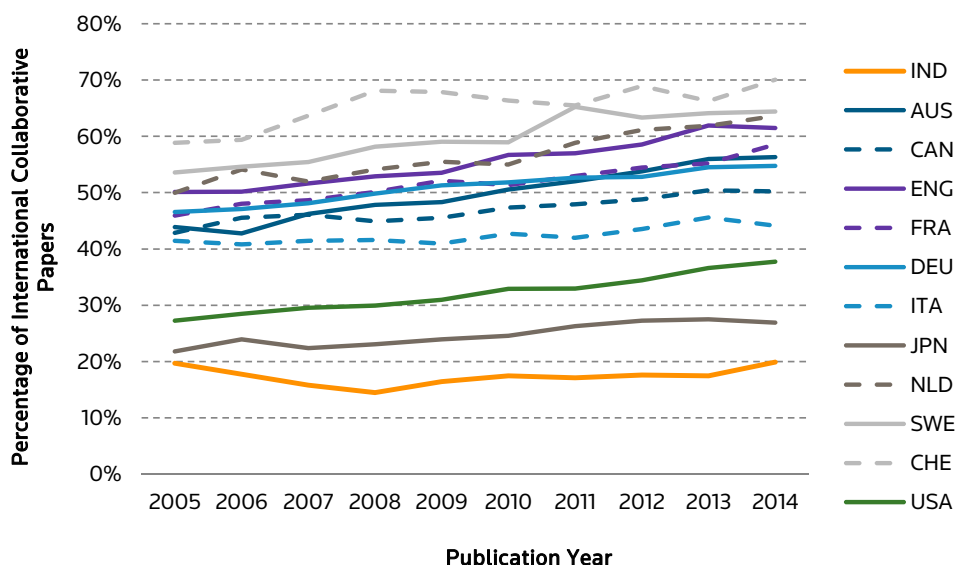


Figure 4.7.5-1 Percentage of internationally collaborative papers, Biology & Biochemistry, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Biology & Biochemistry dropped from 19.72% in 2005 to 14.47% in 2008, but then increased to 19.92% in 2014. The USA had the greatest increase in percentage of collaborative papers from 27.25% in 2005 to 37.75% in 2014. Switzerland had the highest percentage of collaborative papers between 2005 and 2008, followed by Sweden.

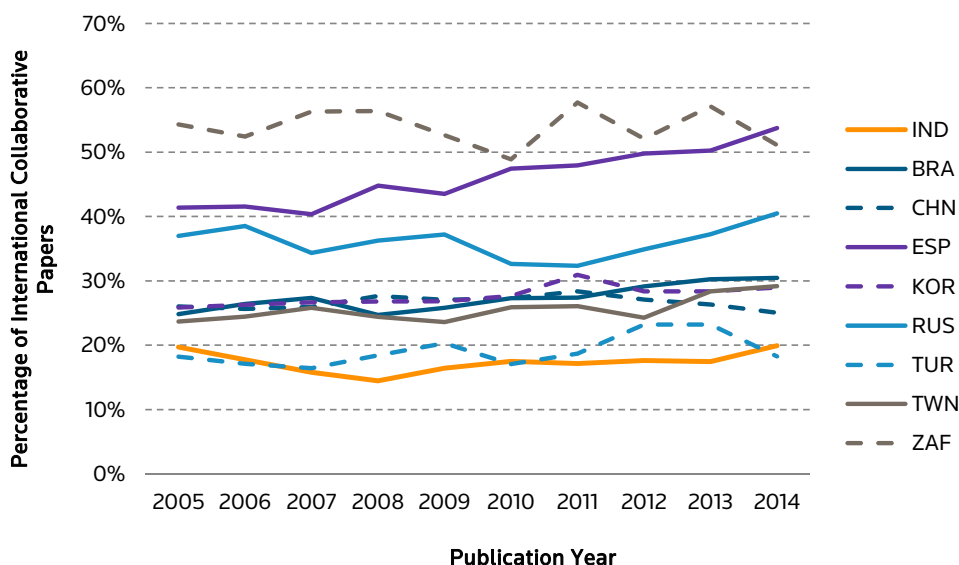


Figure 4.7.5-2 Percentage of internationally collaborative papers, Biology & Biochemistry, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

Since 2007, India's percentage of internationally collaborative papers in Biology & Biochemistry was the lowest of the emerging research economies. Both China and South Africa's percentage of internationally collaborative papers decreased in this field. Spain had the greatest increase, from 41.35% in 2005 to 53.73% in 2014.

**Table 4.7.5-1 Percentage of internationally collaborative papers, Biology and Biochemistry, All countries**  
**Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science**

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	16.51%	17.21%	18.70%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	45.27%	51.36%	56.14%
<b>CANADA</b>	44.87%	47.42%	50.33%
<b>SWITZERLAND</b>	62.48%	67.20%	68.09%
<b>GERMANY</b>	47.91%	52.16%	54.63%
<b>ENGLAND</b>	51.23%	56.48%	61.69%
<b>FRANCE</b>	48.18%	52.73%	56.78%
<b>ITALY</b>	41.31%	42.33%	44.85%
<b>JAPAN</b>	22.80%	25.53%	27.23%
<b>NETHERLANDS</b>	52.60%	57.74%	62.71%
<b>SWEDEN</b>	55.42%	61.65%	64.24%
<b>USA</b>	28.80%	32.85%	37.17%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	25.77%	27.48%	30.34%
<b>CHINA</b>	26.40%	27.47%	25.67%
<b>SPAIN</b>	42.08%	47.34%	51.92%
<b>SOUTH KOREA</b>	26.43%	28.52%	28.66%
<b>RUSSIA</b>	36.46%	34.20%	38.79%
<b>TURKEY</b>	17.58%	19.84%	20.57%
<b>TAIWAN</b>	24.60%	25.01%	28.76%
<b>SOUTH AFRICA</b>	54.89%	52.90%	53.91%

4.7.6 AVERAGE JOURNAL IMPACT FACTOR, BIOLOGY & BIOCHEMISTRY

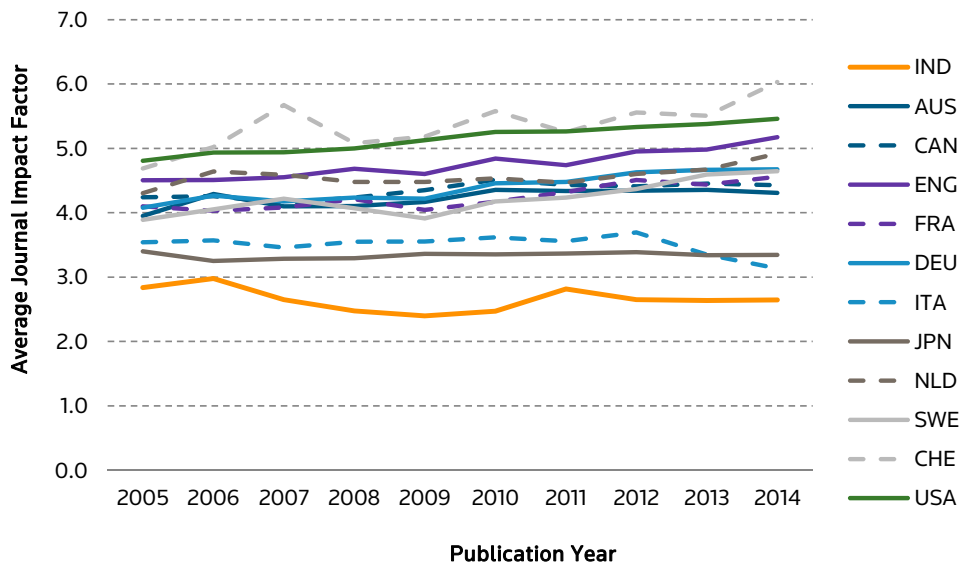


Figure 4.7.6-1 Average Journal Impact Factor, Biology & Biochemistry, Established research economies  
Time period: 2005-2014, Source: Web of Science

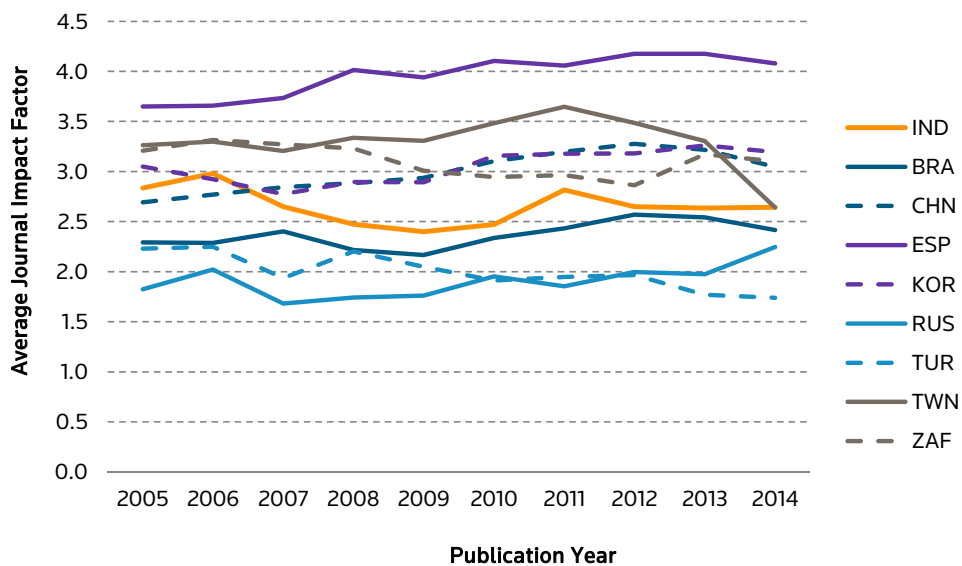


Figure 4.7.6-2 Average Journal Impact Factor, Biology & Biochemistry, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science



**Table 4.7.6-1 Average Journal Impact Factor, Biology & Biochemistry, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	2.69	2.60	2.64
<b>Established Research Economies</b>			
AUSTRALIA	4.11	4.31	4.33
CANADA	4.22	4.43	4.44
SWITZERLAND	5.13	5.40	5.77
GERMANY	4.19	4.45	4.67
ENGLAND	4.56	4.79	5.08
FRANCE	4.11	4.26	4.50
ITALY	3.53	3.61	3.24
JAPAN	3.31	3.37	3.34
NETHERLANDS	4.50	4.52	4.79
SWEDEN	4.06	4.18	4.62
USA	4.92	5.25	5.42
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	2.29	2.39	2.48
CHINA	2.81	3.15	3.13
SPAIN	3.78	4.08	4.13
SOUTH KOREA	2.91	3.11	3.23
RUSSIA	1.81	1.90	2.11
TURKEY	2.15	1.97	1.75
TAIWAN	3.28	3.49	2.97
SOUTH AFRICA	3.26	2.94	3.14

India's average Journal Impact Factor in Biology & Biochemistry was lower than that of the established research economies. India's average Journal Impact Factor in Biology & Biochemistry was higher than that of Brazil, Russia and Turkey for all three time periods.

### 4.8 COMPARATIVE ANALYSIS, AGRICULTURAL SCIENCES

#### 4.8.1 NUMBER OF PAPERS, AGRICULTURAL SCIENCES

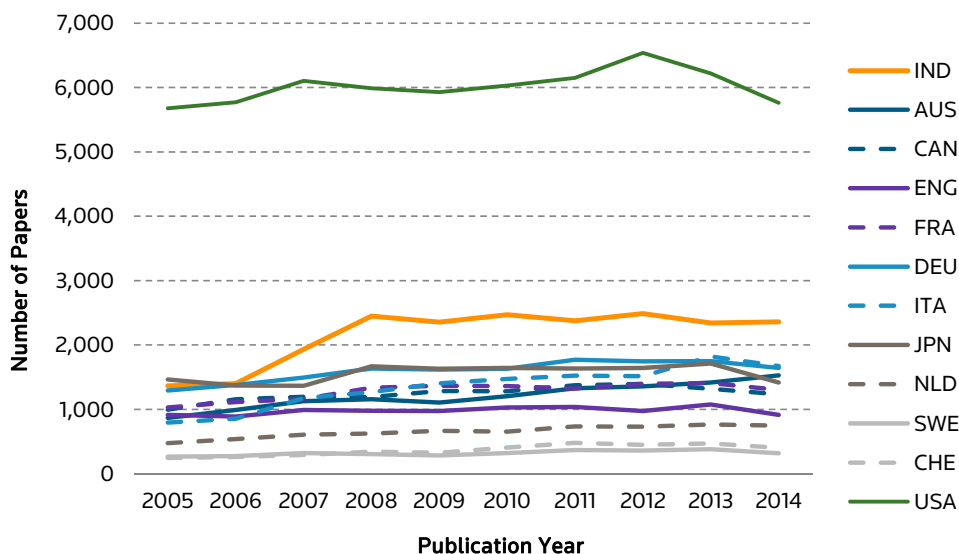


Figure 4.8.1-1 Number of papers, Agricultural Sciences, Established research economies  
Time period: 2005-2014, Source: Web of Science

India published 73% more Agricultural Sciences papers in 2014 (2,359 papers) than it did in 2005 (1,364 papers). Since 2006, India's output of papers in Agricultural Sciences has been greater than most of the established research economies, with the USA being the exception. Japan was the only established research economy whose output of papers decreased in this field. Italy had the greatest increase (110%) in output of papers from 796 in 2005 to 1,674 in 2014.

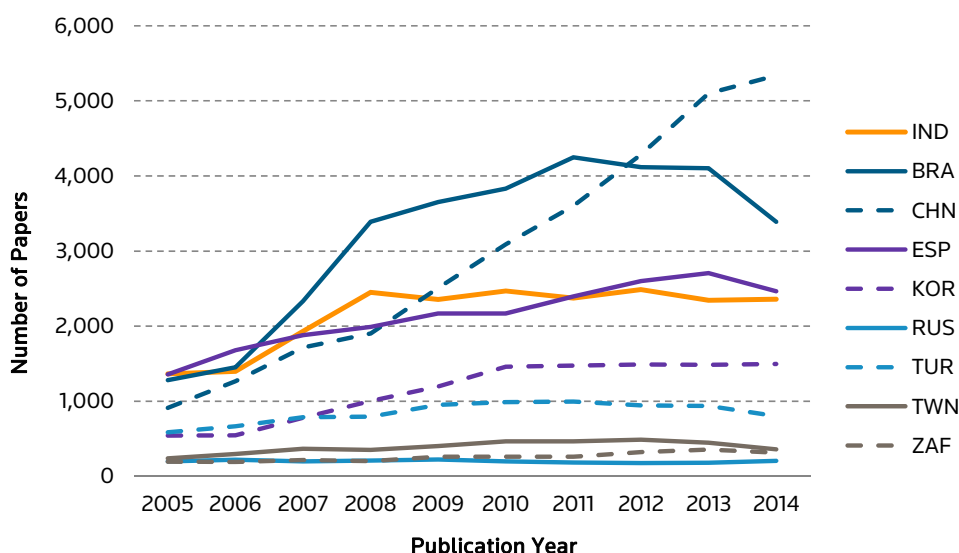


Figure 4.8.1-2 Number of papers, Agricultural Sciences, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's output of papers in Agricultural Sciences was generally greater than that of most of the emerging research economies, with Brazil, China and Spain being the exceptions. Brazil and Spain overtook India in 2006. China had the greatest increase, publishing nearly six times (5.87) as many papers in 2014 (5,338 papers) as they did in 2005 (910 papers). Overall, the output of papers in Agricultural Sciences for all the emerging research economies increased.

Table 4.8.1-1 Number of papers, Agricultural Sciences, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	7,146	9,687	4,703
<i>Established Research Economies</i>			
AUSTRALIA	4,138	4,993	2,944
CANADA	4,537	5,332	2,555
SWITZERLAND	1,140	1,663	872
GERMANY	5,800	6,763	3,390
ENGLAND	3,767	4,015	1,992
FRANCE	4,642	5,450	2,711
ITALY	4,095	5,918	3,496
JAPAN	5,868	6,547	3,131
NETHERLANDS	2,246	2,785	1,511
SWEDEN	1,165	1,330	696
USA	23,539	24,647	11,979
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	8,455	15,846	7,493
CHINA	5,792	13,483	10,437
SPAIN	6,903	9,330	5,168
SOUTH KOREA	2,868	5,621	2,982
RUSSIA	826	784	387
TURKEY	2,835	3,876	1,736
TAIWAN	1,253	1,819	806
SOUTH AFRICA	808	1,107	674

4.8.2 SHARE OF WORLD OUTPUT, AGRICULTURAL SCIENCES

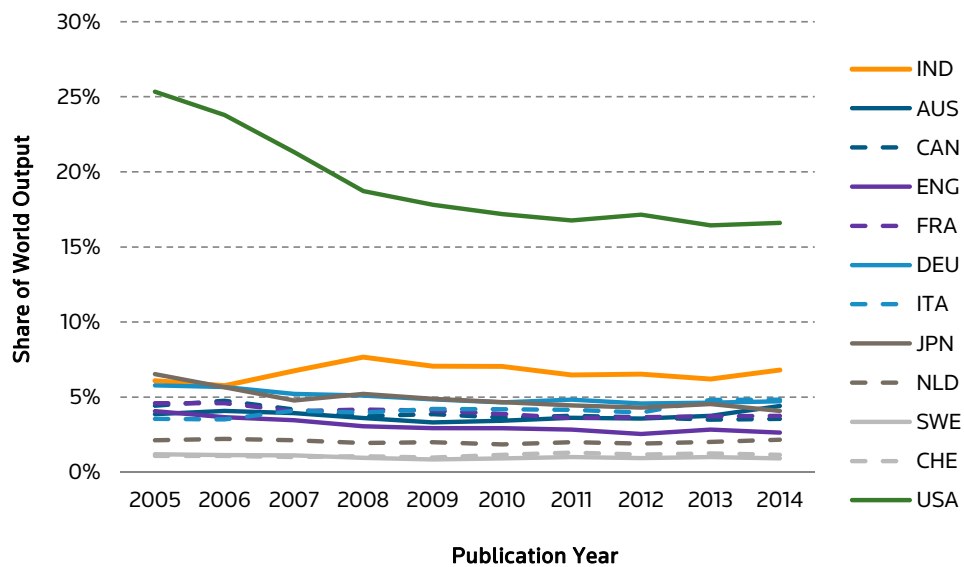


Figure 4.8.2-1 Share of world output, Agricultural Sciences, Established research economies  
Time period: 2005-2014, Source: Web of Science

After 2006, India's share of world output in Agricultural Sciences was greater than the majority of the established research economies, with the USA being the only exception. Australia, Italy, the Netherlands, and Switzerland's share of the world output increased between 2005 and 2014, while the share of output for all the remaining countries decreased.

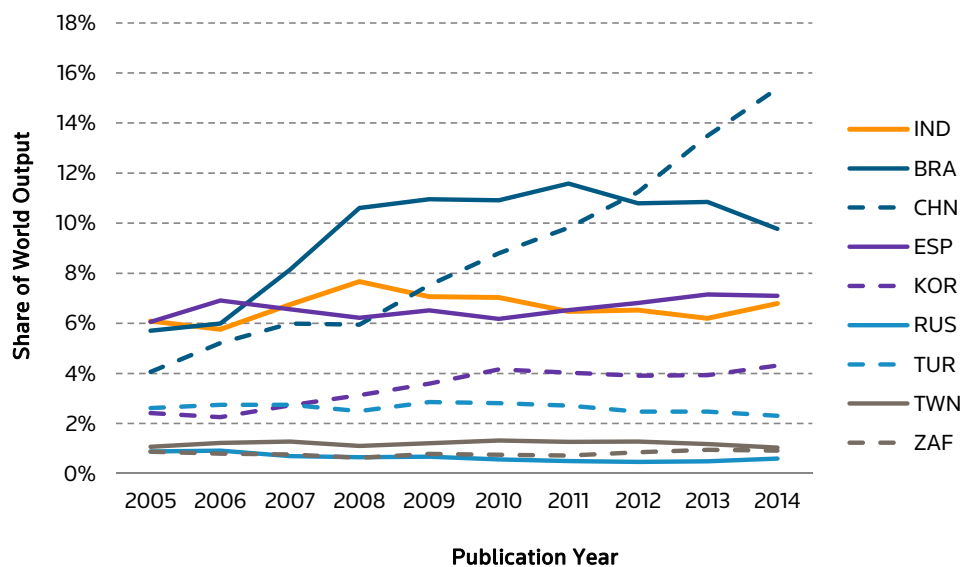


Figure 4.8.2-2 Share of world output, Agricultural Sciences, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Agricultural Sciences was generally greater than that of most of the emerging research economies, with Brazil, China and Spain being the exceptions. China had the greatest increase from 4.06% in 2005 to 15.38% in 2014. The share of world output in Agricultural Sciences for Russia, Turkey and Taiwan all decreased.

Table 4.8.2-1 Share of world output, Agricultural Sciences, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Share of World Output			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	6.66%	6.76%	6.48%
<i>Established Research Economies</i>			
AUSTRALIA	3.86%	3.49%	4.06%
CANADA	4.23%	3.72%	3.52%
SWITZERLAND	1.06%	1.16%	1.20%
GERMANY	5.41%	4.72%	4.67%
ENGLAND	3.51%	2.80%	2.75%
FRANCE	4.33%	3.81%	3.74%
ITALY	3.82%	4.13%	4.82%
JAPAN	5.47%	4.57%	4.32%
NETHERLANDS	2.09%	1.94%	2.08%
SWEDEN	1.09%	0.93%	0.96%
USA	21.94%	17.21%	16.52%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	7.88%	11.06%	10.33%
CHINA	5.40%	9.41%	14.39%
SPAIN	6.43%	6.51%	7.13%
SOUTH KOREA	2.67%	3.92%	4.11%
RUSSIA	0.77%	0.55%	0.53%
TURKEY	2.64%	2.71%	2.39%
TAIWAN	1.17%	1.27%	1.11%
SOUTH AFRICA	0.75%	0.77%	0.93%

4.8.3 NORMALISED CITATION IMPACT, AGRICULTURAL SCIENCES

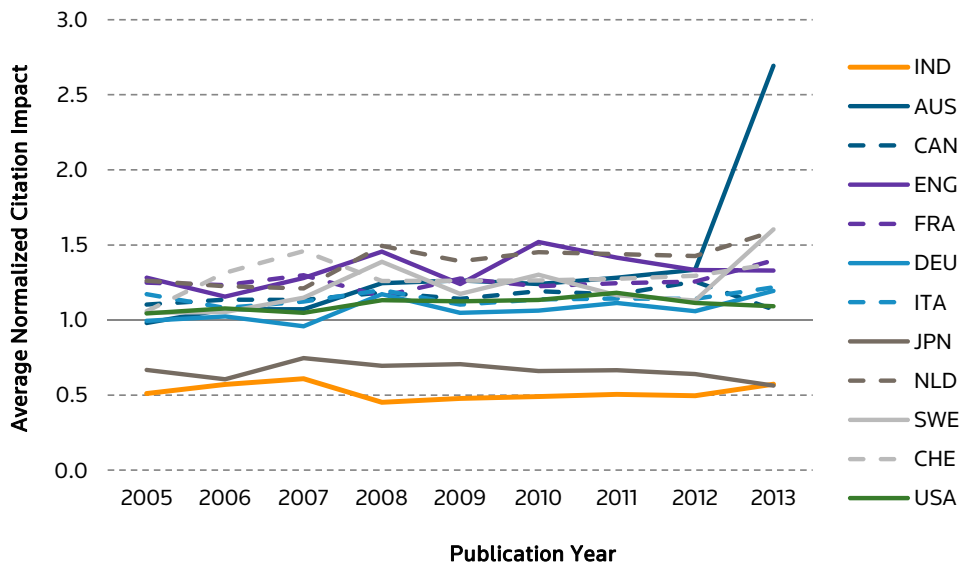


Figure 4.8.3-1 Normalised citation impact, Agricultural Sciences, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Agricultural Sciences remained below the world average at approximately 0.5~0.6 between 2005 and 2013. With the exception of Japan, the majority of the established research economies had a citation impact higher than the world average in Agricultural Sciences, most notably Australia which had a citation impact of 2.69 in 2013.

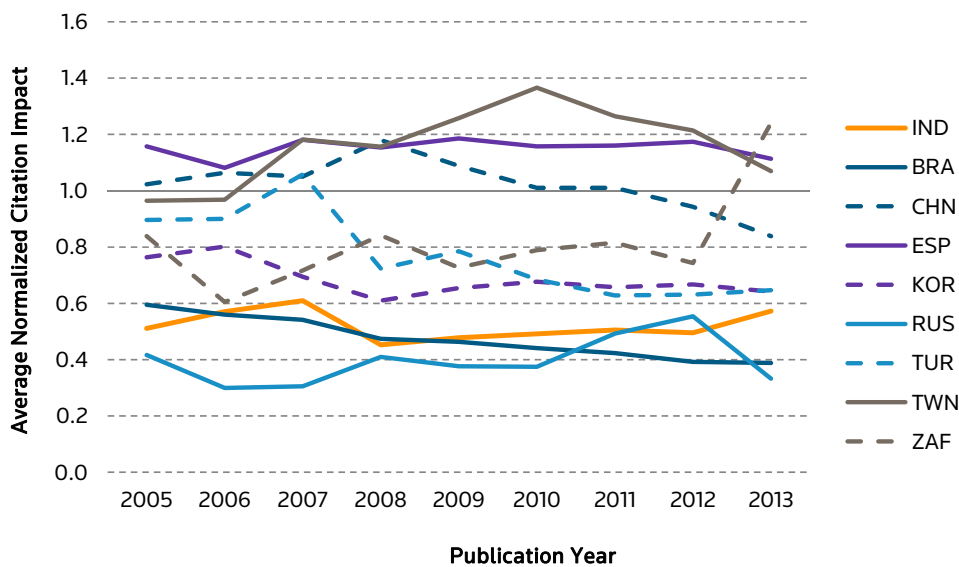


Figure 4.8.3-2 Normalised citation impact, Agricultural Sciences, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Agricultural Sciences was higher than that of Brazil and Russia. The citation impact of India, Taiwan, and South Africa increased between 2005 and 2013. Spain's citation impact was above world average during the time period analysed. Taiwan had a citation impact higher than the world average between 2009 and 2012, and China between 2005 and 2011.

**Table 4.8.3-1 Normalised citation impact, Agricultural Sciences, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.53	0.49	0.57
<b>Established Research Economies</b>			
AUSTRALIA	1.10	1.28	2.69
CANADA	1.14	1.19	1.07
SWITZERLAND	1.28	1.27	1.37
GERMANY	1.04	1.07	1.19
ENGLAND	1.30	1.38	1.33
FRANCE	1.23	1.25	1.40
ITALY	1.15	1.13	1.22
JAPAN	0.68	0.67	0.56
NETHERLANDS	1.31	1.43	1.59
SWEDEN	1.16	1.19	1.60
USA	1.08	1.14	1.09
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.52	0.43	0.39
CHINA	1.09	1.00	0.84
SPAIN	1.14	1.17	1.11
SOUTH KOREA	0.70	0.66	0.64
RUSSIA	0.36	0.45	0.33
TURKEY	0.89	0.68	0.65
TAIWAN	1.09	1.28	1.07
SOUTH AFRICA	0.75	0.77	1.24

## 4.8.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, AGRICULTURAL SCIENCES

**Table 4.8.4-1 Highly-cited papers, Agricultural Sciences, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.42%	2.31%	4.65%	11.38%	0.43%	2.07%	4.03%	11.09%	0.49%	2.34%	5.27%	13.27%
<b>Established Research Economies</b>												
AUSTRALIA	1.11%	5.58%	11.62%	29.22%	1.94%	8.01%	14.06%	32.79%	2.31%	7.27%	14.23%	31.22%
CANADA	2.20%	8.02%	13.49%	31.08%	1.86%	8.06%	14.44%	33.03%	1.02%	5.44%	11.70%	28.14%
SWITZERLAND	2.54%	7.81%	16.75%	40.18%	2.83%	9.08%	15.51%	34.34%	1.95%	6.08%	13.07%	29.59%
GERMANY	1.59%	6.64%	12.71%	28.07%	1.69%	6.68%	12.27%	28.73%	1.36%	4.66%	10.71%	26.99%
ENGLAND	2.34%	9.66%	17.87%	37.35%	2.74%	10.91%	18.61%	39.55%	2.31%	8.18%	15.51%	33.13%
FRANCE	1.38%	6.72%	13.61%	33.67%	2.20%	7.72%	14.95%	35.23%	1.73%	7.01%	12.87%	30.43%
ITALY	1.32%	6.84%	13.68%	33.92%	1.45%	6.51%	13.23%	32.87%	1.14%	5.55%	12.10%	29.00%
JAPAN	0.53%	2.91%	6.48%	17.09%	0.53%	2.41%	5.42%	15.92%	0.32%	1.21%	4.31%	14.69%
NETHERLANDS	2.05%	9.17%	16.70%	36.73%	2.80%	10.84%	18.78%	40.68%	1.92%	7.61%	14.16%	34.41%
SWEDEN	2.06%	7.12%	15.36%	35.11%	2.11%	8.35%	14.96%	35.04%	2.16%	6.90%	12.64%	30.75%
USA	1.46%	6.29%	11.92%	27.62%	1.78%	6.86%	12.51%	29.08%	1.04%	4.80%	9.99%	25.36%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.27%	1.67%	3.43%	9.53%	0.25%	1.40%	2.90%	8.30%	0.29%	1.51%	3.26%	9.98%
CHINA	1.14%	6.41%	13.45%	32.61%	0.90%	5.90%	11.68%	29.30%	0.97%	4.28%	9.17%	23.57%
SPAIN	0.91%	6.68%	14.31%	35.19%	1.45%	7.17%	14.23%	35.32%	1.03%	4.97%	11.61%	29.16%
SOUTH KOREA	0.84%	3.91%	7.32%	18.79%	0.50%	2.99%	6.71%	18.00%	0.50%	2.92%	6.41%	16.47%
RUSSIA	0.48%	1.57%	3.39%	8.60%	0.26%	2.17%	3.57%	8.29%	0.52%	2.84%	5.43%	13.44%
TURKEY	1.13%	5.15%	10.55%	24.20%	0.59%	3.02%	6.27%	16.67%	0.40%	2.07%	5.18%	15.96%
TAIWAN	0.96%	7.26%	14.13%	34.80%	1.15%	6.71%	14.35%	34.63%	0.62%	3.60%	8.68%	24.57%
SOUTH AFRICA	0.62%	3.84%	8.29%	20.05%	0.27%	3.43%	6.59%	17.98%	0.59%	2.52%	6.23%	20.33%

India's percentage of highly-cited papers in Agricultural Sciences was below the world average for all three time periods and thresholds: 1%, 5%, 10%, and 25%.

The majority of the established research economies had a percentage of highly-cited papers greater than the world average, with Japan being the exception.

Between 2005 and 2012, emerging research economies such as China, Spain, Turkey and Taiwan had percentages of highly-cited papers greater than the world average. Only Spain, however, managed to maintain this trend in 2013-2014



4.8.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, AGRICULTURAL SCIENCES

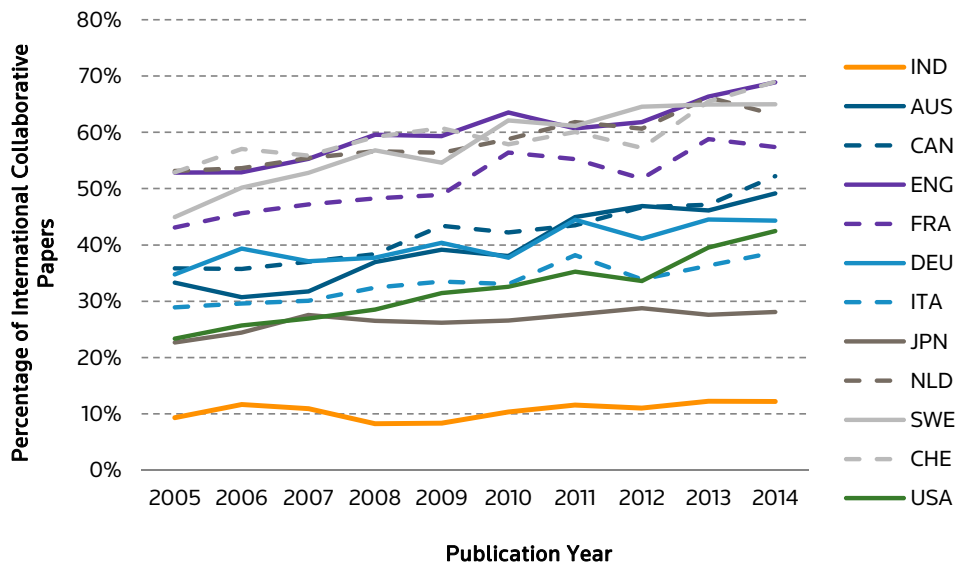


Figure 4.8.5-1 Percentage of internationally collaborative papers, Agricultural Sciences, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Agricultural Sciences increased from 9.31% in 2005 to 12.21% in 2014. The percentage of internationally collaborative papers for all the established research economies increased in this field. The USA had the greatest increase, from 23.36% in 2005 to 42.49% in 2014.

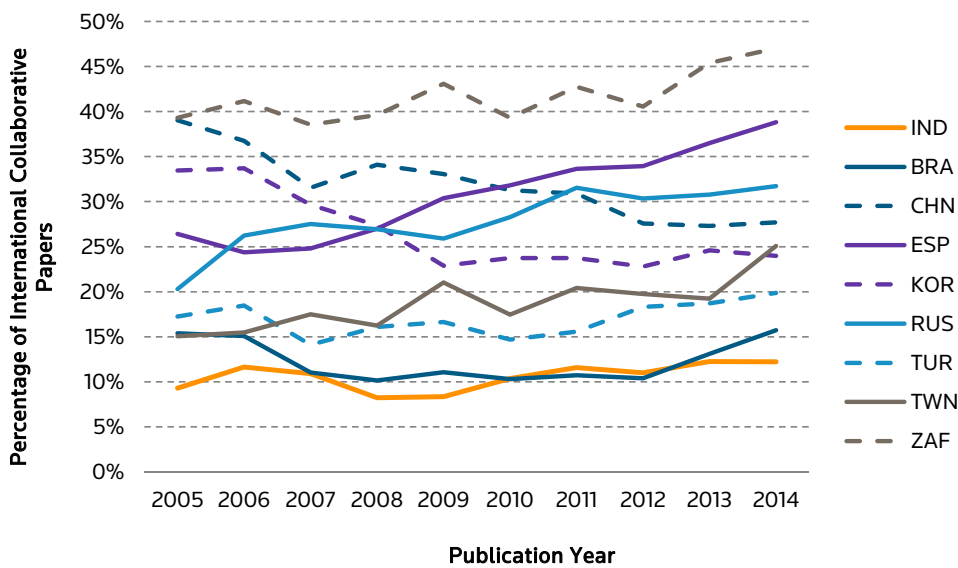


Figure 4.8.5-2 Percentage of internationally collaborative papers, Agricultural Sciences, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Agricultural Sciences was generally the lowest of the emerging research economies. South Africa maintained the highest percentage of internationally collaborative papers, from 39.29% in 2005 to 47% in 2014. China had the greatest decrease in the percentage of internationally collaborative papers, with 39.01% in 2005 to 27.71% in 2014.

**Table 4.8.5-1 Percentage of internally collaborative papers, Agricultural Sciences, All countries**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	9.84%	10.34%	12.23%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	33.28%	42.52%	47.69%
<b>CANADA</b>	36.79%	44.00%	49.59%
<b>SWITZERLAND</b>	56.49%	58.87%	67.09%
<b>GERMANY</b>	37.29%	40.99%	44.42%
<b>ENGLAND</b>	55.24%	61.37%	67.52%
<b>FRANCE</b>	46.21%	53.05%	58.10%
<b>ITALY</b>	30.48%	34.69%	37.47%
<b>JAPAN</b>	25.32%	27.29%	27.82%
<b>NETHERLANDS</b>	54.85%	59.50%	64.66%
<b>SWEDEN</b>	51.42%	60.90%	64.94%
<b>USA</b>	26.17%	33.24%	40.95%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	12.03%	10.62%	14.29%
<b>CHINA</b>	34.69%	30.33%	27.51%
<b>SPAIN</b>	25.64%	32.53%	37.60%
<b>SOUTH KOREA</b>	30.33%	23.31%	24.28%
<b>RUSSIA</b>	25.30%	28.83%	31.27%
<b>TURKEY</b>	16.33%	16.28%	19.24%
<b>TAIWAN</b>	16.20%	19.63%	21.84%
<b>SOUTH AFRICA</b>	39.60%	41.37%	46.14%

4.8.6 AVERAGE JOURNAL IMPACT FACTOR, AGRICULTURAL SCIENCES

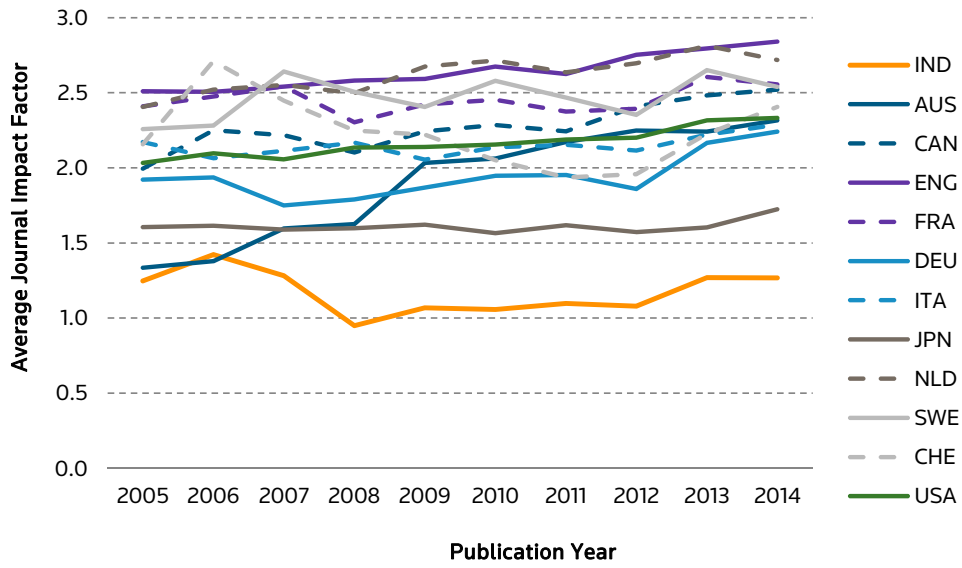


Figure 4.8.6-1 Average Journal Impact Factor, Agricultural Sciences, Established research economies  
Time period: 2005-2014, Source: Web of Science

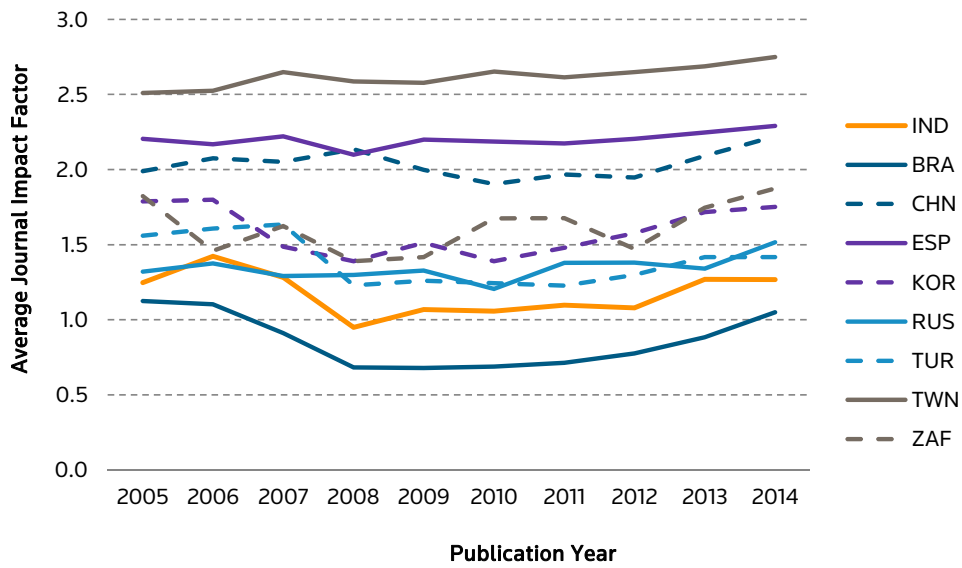


Figure 4.8.6-2 Average Journal Impact Factor, Agricultural Sciences, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

**Table 4.8.6-1 Average Journal Impact Factor, Agricultural Sciences, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	1.19	1.08	1.27
<b>Established Research Economies</b>			
AUSTRALIA	1.50	2.14	2.28
CANADA	2.15	2.30	2.50
SWITZERLAND	2.39	2.03	2.32
GERMANY	1.84	1.91	2.20
ENGLAND	2.54	2.66	2.82
FRANCE	2.43	2.41	2.58
ITALY	2.13	2.12	2.25
JAPAN	1.60	1.59	1.66
NETHERLANDS	2.50	2.68	2.77
SWEDEN	2.43	2.45	2.59
USA	2.08	2.17	2.32
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.88	0.72	0.97
CHINA	2.08	1.95	2.16
SPAIN	2.17	2.19	2.27
SOUTH KOREA	1.56	1.49	1.73
RUSSIA	1.32	1.32	1.43
TURKEY	1.50	1.26	1.42
TAIWAN	2.58	2.63	2.72
SOUTH AFRICA	1.57	1.55	1.81

India's average Journal Impact Factor in Agricultural Sciences was lower than established research economies for all three time periods. However, India had a greater average Journal Impact Factor in Agricultural Sciences than Brazil for all three time periods. This is interesting because Brazil had a greater output of papers and share of world output than India in this field.

4.9 COMPARATIVE ANALYSIS, PLANT & ANIMAL SCIENCE

4.9.1 NUMBER OF PAPERS, PLANT & ANIMAL SCIENCE

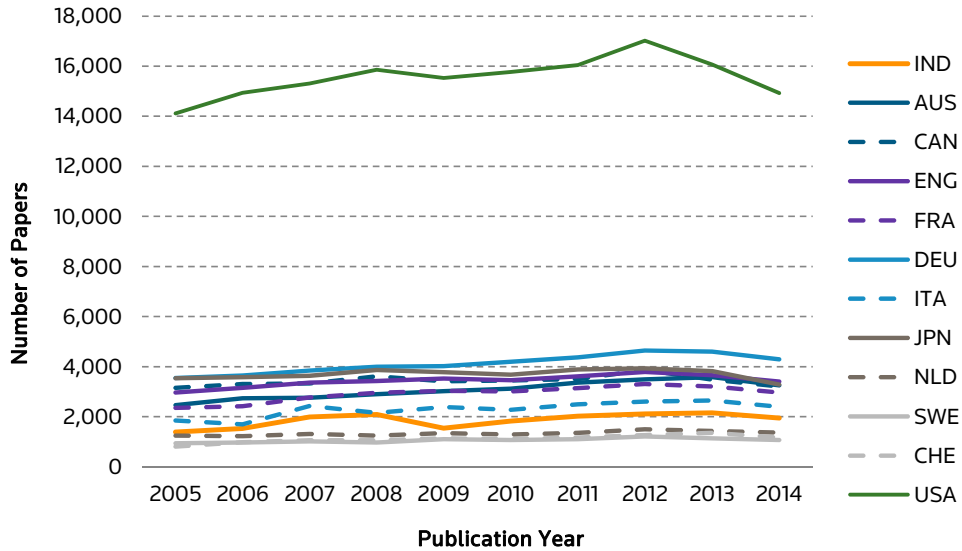


Figure 4.9.1-1 Number of papers, Plant & Animal Science, Established research economies  
Time period: 2005-2014, Source: Web of Science

India published 40% more Plant & Animal Science papers in 2014 (1,943 papers) than it did in 2005 (1,385 papers). India's output of papers in Plant & Animal Science was greater than the Netherlands, Sweden and Switzerland. With the exception of Japan, all of the established research economies' output in Plant & Animal Science increased between 2005 and 2014.

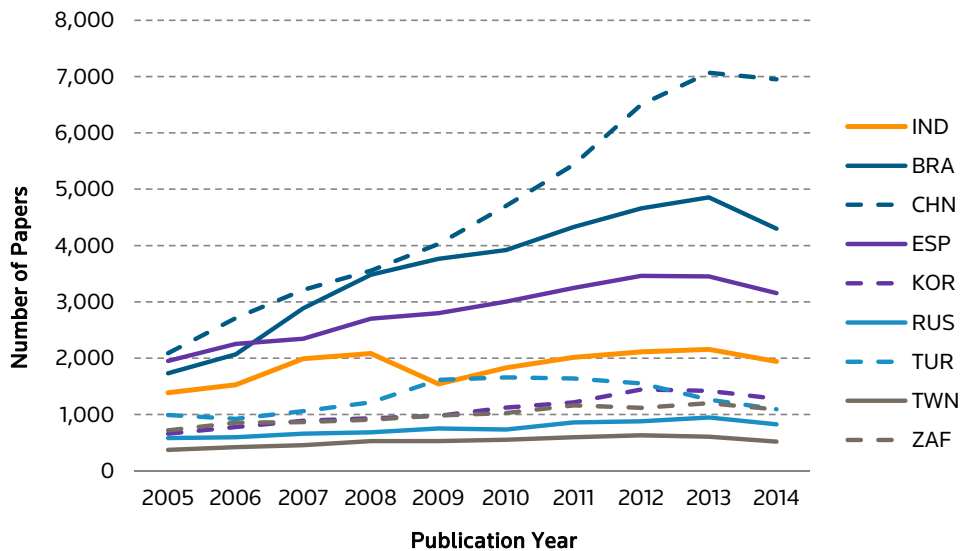


Figure 4.9.1-2 Number of papers, Plant & Animal Science, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's output of papers in Plant & Animal Science was greater than most of the emerging research economies, with Brazil, China, and Spain being the exception. All of the emerging research economies' output of papers increased from 2005 to 2014. China had the highest percentage increase (233%), from 2,086 papers in 2005 to 6,950 papers in 2014. Brazil had the second highest increase (148%), from 1,731 papers in 2005 to 4,298 papers in 2014.

**Table 4.9.1-1 Number of papers, Plant & Animal Science, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	6,989	7,497	4,100
<i>Established Research Economies</i>			
AUSTRALIA	10,850	12,977	6,829
CANADA	13,390	14,225	6,687
SWITZERLAND	3,894	4,662	2,521
GERMANY	15,023	17,220	8,888
ENGLAND	12,904	14,380	7,062
FRANCE	10,484	12,495	6,167
ITALY	8,121	9,755	5,041
JAPAN	14,611	15,267	7,097
NETHERLANDS	5,006	5,476	2,797
SWEDEN	3,892	4,464	2,201
USA	60,232	64,361	30,992
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	10,165	16,675	9,151
CHINA	11,569	20,663	14,016
SPAIN	9,253	12,510	6,606
SOUTH KOREA	3,259	4,758	2,697
RUSSIA	2,522	3,223	1,768
TURKEY	4,189	6,465	2,356
TAIWAN	1,781	2,305	1,122
SOUTH AFRICA	3,349	4,280	2,288

4.9.2 SHARE OF WORLD OUTPUT, PLANT & ANIMAL SCIENCE

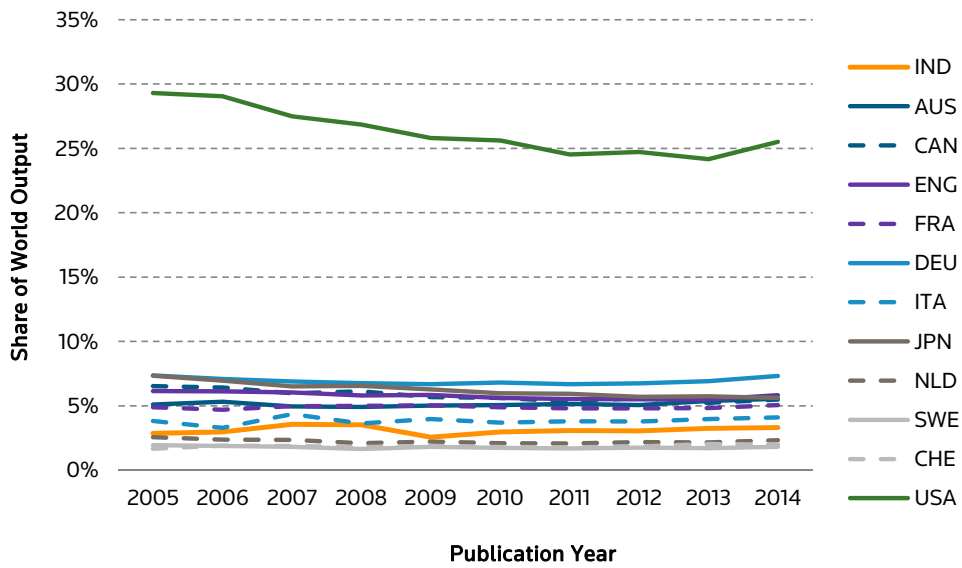


Figure 4.9.2-1 Share of world output, Plant & Animal Science, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Plant & Animal Science increased from 2.87% in 2005 to 3.32% in 2014, which was greater than that of the Netherlands, and Sweden. The share of world output in Plant & Animal Science, for Australia, France, Italy, and Switzerland increased by 8.9%, 3.7%, 6.9%, and 20% respectively.

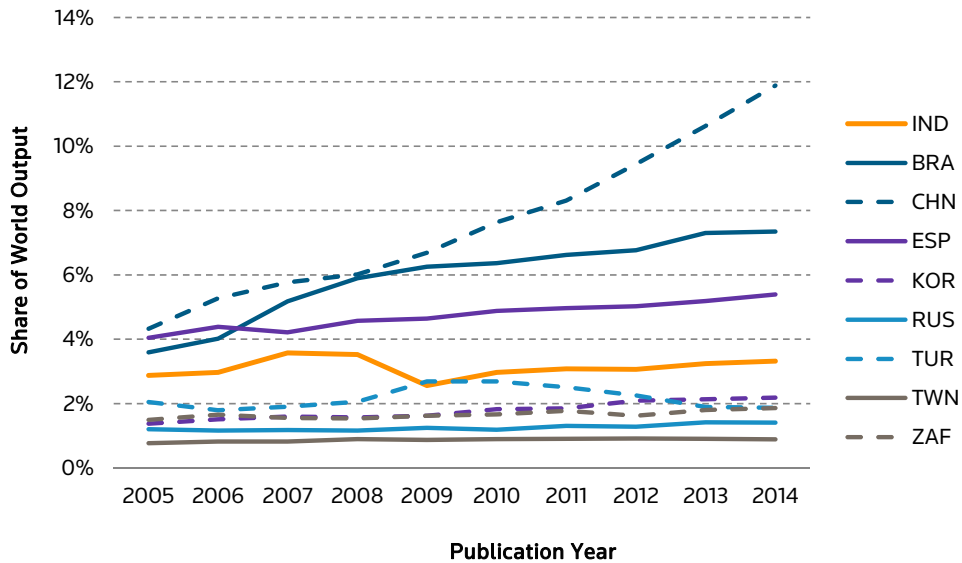


Figure 4.9.2-2 Share of world output, Plant & Animal Science, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's share of output in Plant & Animal Science was greater than that of South Korea, Russia, Turkey, Taiwan, and South Africa. With the exception of Turkey, all the emerging research economies' share of the world output in Plant & Animal Science increased.

Table 4.9.2-1 Share of world output, Plant &amp; Animal Science, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Share of World Output		
	2005-2008	2009-2012	2013-2014
INDIA	3.26%	2.93%	3.28%
<i>Established Research Economies</i>			
AUSTRALIA	5.06%	5.07%	5.46%
CANADA	6.24%	5.56%	5.35%
SWITZERLAND	1.82%	1.82%	2.02%
GERMANY	7.01%	6.73%	7.11%
ENGLAND	6.02%	5.62%	5.65%
FRANCE	4.89%	4.88%	4.93%
ITALY	3.79%	3.81%	4.03%
JAPAN	6.81%	5.96%	5.68%
NETHERLANDS	2.33%	2.14%	2.24%
SWEDEN	1.82%	1.74%	1.76%
USA	28.09%	25.14%	24.80%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	4.74%	6.51%	7.32%
CHINA	5.40%	8.07%	11.21%
SPAIN	4.32%	4.89%	5.29%
SOUTH KOREA	1.52%	1.86%	2.16%
RUSSIA	1.18%	1.26%	1.41%
TURKEY	1.95%	2.53%	1.88%
TAIWAN	0.83%	0.90%	0.90%
SOUTH AFRICA	1.56%	1.67%	1.83%



4.9.3 NORMALISED CITATION IMPACT, PLANT & ANIMAL SCIENCE

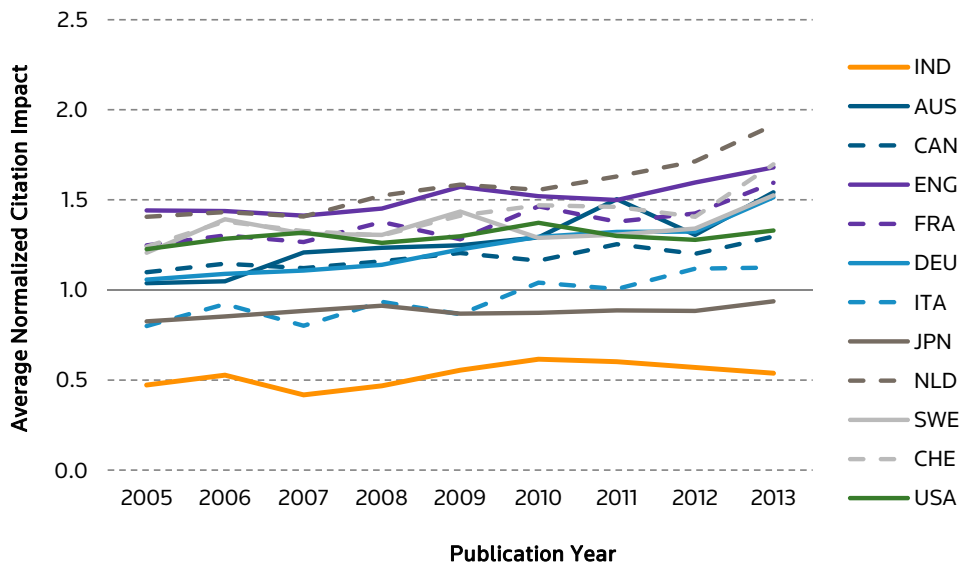


Figure 4.9.3-1 Normalised citation impact, Plant & Animal Science, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Plant & Animal Science fluctuated about 0.5 between 2005 and 2013. After 2010, with the exception of Japan, all of the established research economies had a citation impact higher than the world average.

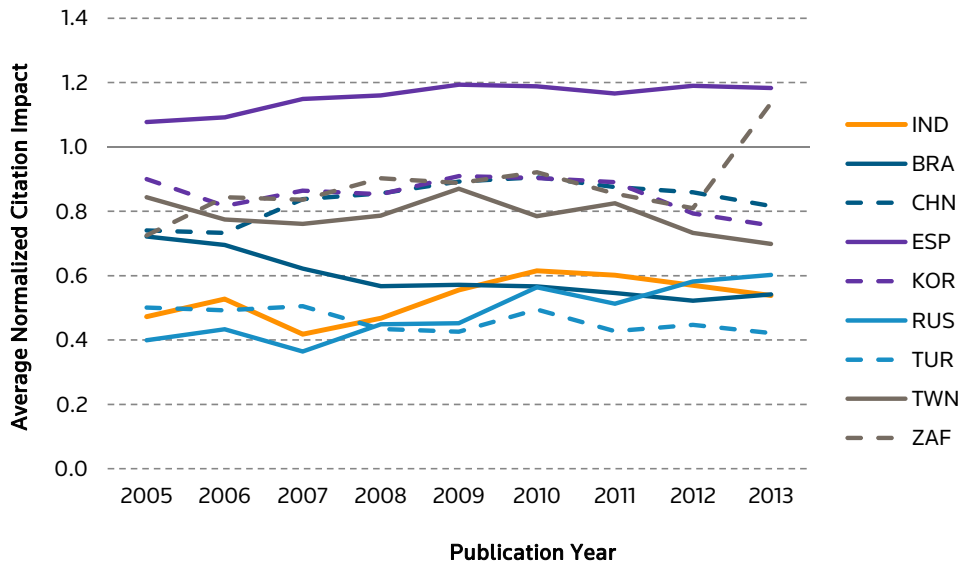


Figure 4.9.3-2 Normalised citation impact, Plant & Animal Science, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Plant & Animal Science was generally higher than that of Russia (2005-2012), Turkey and Brazil (after 2009). Spain was the only emerging research economy whose citation impact was consistently higher than the world average. Between 2005 and 2013, the citation impact in Plant & Animal Science of Brazil, South Korea, Turkey and Taiwan fell.

**Table 4.9.3-1 Normalised citation impact, Plant & Animal Science, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.47	0.59	0.54
<b>Established Research Economies</b>			
AUSTRALIA	1.14	1.34	1.54
CANADA	1.13	1.21	1.30
SWITZERLAND	1.32	1.44	1.70
GERMANY	1.10	1.29	1.51
ENGLAND	1.44	1.55	1.68
FRANCE	1.30	1.39	1.60
ITALY	0.86	1.01	1.12
JAPAN	0.87	0.88	0.94
NETHERLANDS	1.44	1.63	1.91
SWEDEN	1.31	1.34	1.52
USA	1.27	1.31	1.33
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.63	0.55	0.54
CHINA	0.80	0.88	0.82
SPAIN	1.12	1.18	1.18
SOUTH KOREA	0.86	0.87	0.76
RUSSIA	0.41	0.53	0.60
TURKEY	0.48	0.45	0.42
TAIWAN	0.79	0.80	0.70
SOUTH AFRICA	0.83	0.87	1.14

## 4.9.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, PLANT &amp; ANIMAL SCIENCE

Table 4.9.4-1 Highly-cited papers, Plant & Animal Science, All countries  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.34%	1.83%	3.89%	11.50%	0.44%	2.37%	5.31%	13.75%	0.39%	1.68%	4.29%	17.22%
<b>Established Research Economies</b>												
AUSTRALIA	1.63%	7.42%	13.84%	31.44%	1.97%	8.27%	15.33%	31.76%	2.14%	6.56%	12.64%	32.95%
CANADA	1.19%	6.03%	11.99%	29.77%	1.50%	6.59%	13.03%	29.55%	1.47%	5.04%	9.83%	27.80%
SWITZERLAND	1.95%	9.24%	17.51%	37.13%	2.57%	10.45%	19.35%	37.73%	2.62%	7.81%	15.39%	36.33%
GERMANY	1.97%	8.25%	15.26%	32.82%	2.52%	9.84%	17.46%	34.16%	2.28%	7.61%	13.69%	33.73%
ENGLAND	2.48%	11.15%	19.28%	38.54%	2.97%	11.45%	19.58%	37.69%	2.44%	7.49%	13.42%	34.75%
FRANCE	1.81%	8.57%	16.67%	36.89%	2.34%	9.48%	17.54%	35.84%	2.45%	7.41%	13.80%	35.43%
ITALY	0.76%	4.43%	9.47%	23.62%	0.96%	5.07%	10.45%	24.52%	1.53%	5.24%	10.10%	28.65%
JAPAN	1.20%	4.57%	8.49%	20.48%	1.28%	5.42%	9.56%	20.98%	1.32%	4.20%	8.12%	22.93%
NETHERLANDS	2.66%	10.09%	17.88%	37.87%	2.76%	11.07%	19.87%	39.04%	3.15%	8.19%	14.98%	34.75%
SWEDEN	1.90%	8.22%	15.65%	37.00%	1.72%	8.06%	16.17%	34.88%	2.09%	7.45%	13.68%	33.89%
USA	1.59%	7.09%	13.17%	30.04%	1.64%	7.13%	13.26%	28.56%	1.48%	5.36%	10.38%	27.91%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.16%	1.52%	3.81%	12.86%	0.20%	1.34%	3.24%	10.41%	0.35%	1.41%	3.46%	13.10%
CHINA	0.80%	4.68%	9.85%	24.53%	0.92%	5.44%	11.01%	25.49%	0.81%	3.72%	7.58%	23.12%
SPAIN	1.01%	5.85%	12.47%	32.07%	1.33%	6.20%	12.75%	29.71%	1.26%	4.98%	9.87%	29.16%
SOUTH KOREA	1.07%	5.28%	10.00%	21.91%	1.09%	4.94%	9.35%	21.84%	0.82%	2.97%	6.01%	19.32%
RUSSIA	0.36%	1.94%	4.20%	11.02%	0.37%	2.26%	4.03%	10.67%	0.34%	1.92%	4.69%	17.59%
TURKEY	0.10%	1.03%	2.22%	7.59%	0.28%	0.76%	1.76%	5.65%	0.08%	0.76%	2.12%	9.34%
TAIWAN	0.45%	3.26%	7.30%	20.38%	1.00%	3.56%	7.81%	20.30%	0.89%	3.57%	7.40%	22.91%
SOUTH AFRICA	0.54%	3.97%	8.54%	21.74%	0.98%	3.95%	7.83%	21.47%	1.31%	3.85%	7.87%	23.47%

India's percentage of highly-cited papers in Plant & Animal Science was below the world average for all three time periods and thresholds: 1%, 5%, 10%, and 25%.

Of all the established research economies, Italy and Japan's percentage of highly-cited papers was generally lower than the world average.

The majority of the emerging countries did not have a percentage of highly-cited papers which were greater than the world average. The exception is Spain which had a percentage of highly-cited papers greater than the world average between 2005 and 2012, for the Top 1% and for the Top 25% in 2013-2014.

4.9.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, PLANT & ANIMAL SCIENCE

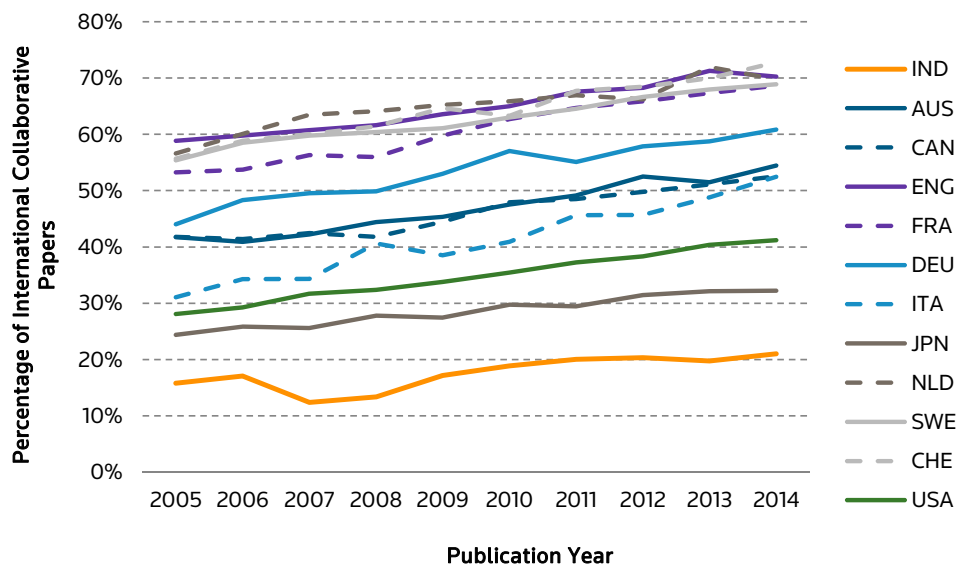


Figure 4.9.5-1 Percentage of internationally collaborative papers, Plant & Animal Science, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Plant & Animal Science increased from 15.81% in 2005 to 21% in 2014. The percentage of internationally collaborative papers for all of the established research economies increased. Italy had the greatest increase in percentage of collaborative papers, rising from 31.04% in 2005 to 52.46% in 2014.

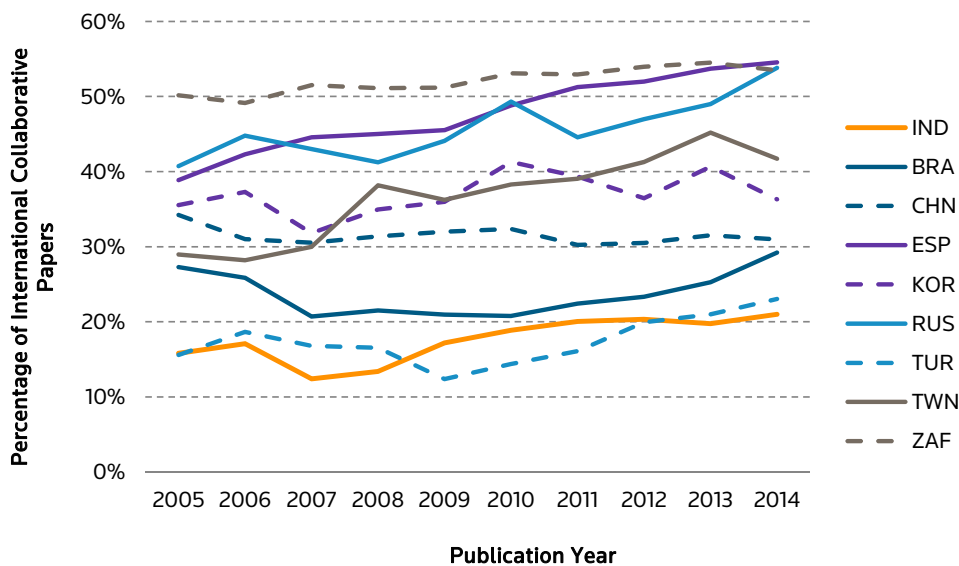


Figure 4.9.5-2 Percentage of internationally collaborative papers, Plant & Animal Science, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Plant & Animal Science was the lowest of the emerging research economies between 2005 and 2008, and again between 2012 and 2014. Between 2009 and 2013, Turkey had the lowest percentage. However, Turkey had the highest increase in the percentage of internationally collaborative papers, rising from 15.57% in 2005 to 23.03% in 2014. South Africa maintained the highest percentage of internationally collaborative papers at above 50% between 2005 and 2013.

**Table 4.9.5-1 Percentage of internally collaborative papers, Plant & Animal Science, All countries**  
**Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science**

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	14.39%	19.25%	20.34%
<b>Established Research Economies</b>			
AUSTRALIA	42.36%	48.76%	52.91%
CANADA	41.85%	47.73%	51.79%
SWITZERLAND	59.19%	66.11%	71.24%
GERMANY	48.02%	55.81%	59.73%
ENGLAND	60.29%	66.13%	70.76%
FRANCE	54.92%	63.31%	67.94%
ITALY	35.23%	42.81%	50.55%
JAPAN	25.96%	29.55%	32.17%
NETHERLANDS	61.09%	66.05%	70.90%
SWEDEN	58.56%	63.89%	68.38%
USA	30.42%	36.25%	40.75%
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	23.14%	21.96%	27.12%
CHINA	31.56%	31.14%	31.25%
SPAIN	42.94%	49.58%	54.10%
SOUTH KOREA	34.77%	38.23%	38.60%
RUSSIA	42.43%	46.20%	51.24%
TURKEY	16.83%	15.64%	21.94%
TAIWAN	31.78%	38.83%	43.58%
SOUTH AFRICA	50.49%	52.83%	54.02%

4.9.6 AVERAGE JOURNAL IMPACT FACTOR, PLANT & ANIMAL SCIENCE

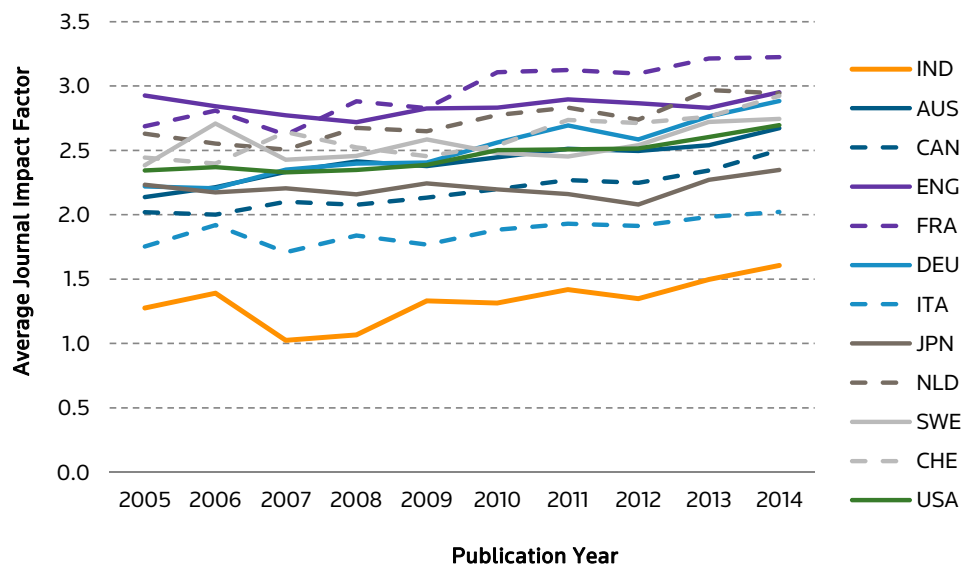


Figure 4.9.6-1 Average Journal Impact Factor, Plant & Animal Science, Established research economies  
Time period: 2005-2014, Source: Web of Science

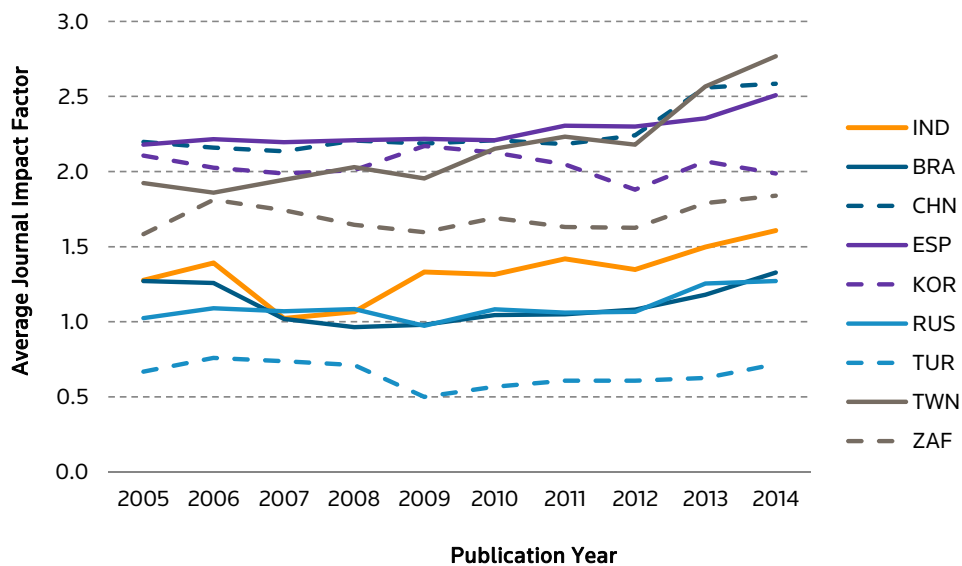


Figure 4.9.6-2 Average Journal Impact Factor, Plant & Animal Science, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

**Table 4.9.6-1 Average Journal Impact Factor, Plant & Animal Science, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	1.17	1.36	1.55
<b>Established Research Economies</b>			
AUSTRALIA	2.28	2.46	2.61
CANADA	2.05	2.21	2.42
SWITZERLAND	2.51	2.61	2.84
GERMANY	2.30	2.57	2.82
ENGLAND	2.81	2.86	2.89
FRANCE	2.75	3.04	3.22
ITALY	1.80	1.88	2.00
JAPAN	2.19	2.17	2.31
NETHERLANDS	2.59	2.75	2.95
SWEDEN	2.50	2.51	2.73
USA	2.35	2.48	2.65
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	1.08	1.04	1.25
CHINA	2.17	2.21	2.57
SPAIN	2.20	2.26	2.43
SOUTH KOREA	2.03	2.04	2.03
RUSSIA	1.07	1.05	1.26
TURKEY	0.72	0.57	0.67
TAIWAN	1.95	2.14	2.67
SOUTH AFRICA	1.70	1.64	1.81

India's average Journal Impact Factor in Plant & Animal Science was lower than that of the established research economies for all three time periods. However, India's average Journal Impact Factor was higher than that of Brazil, Russia, and Turkey for all three time periods.

4.10 COMPARATIVE ANALYSIS, PHARMACOLOGY & TOXICOLOGY

4.10.1 NUMBER OF PAPERS, PHARMACOLOGY & TOXICOLOGY

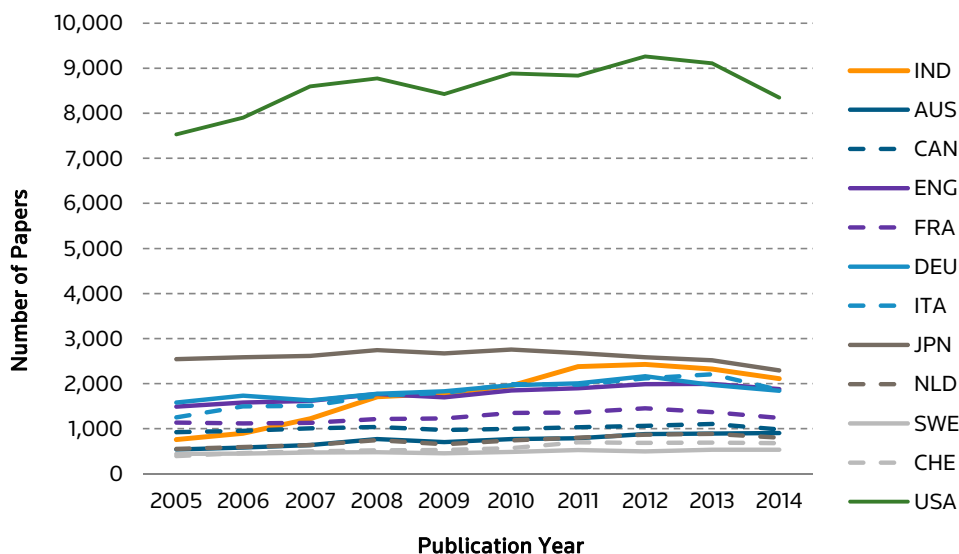


Figure 4.10.1-1 Number of papers, Pharmacology & Toxicology, Established research economies  
Time period: 2005-2014, Source: Web of Science

India nearly tripled its Pharmacology & Toxicology papers with 2,108 papers in 2014 compared with 755 papers in 2005. Since 2010, with the exception of Japan and the USA, India's output in Pharmacology & Toxicology has been greater than most of the established research economies. Japan was the only established research economy whose output of papers decreased in Pharmacology & Toxicology.

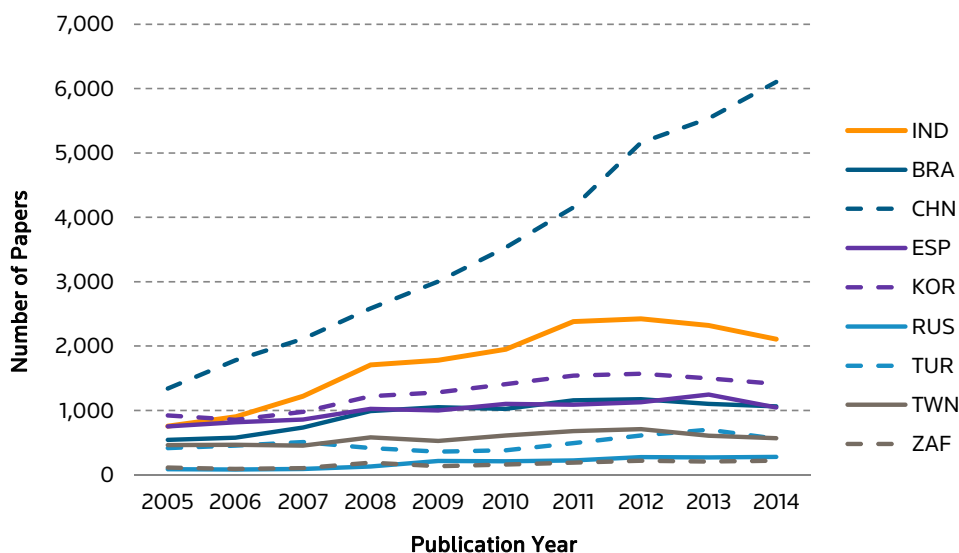


Figure 4.10.1-2 Number of papers, Pharmacology & Toxicology BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

After 2006, India had the second highest output of papers in papers in Pharmacology & Toxicology when compared to the emerging economies. All of the emerging research economies increased their output of papers in this field. China had the greatest increase, from 1,340 papers in 2005 to 6,102 papers in 2014. Russia had the second greatest percentage increase (106%), from 85 papers in 2005 to 277 papers in 2014.



**Table 4.10.1-1 Number of papers, Pharmacology & Toxicology, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	4,579	8,534	4,429
<i>Established Research Economies</i>			
AUSTRALIA	2,523	3,145	1,794
CANADA	3,917	4,055	2,082
SWITZERLAND	1,863	2,476	1,366
GERMANY	6,716	7,961	3,810
ENGLAND	6,453	7,425	3,869
FRANCE	4,589	5,386	2,607
ITALY	5,982	7,865	4,066
JAPAN	10,485	10,686	4,811
NETHERLANDS	2,523	3,060	1,683
SWEDEN	1,840	1,952	1,064
USA	32,799	35,398	17,452
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	2,844	4,408	2,165
CHINA	7,817	15,851	11,640
SPAIN	3,454	4,317	2,296
SOUTH KOREA	3,976	5,799	2,909
RUSSIA	391	923	547
TURKEY	1,795	1,841	1,259
TAIWAN	1,968	2,523	1,176
SOUTH AFRICA	498	699	427

4.10.2 SHARE OF WORLD OUTPUT, PHARMACOLOGY & TOXICOLOGY

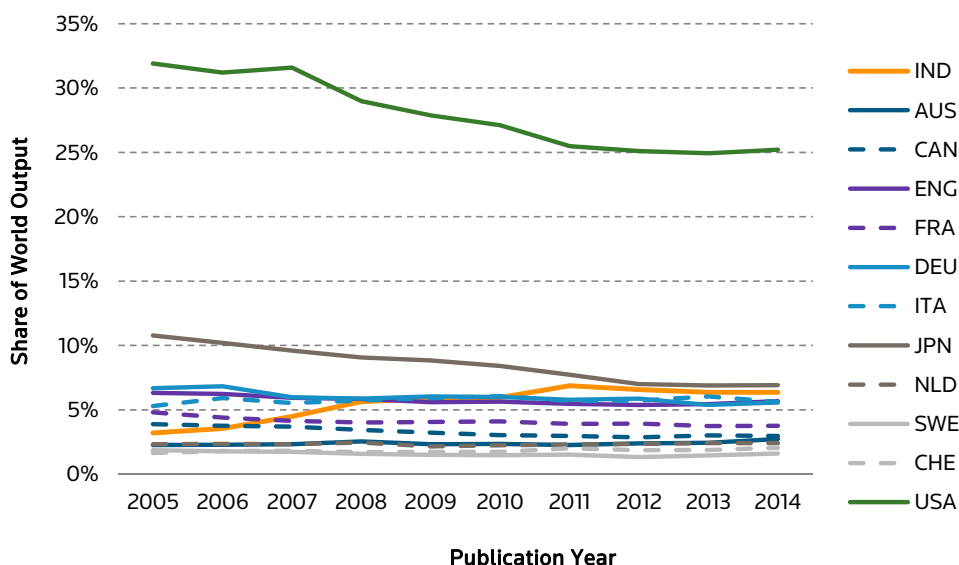


Figure 4.10.2-1 Share of world output, Pharmacology & Toxicology, Established research economies  
Time period: 2005-2014, Source: Web of Science

India nearly doubled (1.99) its share of world output in Pharmacology & Toxicology from 3.20% in 2005 to 6.37% in 2014. As of 2010, India's share of output was greater than the majority of the established research economies, with Japan and the USA being the exceptions. Australia, Italy, the Netherlands and Switzerland's share of world output increased by 20%, 6.0%, 3.7% and 23.7%, respectively.

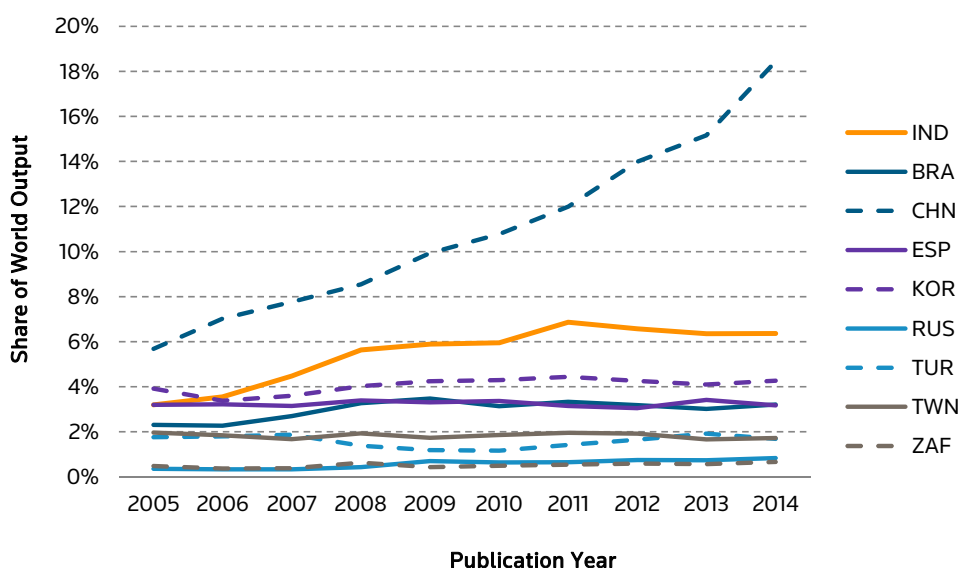


Figure 4.10.2-2 Share of world output, Pharmacology & Toxicology, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

Since 2006, India's share of world output in Pharmacology & Toxicology has been greater than most of the emerging research economies, with China being the exception. China's share of world output increased from 5.68% in 2005 to 18.43% in 2014. The share of world output in Pharmacology & Toxicology of Spain, Turkey and Taiwan decreased by 0.9%, 4.1% and 12.5%, respectively.

**Table 4.10.2-1 Share of world output, Pharmacology & Toxicology, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Share of World Output		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	4.30%	6.34%	6.36%
<i>Established Research Economies</i>			
AUSTRALIA	2.37%	2.34%	2.58%
CANADA	3.68%	3.01%	2.99%
SWITZERLAND	1.75%	1.84%	1.96%
GERMANY	6.31%	5.92%	5.47%
ENGLAND	6.06%	5.52%	5.56%
FRANCE	4.31%	4.00%	3.74%
ITALY	5.62%	5.84%	5.84%
JAPAN	9.85%	7.94%	6.91%
NETHERLANDS	2.37%	2.27%	2.42%
SWEDEN	1.73%	1.45%	1.53%
USA	30.82%	26.31%	25.06%
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	2.67%	3.28%	3.11%
CHINA	7.35%	11.78%	16.71%
SPAIN	3.25%	3.21%	3.30%
SOUTH KOREA	3.74%	4.31%	4.18%
RUSSIA	0.37%	0.69%	0.79%
TURKEY	1.69%	1.37%	1.81%
TAIWAN	1.85%	1.87%	1.69%
SOUTH AFRICA	0.47%	0.52%	0.61%

4.10.3 NORMALISED CITATION IMPACT, PHARMACOLOGY & TOXICOLOGY

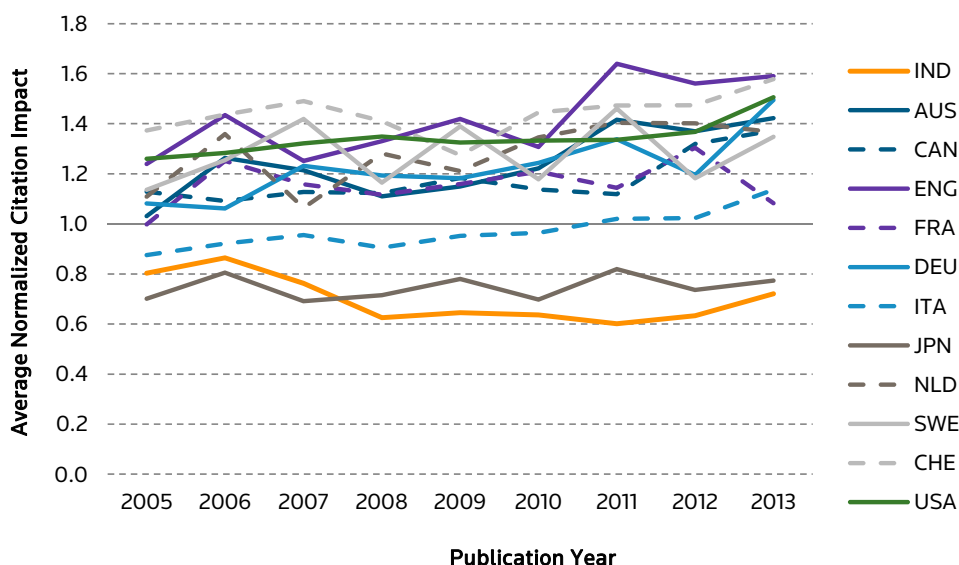


Figure 4.10.3-1 Normalised citation impact, Pharmacology & Toxicology, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Pharmacology & Toxicology decreased from 0.86 in 2006 to 0.72 in 2013. The majority of the established research economies had citation impact higher than the world average, with Japan and Italy being the exceptions. All of the established research economies' citation impact in Pharmacology & Toxicology increased from 2005 to 2013.

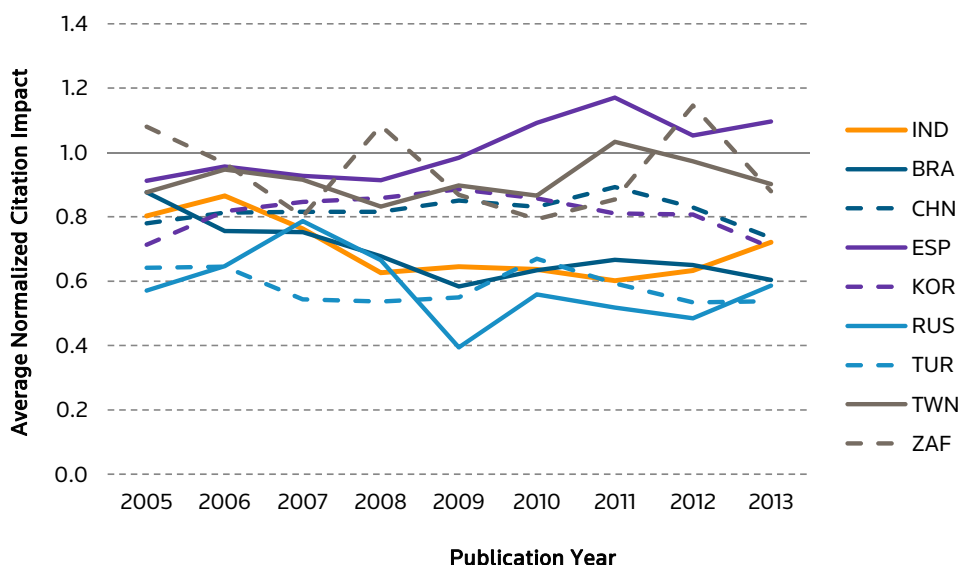


Figure 4.10.3-2 Normalised citation impact, Pharmacology & Toxicology, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Pharmacology & Toxicology was higher than that of Russia and Turkey. Spain, Russia, and Taiwan's citation impact in Pharmacology & Toxicology increased between 2005 and 2013. After 2009, Spain's citation impact in this field was higher than the world average.

**Table 4.10.3-1 Normalised citation impact, Pharmacology & Toxicology, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	0.74	0.63	0.72
<b>Established Research Economies</b>			
AUSTRALIA	1.16	1.30	1.42
CANADA	1.12	1.19	1.37
SWITZERLAND	1.43	1.42	1.58
GERMANY	1.14	1.24	1.49
ENGLAND	1.31	1.49	1.59
FRANCE	1.13	1.21	1.08
ITALY	0.92	0.99	1.14
JAPAN	0.73	0.76	0.77
NETHERLANDS	1.21	1.35	1.37
SWEDEN	1.25	1.31	1.35
USA	1.31	1.34	1.51
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.75	0.64	0.60
CHINA	0.81	0.85	0.73
SPAIN	0.93	1.08	1.10
SOUTH KOREA	0.81	0.84	0.70
RUSSIA	0.67	0.49	0.59
TURKEY	0.59	0.58	0.54
TAIWAN	0.89	0.95	0.90
SOUTH AFRICA	1.00	0.94	0.88

## 4.10.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, PHARMACOLOGY &amp; TOXICOLOGY

**Table 4.10.4-1 Highly-cited papers, Pharmacology & Toxicology, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.52%	2.97%	6.20%	17.51%	0.40%	2.27%	4.76%	14.21%	0.47%	3.00%	4.76%	13.55%
<b>Established Research Economies</b>												
AUSTRALIA	1.31%	6.18%	11.97%	28.70%	1.37%	8.36%	14.69%	32.37%	2.17%	8.81%	12.88%	25.64%
CANADA	1.25%	6.05%	12.31%	29.21%	1.38%	6.76%	12.70%	30.23%	1.83%	7.44%	11.67%	22.67%
SWITZERLAND	1.29%	8.86%	17.55%	35.80%	2.06%	9.41%	16.24%	35.54%	2.56%	10.18%	13.91%	25.77%
GERMANY	1.44%	6.82%	13.13%	29.15%	1.58%	7.13%	13.50%	31.50%	1.86%	8.27%	11.84%	24.20%
ENGLAND	1.81%	8.29%	15.54%	33.33%	2.14%	8.77%	16.04%	35.23%	2.35%	8.97%	12.87%	26.70%
FRANCE	1.44%	6.45%	12.86%	29.07%	1.62%	6.44%	12.05%	29.08%	1.65%	6.75%	10.01%	22.98%
ITALY	0.85%	4.43%	9.60%	23.85%	0.98%	5.14%	10.65%	26.83%	0.98%	6.00%	9.25%	21.25%
JAPAN	0.49%	3.00%	6.26%	16.58%	0.54%	2.97%	5.87%	17.32%	0.67%	3.10%	4.61%	13.03%
NETHERLANDS	1.39%	7.21%	13.87%	31.79%	1.90%	8.82%	15.39%	36.05%	1.96%	8.79%	12.89%	26.32%
SWEDEN	1.74%	7.07%	14.18%	30.82%	2.15%	9.22%	14.60%	33.40%	2.07%	8.08%	11.75%	24.53%
USA	1.71%	7.24%	13.48%	30.05%	1.74%	7.73%	13.93%	31.80%	1.71%	7.53%	11.41%	23.81%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.25%	1.97%	5.52%	18.04%	0.27%	1.63%	3.77%	13.61%	0.46%	2.59%	4.20%	11.13%
CHINA	0.36%	2.93%	6.38%	19.91%	0.41%	3.27%	7.49%	22.41%	0.40%	3.22%	5.40%	14.68%
SPAIN	0.75%	4.63%	9.87%	24.00%	1.00%	6.21%	11.35%	27.96%	1.09%	6.36%	9.32%	22.17%
SOUTH KOREA	0.58%	3.04%	6.64%	19.94%	0.69%	3.24%	6.67%	19.66%	0.31%	3.06%	5.57%	15.33%
RUSSIA	0.26%	2.81%	6.14%	19.44%	0.43%	2.93%	4.55%	12.78%	0.18%	3.11%	3.84%	12.61%
TURKEY	0.28%	1.67%	3.62%	12.98%	0.16%	1.36%	3.04%	10.76%	0.24%	1.75%	2.70%	8.10%
TAIWAN	0.20%	2.69%	7.01%	21.90%	0.55%	2.93%	6.86%	22.55%	0.51%	4.17%	6.38%	16.92%
SOUTH AFRICA	0.80%	4.82%	11.04%	26.10%	0.43%	3.29%	7.30%	21.60%	0.70%	4.45%	5.62%	18.50%

India's percentage of highly-cited papers in Pharmacology & Toxicology was below the world average for all three time periods and thresholds: 1%, 5%, 10%, and 25%.

Of the established research economies, Italy and Japan's percentage of highly-cited papers was generally lower than the world average.

The majority of the emerging countries did not have a percentage of highly-cited papers greater than the world average. The exception is Spain, which had a percentage of highly-cited papers greater than the world average for 2009-2012 in the Top 5%, 10%, and 25%, and in 2013-2014 for the Top 1% and Top 5%.

4.10.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, PHARMACOLOGY & TOXICOLOGY

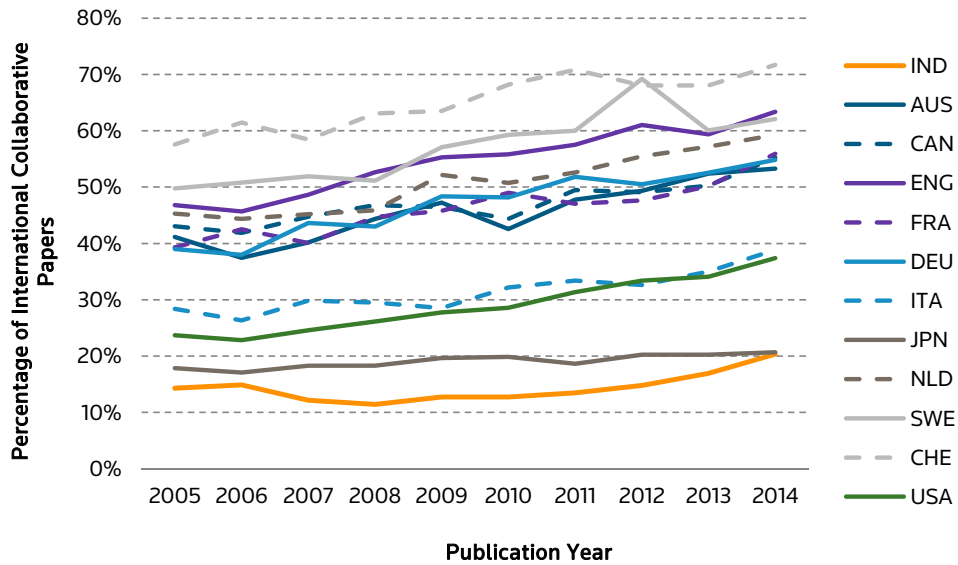


Figure 4.10.5-1 Percentage of internationally collaborative papers, Pharmacology & Toxicology, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Pharmacology & Toxicology increased from 14.3% in 2005 to 20.35% in 2014. All of the established research economies' international collaboration rate increased in the time period analysed. The USA had the greatest increase in percentage of internationally collaborative papers from 23.68% in 2005 to 37.37% in 2014. Switzerland generally had the highest percentage of internationally collaborative papers, with 57.54% in 2005 to 71.68% in 2014.

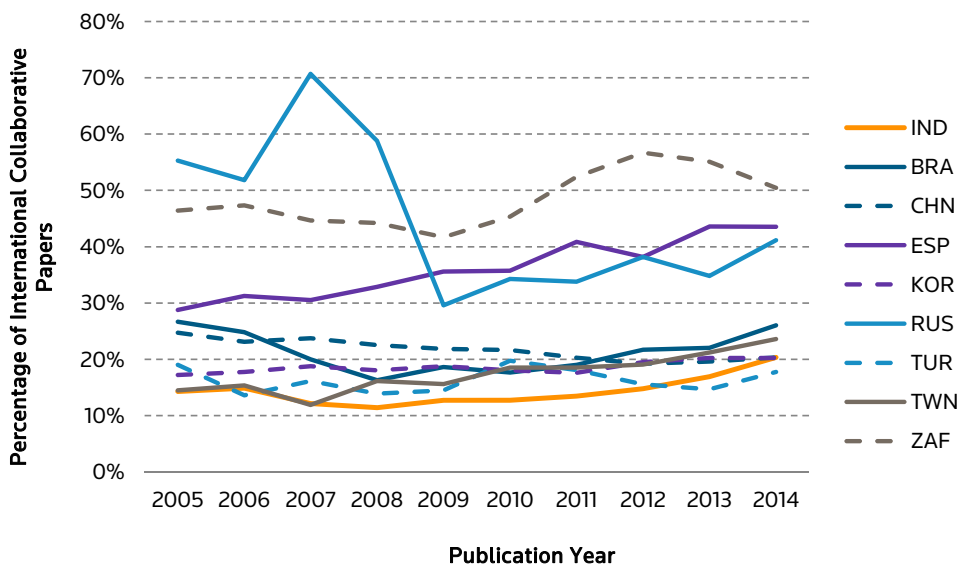


Figure 4.10.5-2 Percentage of internationally collaborative papers, Pharmacology & Toxicology, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Pharmacology & Toxicology was the lowest of the emerging research economies between 2005 and 2012. However, India's 42% increase in collaborative papers was second only to Taiwan's 63%. Russia had the highest percentage of collaborative papers

between 2005 and 2008, but from 2009 onwards, South Africa maintained the highest international collaboration rate in Pharmacology & Toxicology.

**Table 4.10.5-1 Percentage of internally collaborative papers, Pharmacology & Toxicology, All countries**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Percentage of Internationally Collaborative Papers		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	12.78%	13.51%	18.56%
<b>Established Research Economies</b>			
AUSTRALIA	41.02%	46.80%	52.84%
CANADA	44.19%	47.40%	52.59%
SWITZERLAND	60.28%	67.89%	69.84%
GERMANY	40.92%	49.76%	53.67%
ENGLAND	48.60%	57.52%	61.31%
FRANCE	41.69%	47.40%	52.90%
ITALY	28.55%	31.76%	36.77%
JAPAN	17.88%	19.58%	20.45%
NETHERLANDS	45.22%	52.88%	58.17%
SWEDEN	50.92%	61.48%	61.09%
USA	24.37%	30.34%	35.66%
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	20.96%	19.33%	24.02%
CHINA	23.36%	20.53%	19.99%
SPAIN	31.01%	37.64%	43.55%
SOUTH KOREA	17.98%	18.49%	20.25%
RUSSIA	59.34%	34.24%	38.03%
TURKEY	15.65%	16.89%	16.04%
TAIWAN	14.58%	18.07%	22.36%
SOUTH AFRICA	45.38%	50.07%	52.69%



4.10.6 AVERAGE JOURNAL IMPACT FACTOR, PHARMACOLOGY & TOXICOLOGY

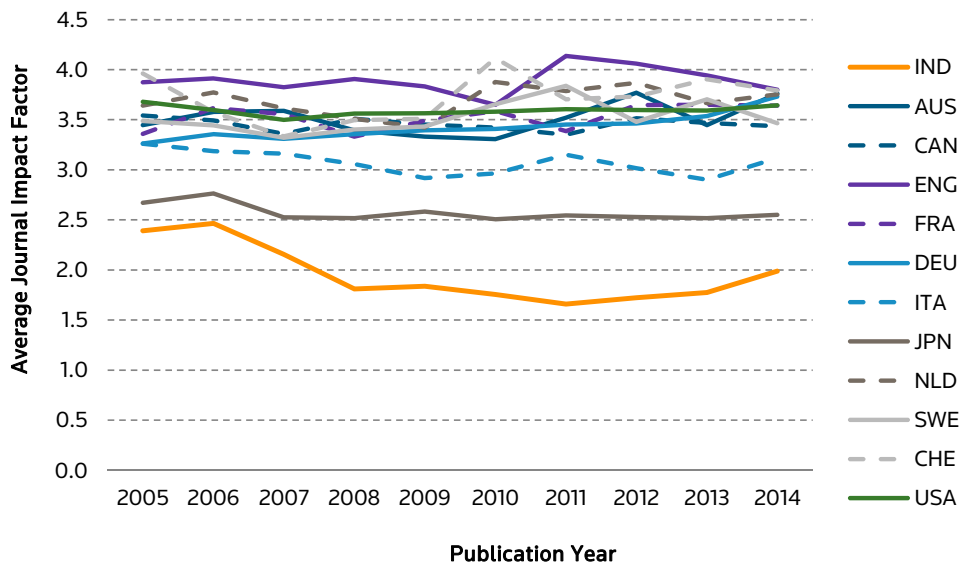


Figure 4.10.6-1 Average Journal Impact Factor, Pharmacology & Toxicology, Established research economies  
Time period: 2005-2014, Source: Web of Science

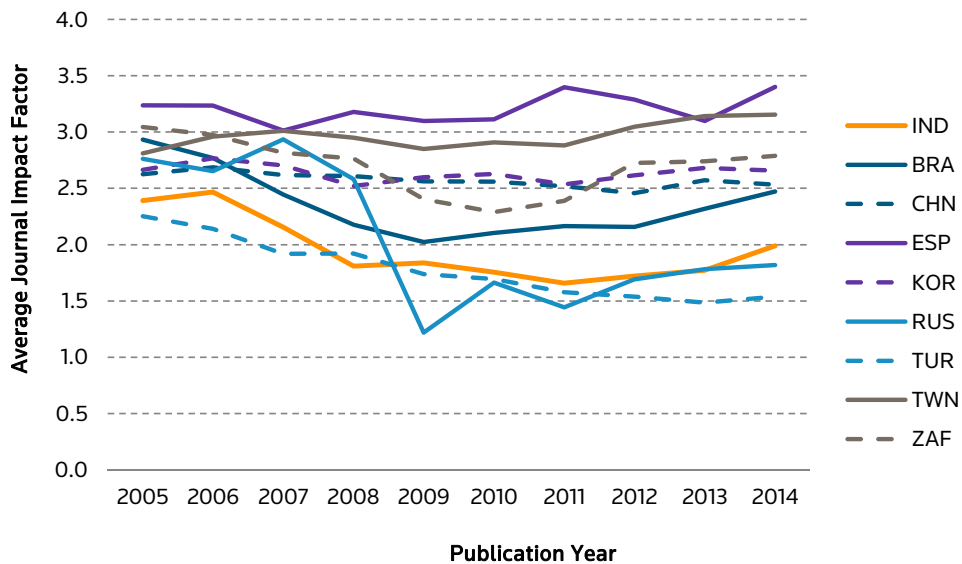


Figure 4.10.6-2 Average Journal Impact Factor, Pharmacology & Toxicology, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

**Table 4.10.6-1 Average Journal Impact Factor, Pharmacology & Toxicology, All countries**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	2.12	1.73	1.88
<b>Established Research Economies</b>			
AUSTRALIA	3.50	3.50	3.60
CANADA	3.47	3.44	3.45
SWITZERLAND	3.57	3.77	3.85
GERMANY	3.32	3.43	3.63
ENGLAND	3.88	3.93	3.87
FRANCE	3.46	3.53	3.65
ITALY	3.16	3.02	3.01
JAPAN	2.62	2.54	2.53
NETHERLANDS	3.63	3.76	3.71
SWEDEN	3.41	3.61	3.58
USA	3.58	3.59	3.62
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	2.50	2.12	2.40
CHINA	2.63	2.52	2.55
SPAIN	3.16	3.23	3.25
SOUTH KOREA	2.65	2.59	2.67
RUSSIA	2.72	1.52	1.80
TURKEY	2.05	1.62	1.51
TAIWAN	2.94	2.93	3.15
SOUTH AFRICA	2.87	2.48	2.76

India's average Journal Impact Factor in Pharmacology & Toxicology was lower than that of all the established research economies but was higher than Turkey's average Journal Impact Factor for all three time periods.

4.11 COMPARATIVE ANALYSIS, GEOSCIENCES

4.11.1 NUMBER OF PAPERS, GEOSCIENCES

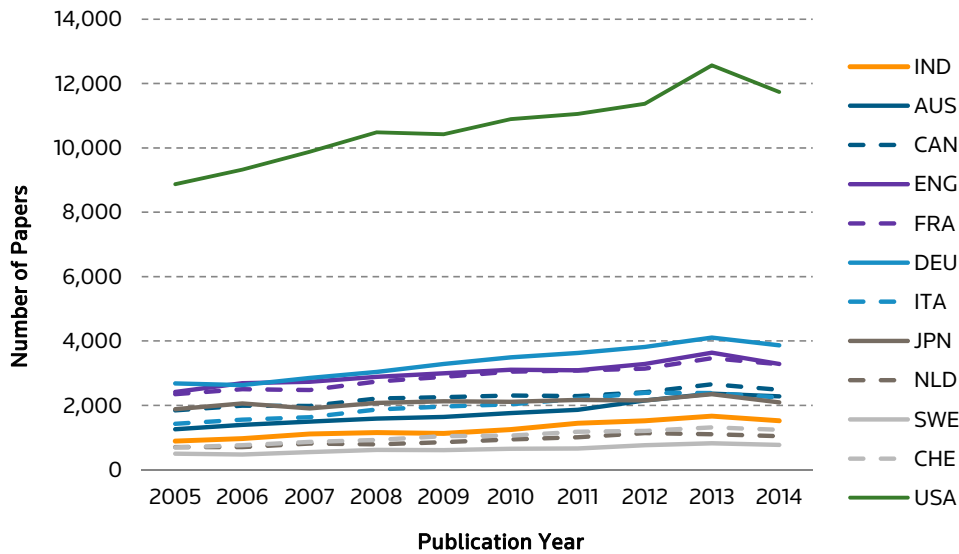


Figure 4.11.1-1 Number of papers, Geosciences, Established research economies  
Time period: 2005-2014, Source: Web of Science

India published 70% more Geosciences papers in 2014 (1,519 papers) than it did in 2005 (891 papers). India's output of papers in Geosciences was greater than that of the Netherlands, Sweden and Switzerland. All of the established research economies' output in Geosciences increased between 2005 and 2014.

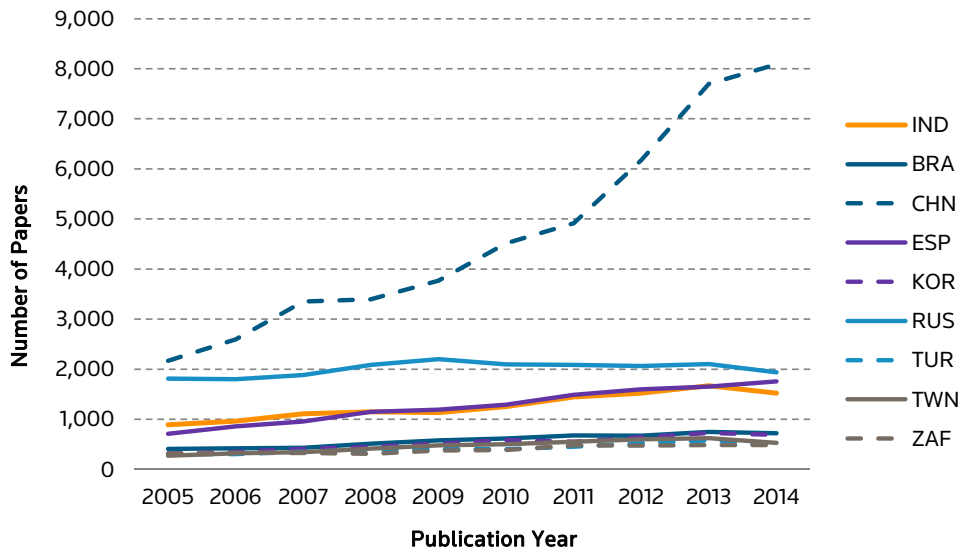


Figure 4.11.1-2 Number of papers, Geosciences, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India had a greater output of papers in Geosciences than most of the emerging research economies, with China, Russia, and Spain (2008-2013) being the exceptions. China's output increased by 273%, from 2,168 in 2005 to 8,087 in 2014. All of the emerging economies' output in Geosciences increased during the time period analysed.

Table 4.11.1-1 Number of papers, Geosciences, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Number of Papers		
	2005-2008	2009-2012	2013-2014
INDIA	4,115	5,343	3,188
<i>Established Research Economies</i>			
AUSTRALIA	5,730	7,413	4,647
CANADA	8,026	9,252	5,143
SWITZERLAND	3,248	4,496	2,550
GERMANY	11,203	14,218	7,970
ENGLAND	10,716	12,481	6,921
FRANCE	10,061	12,150	6,742
ITALY	6,493	8,595	4,625
JAPAN	7,915	8,545	4,443
NETHERLANDS	2,990	3,936	2,144
SWEDEN	2,133	2,676	1,593
USA	38,551	43,740	24,301
<i>BRICS and other emerging Research Economies</i>			
BRAZIL	1,766	2,535	1,467
CHINA	11,512	19,379	15,786
SPAIN	3,673	5,566	3,407
SOUTH KOREA	1,520	2,287	1,414
RUSSIA	7,573	8,447	4,039
TURKEY	1,347	1,777	1,059
TAIWAN	1,346	2,126	1,152
SOUTH AFRICA	1,278	1,712	971

4.11.2 SHARE OF WORLD OUTPUT, GEOSCIENCES

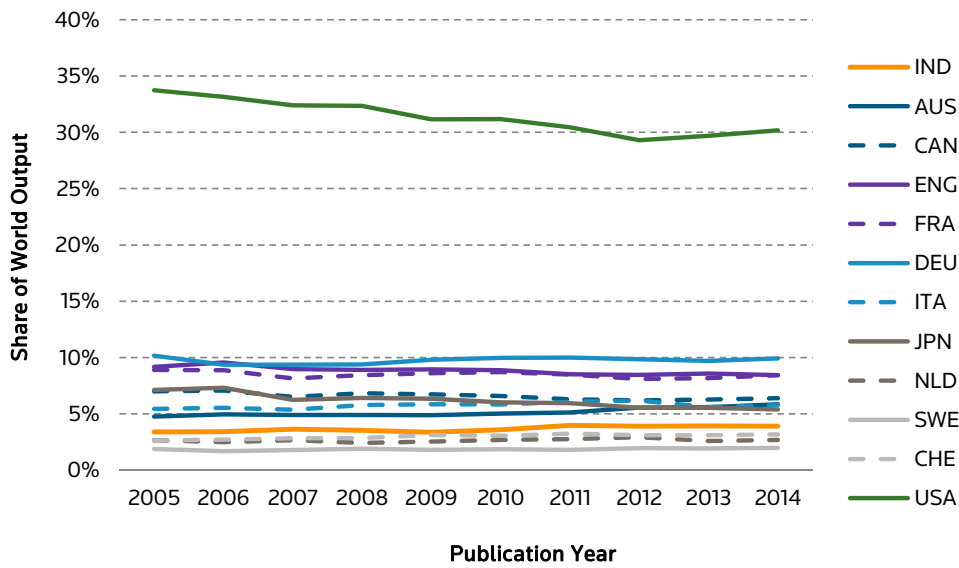


Figure 4.11.2-1 Share of world output, Geosciences, Established research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Geosciences increased from 3.39% in 2005 to 3.91% in 2014. India's share of output was greater than that of the Netherlands, Sweden and Switzerland. Australia, Italy, the Netherlands, Sweden and Switzerland's share of the world output in Geosciences increased, whereas the remaining established research economies' output decreased.

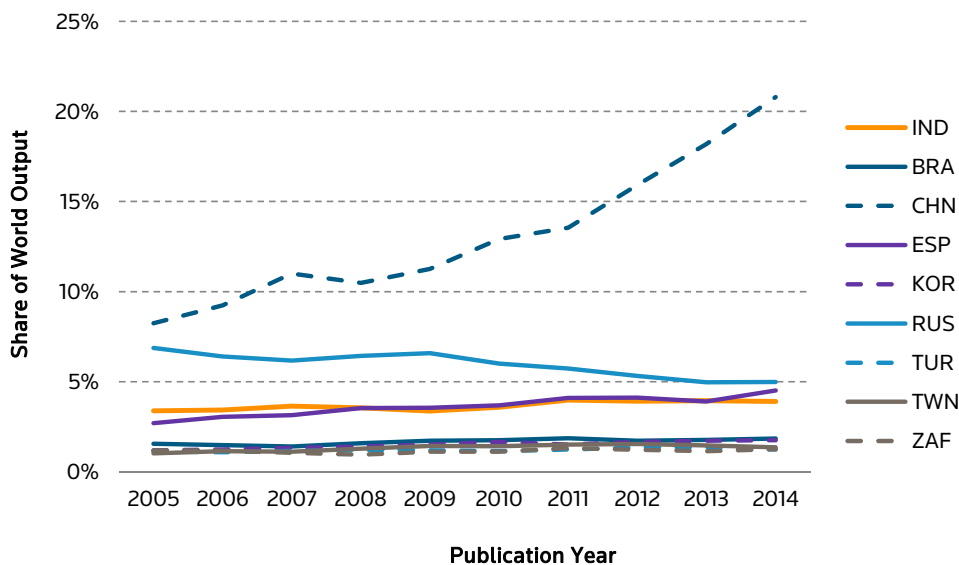


Figure 4.11.2-2 Share of world output, Geosciences, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

India's share of world output in Geosciences was greater than six out of nine emerging research economies, with China, Russia and Spain (2008-2013) being the exceptions. China's share of output increased from 8.24% in 2005 to 20.79% in 2014. With the exception of Russia, the emerging research economies' share of world output in Geosciences increased.

Table 4.11.2-1 Share of world output, Geosciences, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Share of World Output		
	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	3.51%	3.72%	3.92%
<i>Established Research Economies</i>			
<b>AUSTRALIA</b>	4.88%	5.16%	5.72%
<b>CANADA</b>	6.84%	6.45%	6.33%
<b>SWITZERLAND</b>	2.77%	3.13%	3.14%
<b>GERMANY</b>	9.55%	9.90%	9.81%
<b>ENGLAND</b>	9.13%	8.69%	8.52%
<b>FRANCE</b>	8.58%	8.46%	8.30%
<b>ITALY</b>	5.53%	5.99%	5.69%
<b>JAPAN</b>	6.75%	5.95%	5.47%
<b>NETHERLANDS</b>	2.55%	2.74%	2.64%
<b>SWEDEN</b>	1.82%	1.86%	1.96%
<b>USA</b>	32.86%	30.47%	29.92%
<i>BRICS and other emerging Research Economies</i>			
<b>BRAZIL</b>	1.51%	1.77%	1.81%
<b>CHINA</b>	9.81%	13.50%	19.43%
<b>SPAIN</b>	3.13%	3.88%	4.19%
<b>SOUTH KOREA</b>	1.30%	1.59%	1.74%
<b>RUSSIA</b>	6.46%	5.88%	4.97%
<b>TURKEY</b>	1.15%	1.24%	1.30%
<b>TAIWAN</b>	1.15%	1.48%	1.42%
<b>SOUTH AFRICA</b>	1.09%	1.19%	1.20%

4.11.3 NORMALISED CITATION IMPACT, GEOSCIENCES

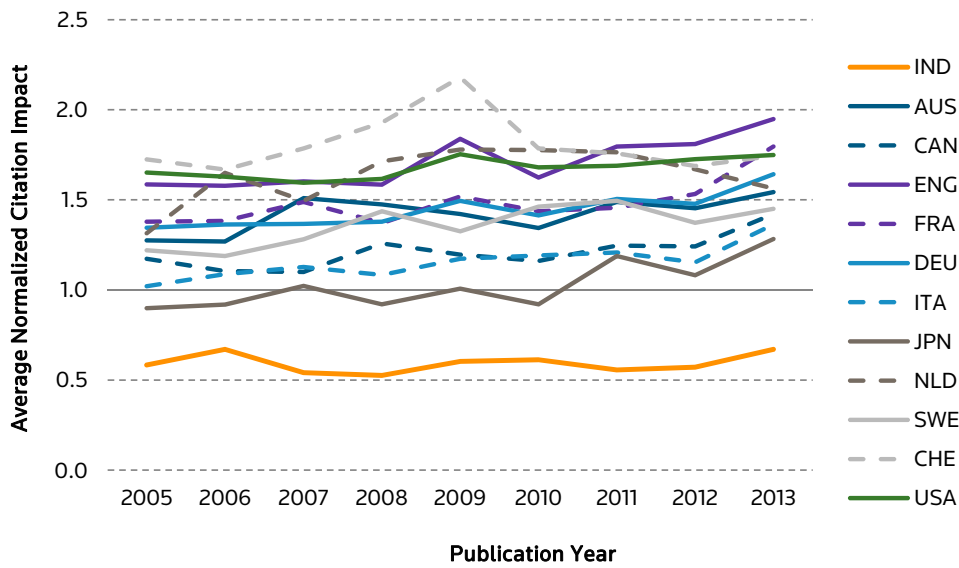


Figure 4.11.3-1 Normalised citation impact, Geosciences, Established research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Geosciences increased from 0.58 in 2005 to 0.67 in 2013. All of the established research economies' citation impact increased and were higher than the world average during 2005-2013, with the exception of Japan which had a citation impact lower than world average between 2005 and 2010.

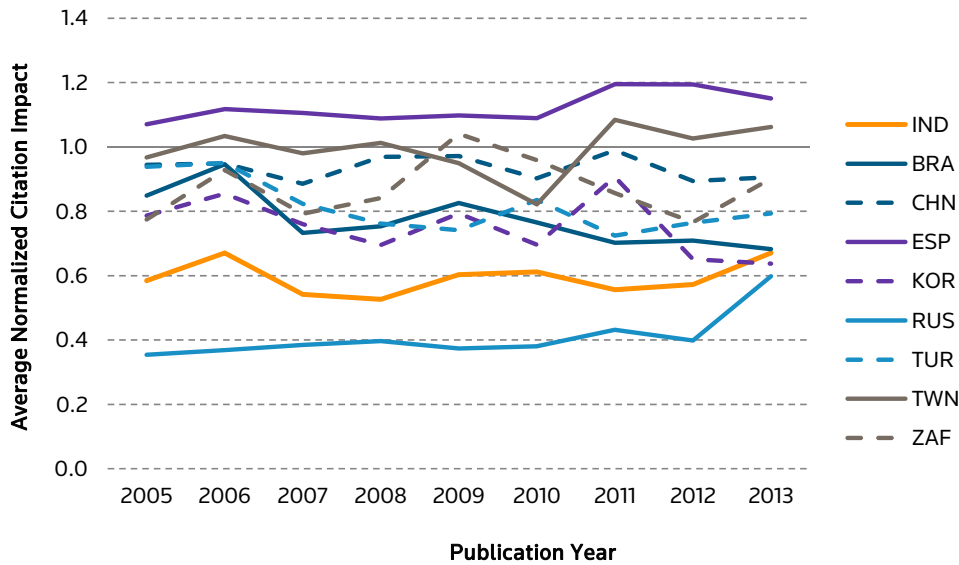


Figure 4.11.3-2 Normalised citation impact, Geosciences, BRICS and other emerging research economies  
Time period: 2005-2013, Source: Web of Science

India's citation impact in Geosciences was higher than that of Russia. Spain was the only emerging research economy consistently to have a citation impact higher than the world average. Between 2005 and 2013, Spain, Russia, Taiwan and South Africa's citation impact in Geosciences increased by 7.4%, 6.9%, 9.8% and 16.4% respectively, while the other emerging research economies' citation impact decreased.

**Table 4.11.3-1 Normalised citation impact, Geosciences, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Normalized Citation Impact		
	2005-2008	2009-2012	2013-2014
INDIA	0.58	0.58	0.67
<b>Established Research Economies</b>			
AUSTRALIA	1.39	1.43	1.54
CANADA	1.16	1.21	1.42
SWITZERLAND	1.79	1.84	1.74
GERMANY	1.36	1.47	1.64
ENGLAND	1.59	1.77	1.95
FRANCE	1.40	1.49	1.80
ITALY	1.08	1.18	1.36
JAPAN	0.94	1.05	1.28
NETHERLANDS	1.55	1.74	1.56
SWEDEN	1.29	1.41	1.45
USA	1.62	1.71	1.75
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	0.81	0.75	0.68
CHINA	0.94	0.93	0.91
SPAIN	1.10	1.15	1.15
SOUTH KOREA	0.77	0.75	0.64
RUSSIA	0.38	0.40	0.60
TURKEY	0.86	0.77	0.79
TAIWAN	1.00	0.98	1.06
SOUTH AFRICA	0.83	0.89	0.90



## 4.11.4 HIGHLY-CITED PAPERS BASED ON FOUR THRESHOLDS, GEOSCIENCES

Table 4.11.4-1 Highly-cited papers, Geosciences, All countries

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
<b>INDIA</b>	0.24%	1.77%	4.06%	11.69%	0.28%	1.89%	4.12%	11.83%	0.47%	2.57%	3.45%	10.60%
<b>Established Research Economies</b>												
AUSTRALIA	2.22%	7.80%	14.31%	32.04%	1.96%	8.34%	14.70%	32.82%	2.28%	8.28%	10.93%	23.80%
CANADA	1.31%	5.88%	11.25%	27.75%	1.60%	6.43%	11.74%	27.16%	1.77%	7.41%	10.09%	21.45%
SWITZERLAND	2.65%	11.67%	20.75%	43.17%	2.94%	10.77%	20.04%	42.06%	2.75%	10.35%	13.65%	29.22%
GERMANY	1.69%	7.55%	13.51%	32.90%	1.84%	8.10%	15.20%	33.65%	2.21%	8.81%	11.57%	25.13%
ENGLAND	2.13%	9.23%	16.55%	37.31%	2.54%	9.55%	17.84%	37.14%	2.62%	10.45%	13.42%	27.84%
FRANCE	1.38%	6.66%	13.34%	33.43%	1.83%	7.65%	14.64%	33.94%	2.25%	8.84%	11.35%	24.90%
ITALY	1.06%	4.88%	10.20%	27.03%	1.18%	5.62%	10.79%	27.56%	1.25%	6.34%	8.78%	20.76%
JAPAN	1.14%	4.08%	7.80%	20.23%	1.40%	5.39%	9.77%	22.87%	2.07%	6.91%	8.76%	17.96%
NETHERLANDS	2.81%	9.03%	16.19%	37.06%	3.30%	10.52%	18.98%	38.77%	2.66%	10.49%	13.57%	26.49%
SWEDEN	1.69%	6.61%	12.47%	32.63%	2.43%	8.15%	15.21%	32.59%	1.76%	7.22%	10.61%	24.17%
USA	1.91%	8.36%	15.77%	35.34%	2.06%	8.74%	15.89%	34.48%	1.89%	8.41%	10.97%	24.03%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	1.08%	4.02%	7.08%	17.61%	0.67%	2.84%	6.00%	15.31%	0.41%	2.45%	3.34%	10.29%
CHINA	1.20%	5.23%	9.95%	21.42%	1.02%	5.07%	9.30%	21.32%	1.01%	4.41%	5.82%	13.87%
SPAIN	0.82%	4.60%	10.07%	27.44%	1.24%	4.80%	9.92%	26.90%	1.47%	6.28%	8.34%	20.69%
SOUTH KOREA	0.72%	3.42%	6.71%	18.62%	0.96%	3.24%	6.60%	18.63%	0.78%	3.11%	4.31%	12.23%
RUSSIA	0.32%	1.33%	2.64%	7.24%	0.32%	1.48%	3.01%	7.00%	0.67%	2.57%	3.37%	8.34%
TURKEY	0.37%	2.52%	5.79%	17.37%	0.28%	2.59%	5.23%	15.25%	1.13%	3.40%	5.19%	11.99%
TAIWAN	0.67%	4.01%	10.40%	27.34%	1.41%	5.36%	9.69%	22.30%	0.61%	3.04%	4.43%	12.59%
SOUTH AFRICA	0.70%	3.29%	6.26%	19.64%	1.64%	5.14%	8.35%	19.92%	1.24%	6.18%	8.34%	17.61%

India's percentage of highly-cited papers in Geosciences was below the world average for all three time periods and thresholds: 1%, 5%, 10%, and 25%.

Of the established research economies, Japan's percentage of highly-cited papers was generally lower than the world average.

Of the emerging research economies, South Korea and Russia were the only two countries which did not have a percentage of highly-cited papers above the world average for any time period, or threshold.

4.11.5 PERCENTAGE OF INTERNATIONALLY COLLABORATIVE PAPERS, GEOSCIENCES

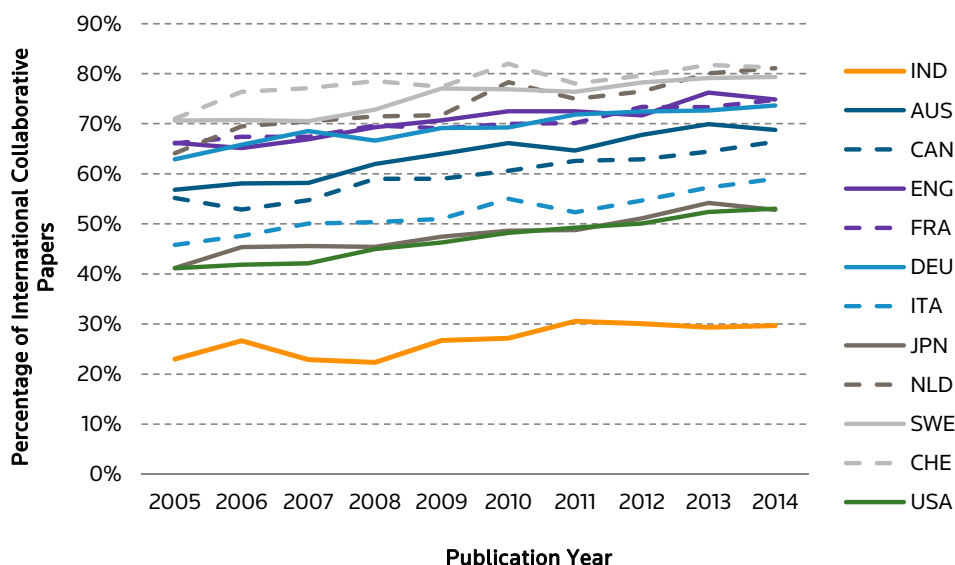


Figure 4.11.5-1 Percentage of internationally collaborative papers, Geosciences, Established research economies Time period: 2005-2014, Source: Web of Science

India's international collaboration rate in Geosciences increased from 23.01% in 2005 to 29.69% in 2014. Although India's percentage was lower than the established research economies, India's 29% increase in internationally collaborative papers was greater than any established research economies. Of all of the established research economies, Italy had the highest increase in international collaboration rate with 45.77% in 2005 and 58.99% in 2014.

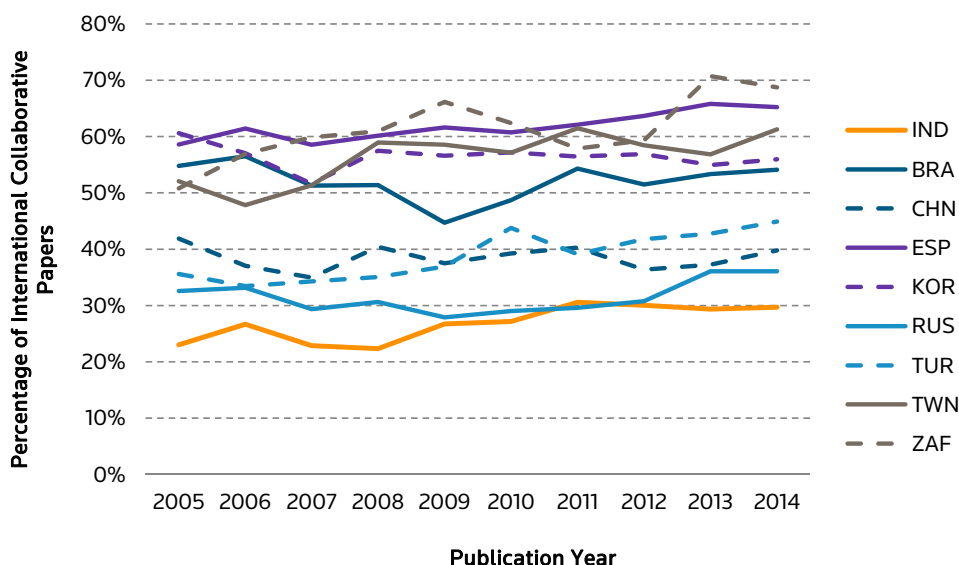


Figure 4.11.5-2 Percentage of internationally collaborative papers, Geosciences, BRICS and other emerging research economies Time period: 2005-2014, Source: Web of Science

India's percentage of internationally collaborative papers in Geosciences was generally the lowest of the emerging research economies between 2005 and 2014. However, India's 29% increase in internationally collaborative papers was second only to South Africa, which had a 35% increase.

**Table 4.11.5-1 Percentage of internally collaborative papers, Geosciences, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Percentage of Internationally Collaborative Papers			
Country	2005-2008	2009-2012	2013-2014
<b>INDIA</b>	23.65%	28.80%	29.52%
<b>Established Research Economies</b>			
<b>AUSTRALIA</b>	58.90%	65.76%	69.36%
<b>CANADA</b>	55.56%	61.29%	65.41%
<b>SWITZERLAND</b>	76.05%	79.23%	81.49%
<b>GERMANY</b>	66.03%	70.75%	73.14%
<b>ENGLAND</b>	66.94%	71.85%	75.57%
<b>FRANCE</b>	67.70%	70.68%	74.00%
<b>ITALY</b>	48.62%	53.30%	58.10%
<b>JAPAN</b>	44.43%	48.99%	53.54%
<b>NETHERLANDS</b>	69.00%	75.48%	80.55%
<b>SWEDEN</b>	71.26%	77.17%	79.22%
<b>USA</b>	42.61%	48.49%	52.68%
<b>BRICS and other emerging Research Economies</b>			
<b>BRAZIL</b>	53.34%	50.02%	53.72%
<b>CHINA</b>	38.34%	38.25%	38.53%
<b>SPAIN</b>	59.73%	62.13%	65.51%
<b>SOUTH KOREA</b>	56.45%	56.80%	55.45%
<b>RUSSIA</b>	31.36%	29.29%	36.07%
<b>TURKEY</b>	34.60%	40.46%	43.72%
<b>TAIWAN</b>	52.97%	58.94%	58.85%
<b>SOUTH AFRICA</b>	57.12%	61.10%	69.72%

4.11.6 AVERAGE JOURNAL IMPACT FACTOR, GEOSCIENCES

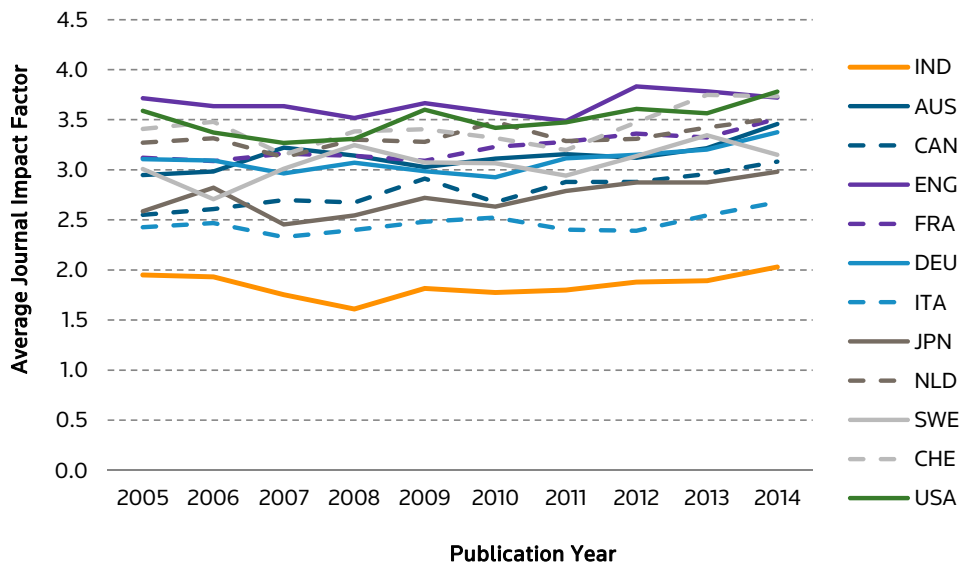


Figure 4.11.6-1 Percentage of internationally collaborative papers, Geosciences, Established research economies  
Time period: 2005-2014, Source: Web of Science

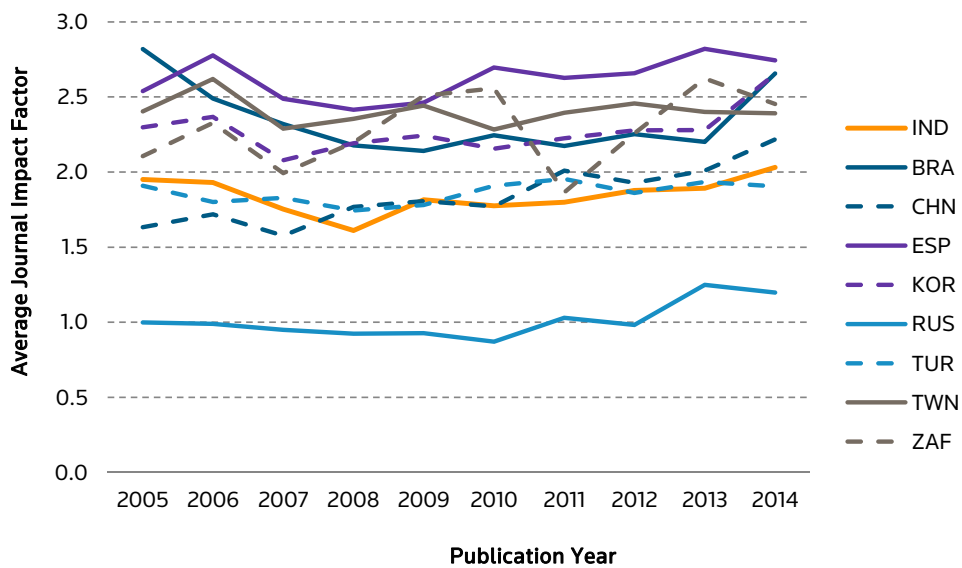


Figure 4.11.6-2 Percentage of internationally collaborative papers, Geosciences, BRICS and other emerging research economies  
Time period: 2005-2014, Source: Web of Science

**Table 4.11.6-1 Average Journal Impact Factor, Geosciences, All countries**  
 Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

Country	Average Impact Factor		
	2005-2008	2009-2012	2013-2014
INDIA	1.80	1.82	1.96
<b>Established Research Economies</b>			
AUSTRALIA	3.08	3.11	3.34
CANADA	2.64	2.84	3.02
SWITZERLAND	3.35	3.35	3.74
GERMANY	3.06	3.05	3.29
ENGLAND	3.62	3.64	3.75
FRANCE	3.13	3.24	3.42
ITALY	2.40	2.44	2.61
JAPAN	2.60	2.76	2.93
NETHERLANDS	3.25	3.34	3.47
SWEDEN	3.01	3.06	3.25
USA	3.38	3.53	3.67
<b>BRICS and other emerging Research Economies</b>			
BRAZIL	2.43	2.20	2.43
CHINA	1.68	1.89	2.11
SPAIN	2.54	2.62	2.78
SOUTH KOREA	2.22	2.23	2.47
RUSSIA	0.96	0.95	1.22
TURKEY	1.81	1.88	1.92
TAIWAN	2.41	2.40	2.40
SOUTH AFRICA	2.16	2.26	2.54

India's average Journal Impact Factor in Geosciences was lower than all of the established research economies for all three time periods. However, India's average Journal Impact Factor in Geosciences was higher than that of China and Turkey between 2005 and 2008. It was also higher than Russia's average Journal Impact Factor for all three time periods.

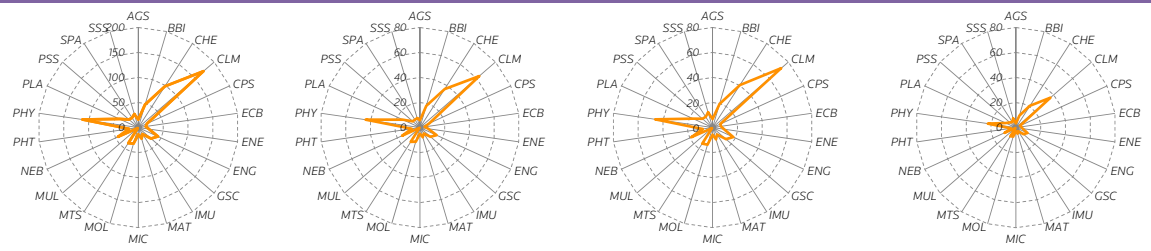
## CHAPTER 5. RESEARCH FOOTPRINT ANALYSIS

This Chapter presents the Research Footprint Analysis for India and its chosen comparator countries. The goal of this analysis is to show the output of papers published in each of the 22 Essential Science Indicators fields for each country, and thereby indicate the countries research focus. The publication years have been aggregated into the following time periods: 2005-2014, 2005-2008, 2009-2012, and 2013-2014.

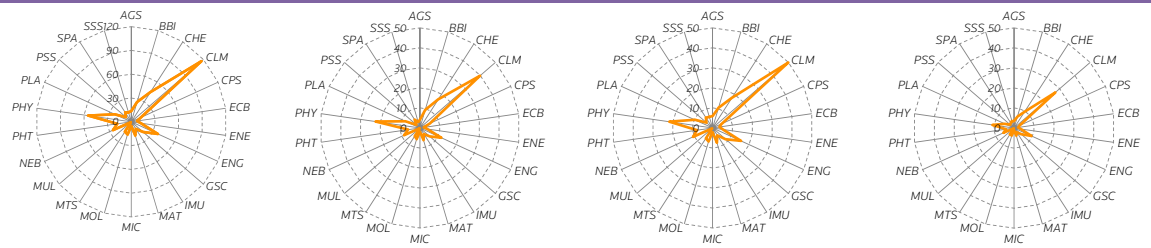
**Table 5-1 Research Footprint, All Countries**  
 Time period: 2005-2014, 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science



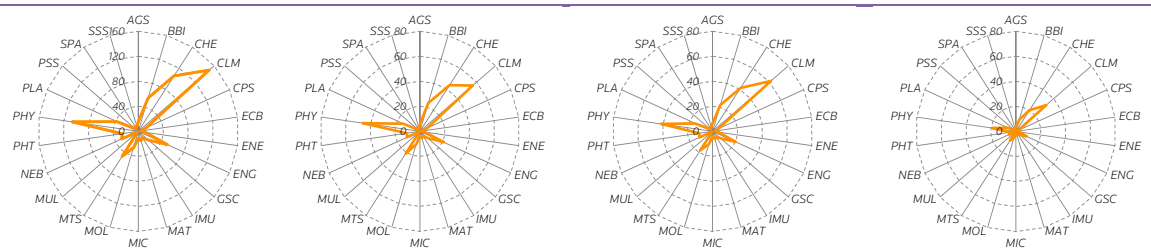
**GERMANY**



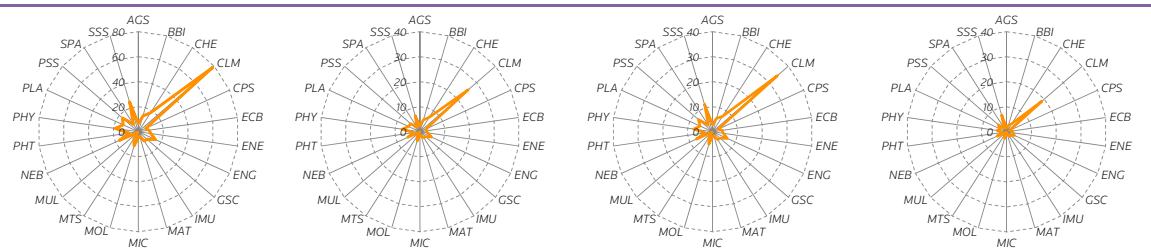
**ITALY**



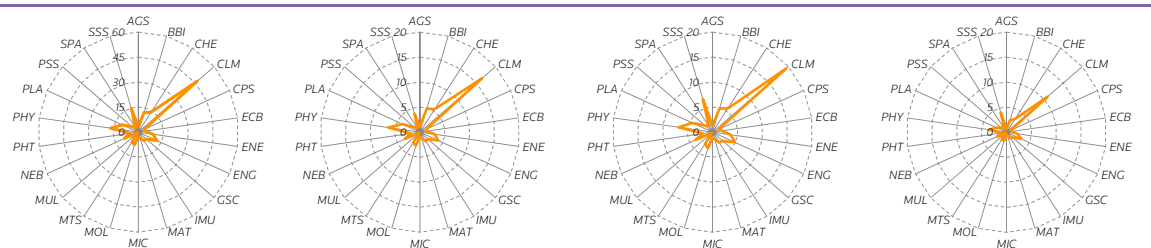
**JAPAN**



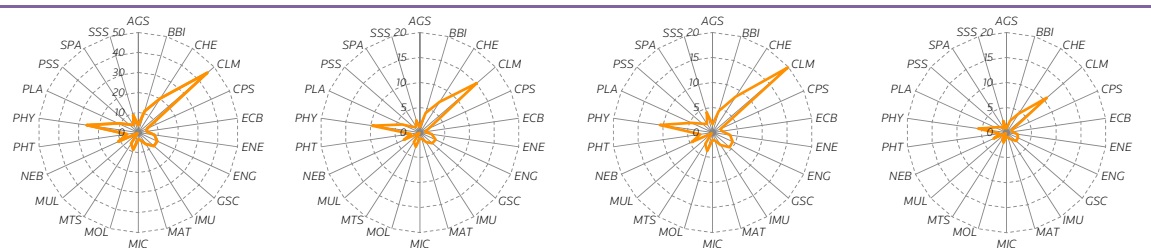
**NETHERLANDS**



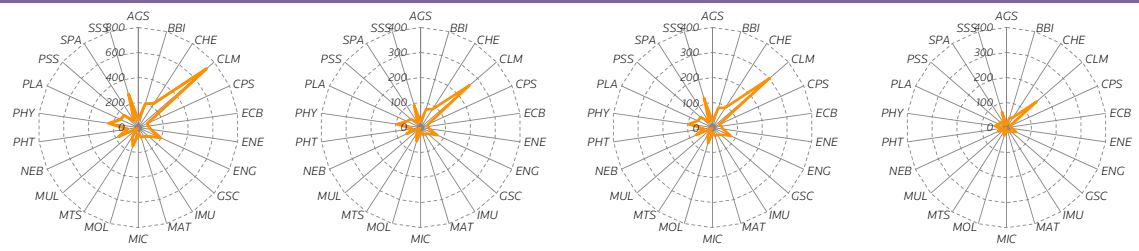
**SWEDEN**



**SWITZERLAND**

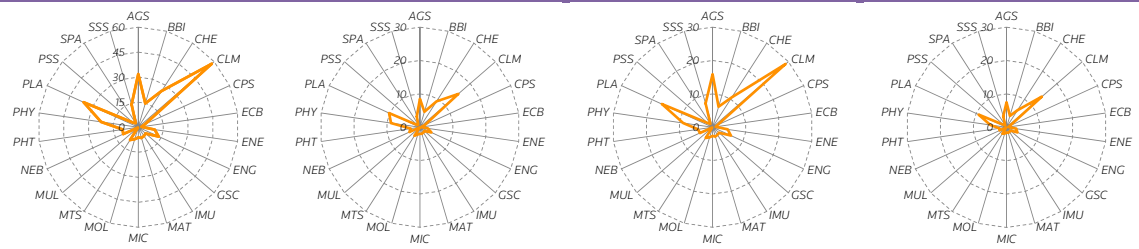


**USA**

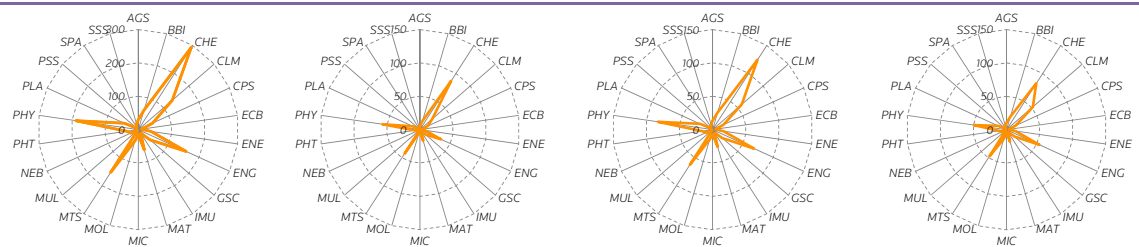


**BRICS and other Emerging Research Economies**

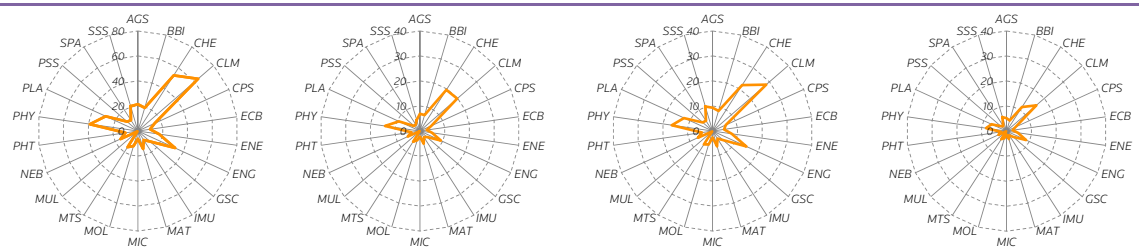
**BRAZIL**



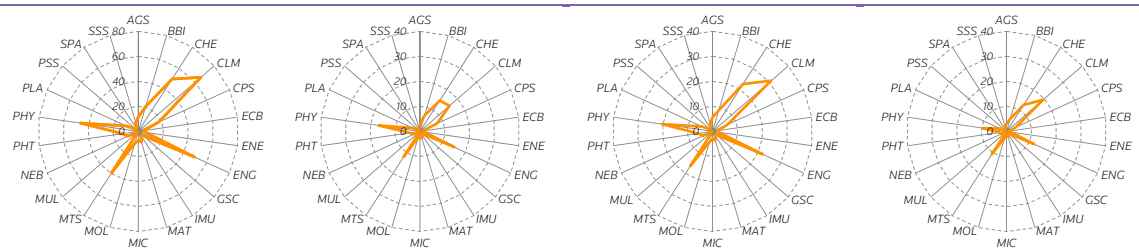
**CHINA**



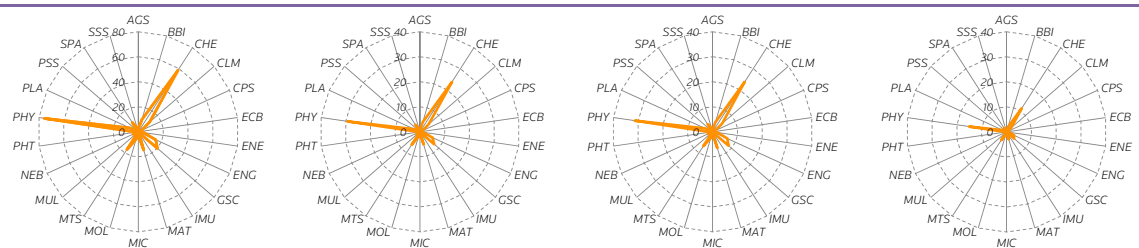
**SPAIN**



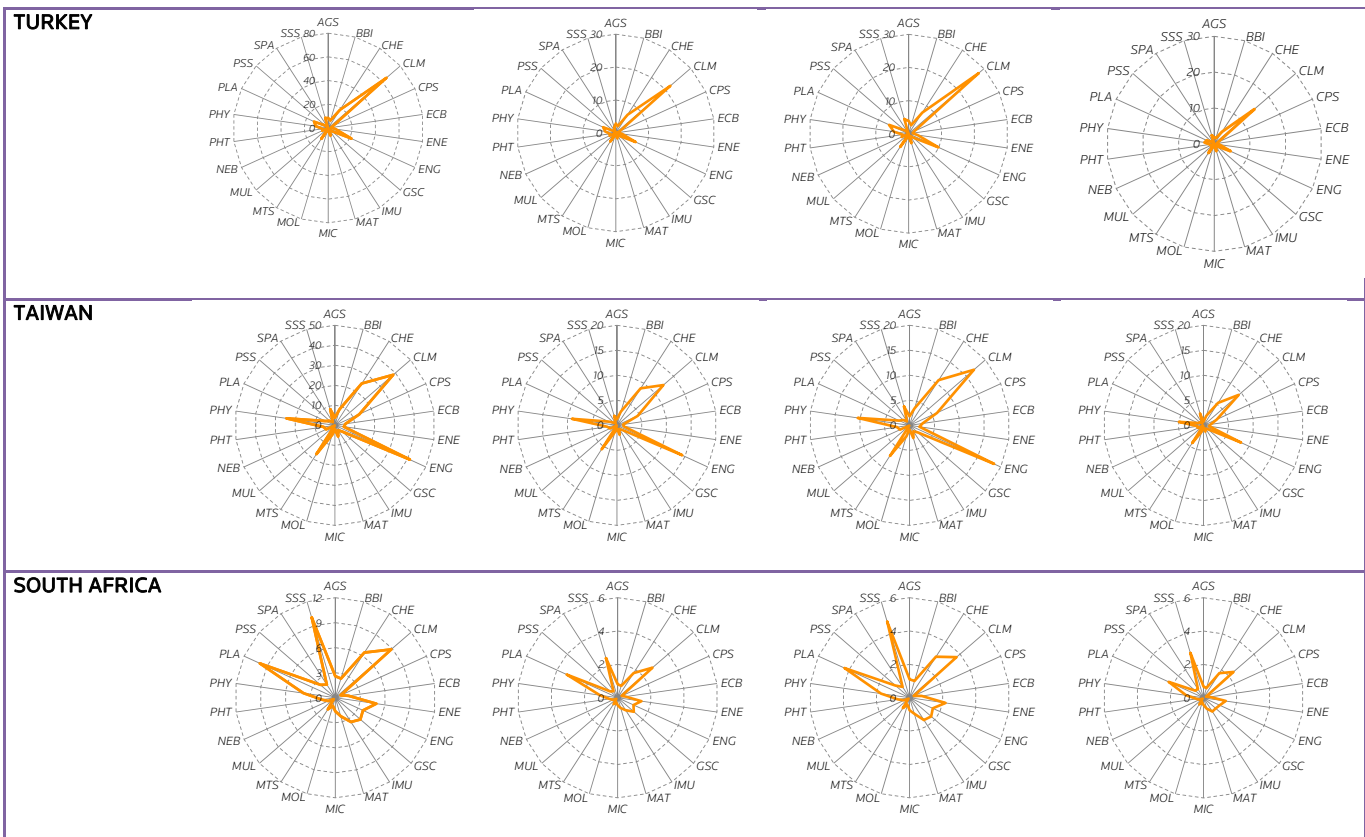
**SOUTH KOREA**



**RUSSIA**







The Research Footprints in Table 5-1 show several trends:

- Between 2005 and 2014, India published more papers in Chemistry, Clinical Medicine, Physics, Engineering, and Materials Science than in other fields. This publication trend is different to that of the established research economies.
- During this time period all of the established research economies produced their highest output of papers in Clinical Medicine. Chemistry and Physics were among the top four fields of publication for a number of established research countries including France, Germany, Italy, Japan, Switzerland and the USA.
- Clinical Medicine was also the largest field of publication for a number of emerging economies including Brazil, South Korea, and Spain.
- In general, the research focus of the emerging economies was more varied than that of the established research economies. For example, Brazil focused on Clinical Medicine, Agricultural Sciences, and Plant & Animal Science, whereas Russia focused on Chemistry and Physics, and China focused on Chemistry, Physics, Engineering, and Materials Science.
- Research focus, as indicated by the number of publications in an Essential Science Indicators category, did not significantly change between the time periods analysed. Both the established and emerging research economies showed a greater output of research in 2009-2012 compared with 2005-2008.

## CHAPTER 6. SWOT ANALYSIS

In this Chapter, we evaluate the relative Strengths, Weaknesses, Opportunities and Threats for India's research output by examining both India's relative share of output and Normalised citation impact in each of the 22 Essential Science Indicators fields.

In Figures 6-1, 6-2 and 6-3, the share output relative to the world (shown on the X-axis) is calculated by dividing the percentage of India's research in each field by the percentage of papers in that field. It therefore indicates whether India produces relatively more or less research in each field than the global average. The global average is equal to 1.0 on the X-axis. The average on the Y-axis is set as India's overall average citation impact, which varies in different time periods.

It is important to note that for the analysis presented in Figure 6-3 only papers published in 2013 were used, since Normalised Citation Impact for 2014 is not available due to the absence of 2014 baseline:

- Fields in the top right quadrant of the Figure represent research **Strengths**. These are the areas having higher than India's average and with large share of institutional research output.
- Fields in the bottom left quadrant of the Figure represent areas of **Weaknesses**. These fields had a citation impact lower than India's average. At the same time, these fields do not form a significant part of the national research portfolio.
- Fields in the top left quadrant of the Figure represent **Opportunities**. These are areas which had higher than India's average, but with a lower share of national research portfolio. These areas are opportunities for India to take advantage of currently high performing areas to develop further strengths.
- Fields in the bottom right quadrant of the Figure represent areas of **Threats**. These fields had a citation impact lower than India's average, but form significant parts of the national research portfolio, suggesting that resources allocated in this area are not yielding the desired impacts.

In general, India's citation impact in all Essential Science Indicators fields increased over the period 2005 to 2013. India's citation impact in the majority of Essential Science Indicators fields is about half the world average for all three time periods:

- India's relative Strengths were in Chemistry (CHE), Physics (PHY), Engineering (ENG) and Materials Science (MTS) for all three time periods. Pharmacology & Toxicology (PHT) changed from being Strengths to Threats since the citation impact in this field decreased and dropped below India's average after 2009.
- Agricultural Sciences (AGS) was always considered a threat since it formed a substantial part of India's total research output, with relatively lower citation impact.
- Microbiology (MIC) changed from a weakness in 2005-2008 (Figure 6-1) to a threat in 2009-2012 (Figure 6-2) since India's relative share of output in this field increased. Plant & Animal Science (PLA) changed from being a threat to a weakness since India's relative share of output in this field decreased.
- Mathematics changed from being a weakness in 2005-2008 (Figure 6-1) to an opportunity after 2009 (Figures 6-2 and 6-3), since the citation impact in this field increased over the time period.
- Computer Science (CPS) changed from being an opportunity in 2005-2008 and 2009-2012 (Figures 6-1 and 6-2) to a weakness since the citation impact in this field decreased and dropped below India's average in 2013 (Figure 6-3).
- Economics & Business (ECB) became an opportunity in 2013 (Figure 6-3) with substantially increased citation impact during the time period analysed.

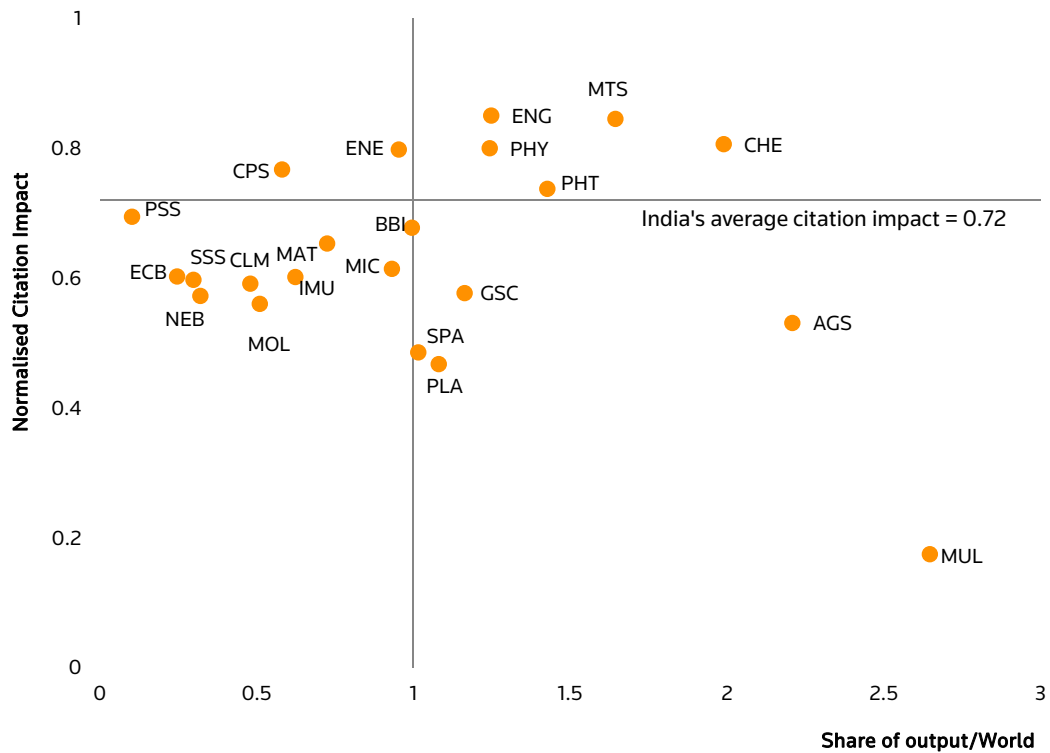


Figure 6-1 Relative Strengths, Weaknesses, Opportunities and Threats by Essential Science Indicators fields, India (with India baseline), Time period: 2005-2008 in aggregate, Source: Web of Science

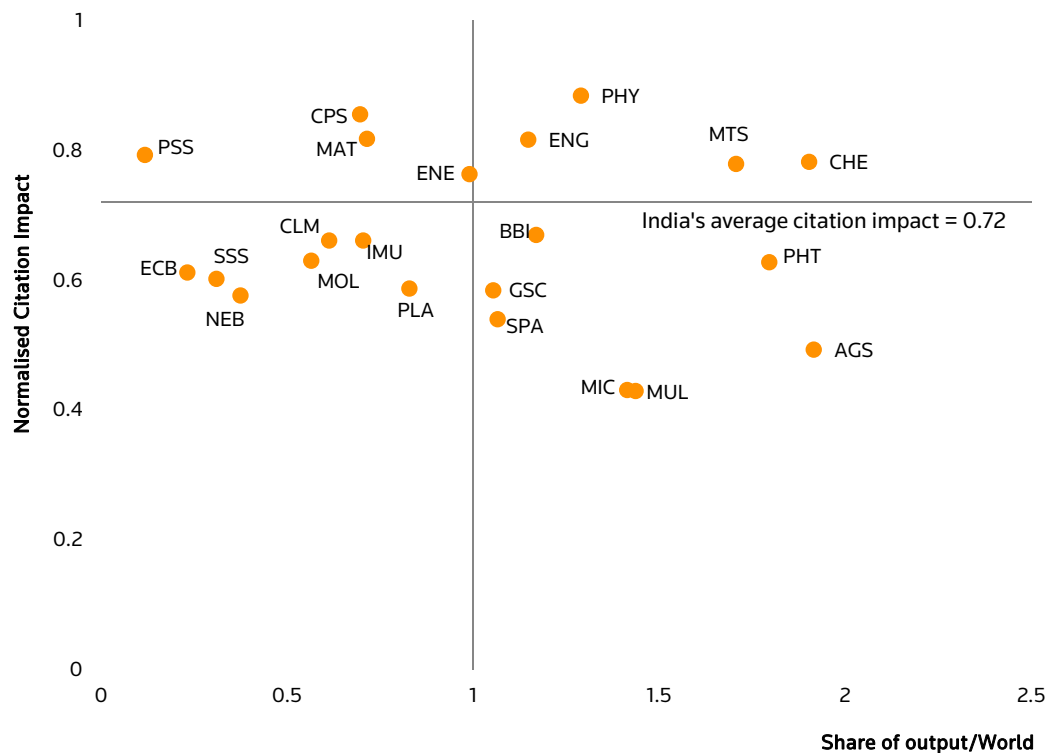


Figure 6-2 Relative Strengths, Weaknesses, Opportunities and Threats by Essential Science Indicators fields, India (with India baseline), Time period: 2009-2012 in aggregate, Source: Web of Science

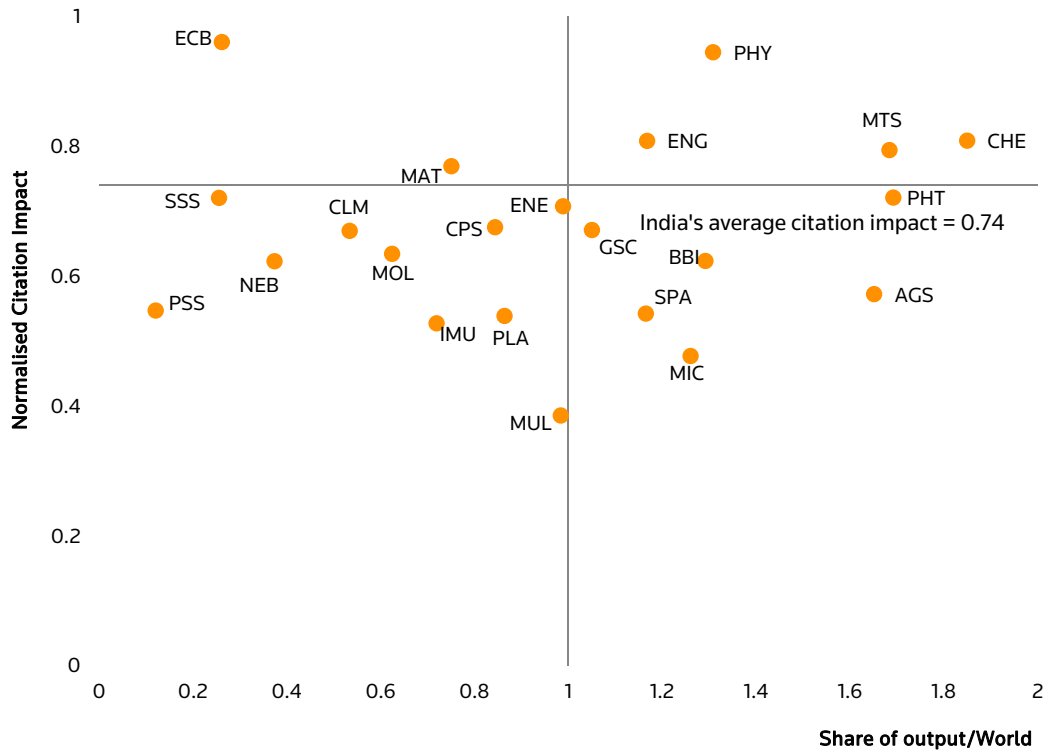
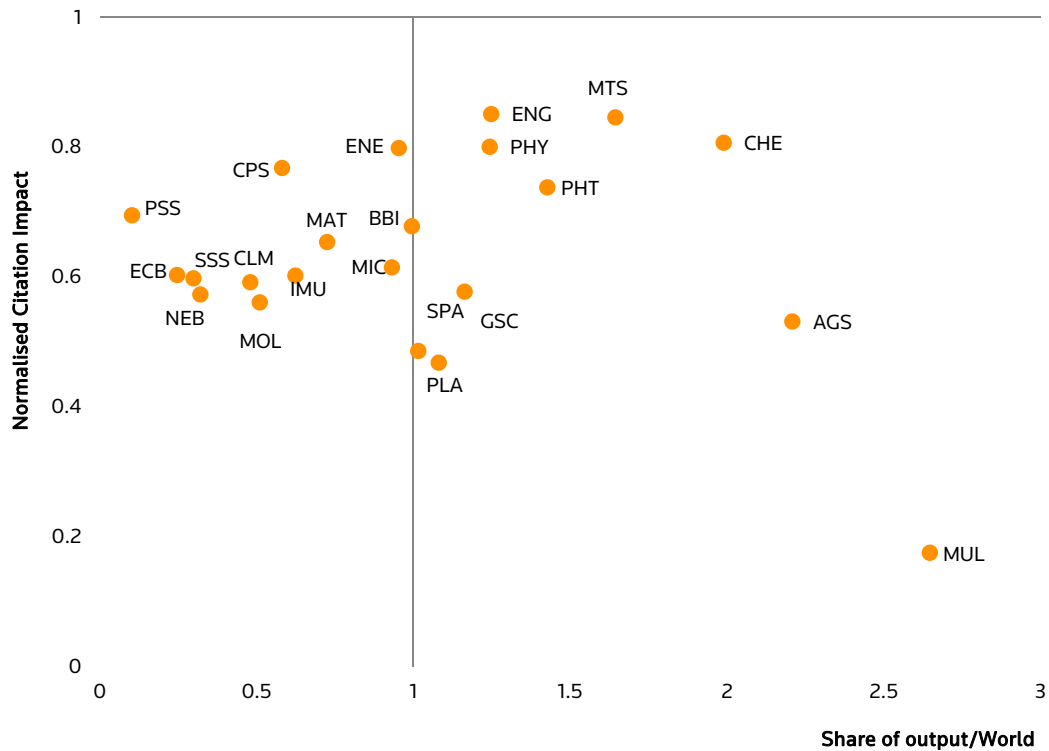


Figure 6-3 Relative Strengths, Weaknesses, Opportunities and Threats by Essential Science Indicators fields, India (with India baseline), Time period: 2013, Source: Web of Science

In addition, similar SWOT analysis was conducted based on upon global citation baseline, shown in Figure 6-3, 6-4 and 6-5. Being in the global context, none of India’s ESI fields were strengths or opportunities, in any time period.

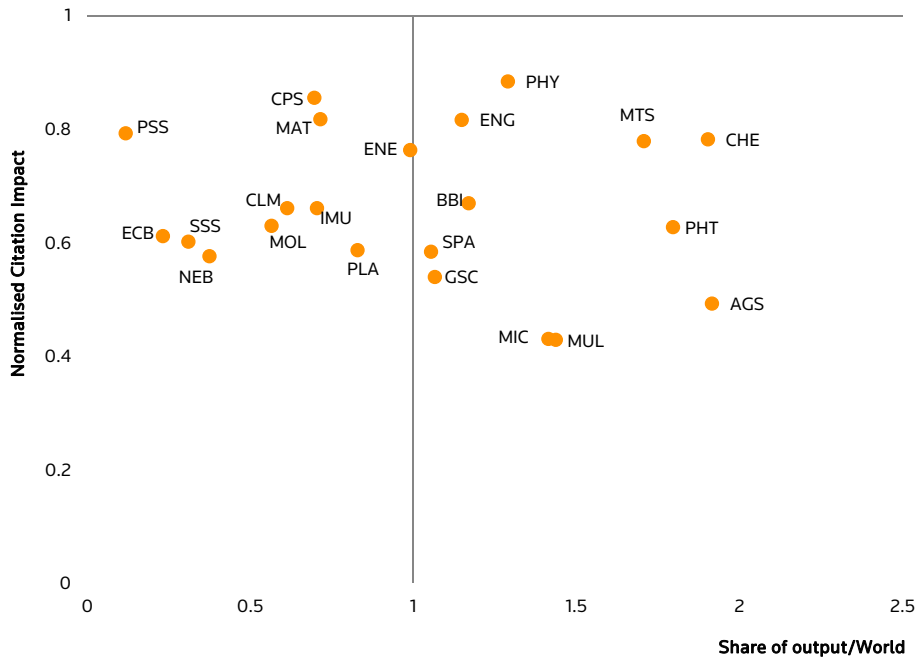


**Figure 6-4 Relative Strengths, Weaknesses, Opportunities and Threats by Essential Science Indicators fields, India(with global baseline), Time period: 2005-2008 in aggregate, Source: Web of Science**

As show in Figure 6-4, India had a citation impact greater than or equal to half the world average (0.5) in 19 of the 22 ESI fields between 2005 and 2008. That this, India’s citation impact for the majority of ESI fields is about half the world average. The three fields with citation impact below 0.5 were Space Science (SPA), Plant & Animal Science (PLA), and Multidisciplinary and these were threats during this time period.

In 17 out of the 22 ESI fields, India had a citation impact between 0.5 and 0.8. Engineering (ENG) and Materials Science (MTS) were the only two fields which had citation impact greater than 0.8, and both were threats during this time period.

In 10 out of the 22 ESI fields, India had a relative share of output above the world average (i.e. greater than 1). From 2005 to 2008, the three fields in which India published most research was Chemistry (CHE), Physics (PHY) and Engineering (ENG) (see Figure 6.1). While India’s share of output in these fields was greater than what would be expected based on world averages, the citation impact of these papers was below world average. Therefore Chemistry, Physics, and Engineering were threats.



**Figure 6-5 Relative Strengths, Weaknesses, Opportunities and Threats by Essential Science Indicators fields, India (with global baseline), Time period: 2009-2012 in aggregate, Source: Web of Science**

As in Figure 6-5, India had a citation impact higher or equal to 0.5. in 19 out of 22 ESI fields between 2009 and 2012. The fields with a citation impact below this level were Multidisciplinary (MUL), Agricultural Sciences (AGS), and Microbiology (MIC). Microbiology (MIC) changed from a weakness in 2005-2008 (Figure 6.1) to a threat in 2009-2012 (Figure6.2) since India’s relative share of output in this field increased. Plant & Animal Science (PLA) changed from being a threat to a weakness since Indi’s relative share in this field decreased.



**Figure 6-6 Relative Strengths, Weaknesses, Opportunities and Threats by Essential Science Indicators fields, India (with global baseline), Time period: 2013, Source: Web of Science**

Similar to the data for 2009-2012, India have a citation impact higher than or equal to 0.5 in 20 out of 22 ESI fields. In 2013, Economics & Business (ECB) was very close to being an opportunity and Physics (PHY) was very close to being a strength.

## CHAPTER 7. FUNDING ACKNOWLEDGEMENT ANALYSIS

This Chapter analyses India's research funding, using data from the funding acknowledgement sections of research papers published between 2005 and 2014. The total percentage of papers that acknowledged any funding is presented with publication data aggregated in three time periods: 2005-2008, 2009-2012, and 2013-2014.

Thomson Reuters started indexing Funding Acknowledgement information in Web of Science only since the mid-2008. Therefore, only a small proportion of 2008 publications include funding acknowledgement for this part of the analysis. For this reason, the number of funded papers for 2005-2008 should be used with caution and should not be compared with other time periods.

Further analysis of the 25 most frequent funders was performed by examining the top 100 most highly-cited papers. This is defined as the highest percentile<sup>8</sup> of citations, taking into account journal categories and publications year.

### 7.1 PROPORTION OF PAPERS WITH FUNDING ACKNOWLEDGEMENT

**Table 7.1-1 Proportion of papers with funding acknowledgement, India, All fields**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate, Source: Web of Science

2005-2008	2009-2012	2013-2014
5.1%	47.7%	55.6%

There were 407,276 papers attributed to India from 2005 to 2014 in the dataset used. Of these, 149,586 papers acknowledged funding which are primarily from papers published between 2008 and 2014.

The acknowledgement of funding has increased over the time period analysed. Between 2009 and 2012, 47.7% of papers acknowledged funding, whereas papers from the period 2013 to 2014 acknowledged funding 55.6% of the time.

<sup>8</sup> Since the percentile rankings of the 100<sup>th</sup> to 118<sup>th</sup> papers were equal, 118 papers were used in this analysis.

## 7.2 TOP 25 MOST FREQUENT FUNDERS AMONG TOP 100 MOST HIGHLY-CITED PAPERS

**Table 7.2-1 Top 25 most frequent funder among top 100 most highly-cited papers, India, All fields**  
Time period: 2005-2014, Source: Web of Science

Top 25 funder	Number of highly-cited papers funded
Department of Science and Technology, India	24
National Science Foundation, USA	22
U.S. Department of Energy	15
Council of Scientific and Industrial Research, India	15
National Natural Science Foundation of China	12
Fed Ministry of Education & Research (BMBF), Germany	11
German Research Foundation	11
National Council for Science and Technology Development (CNPq), Brazil	11
European Union	11
Pfizer	11
National Institute Health, USA	11
Italy Institute for Nuclear Physics (INFN)	10
Sao Paulo Research Foundation (FAPESP), Brazil	10
Science & Technology Facilities Council, UK	10
French Atomic Energy Commission	9
Bristol-Myers Squibb	9
Bill and Melinda Gates Foundation	9
Alfred P. Sloan Foundation	8
Novartis	8
National Council for Science and Technology (CONACyT), Mexico	8
GlaxoSmithKline	8
Chinese Academy of Sciences	7
Ministry of Education and Science, Spain	7
Sanofi-Aventis	7
European Commission	7

The top five of the 25 most frequent funders for these top cited papers are from India and the USA. These top five organisations partially funded 76% of these highly-cited papers. Funders from the USA, Europe, China, Brazil and Mexico primarily derive from collaboration with groups in these regions.

The most frequent industrial funders are international pharmaceutical companies: Pfizer, Bristol-Myers Squibb, Novartis, GlaxoSmithKline, and Sanofi-Aventis. Together these organisations partially funded 36% of these highly-cited papers.

Funding also came from foundations such as the Alfred P. Sloan Foundation and the Bill and Melinda Gates Foundation. These two foundations were responsible for partially funding 14% of these highly-cited papers.



## CHAPTER 8. COLLABORATION ANALYSIS

This Chapter analyses India's international collaborative research and inter-institutional collaboration among 289 of its institutions.

An overall analysis by total number of collaborative papers published by India and its 20 most frequent collaborating countries is presented first, with publication data aggregated into three time periods: 2005-2008, 2009-2012, and 2013-2014. Further analysis of international collaboration within Essential Science Indicators subject categories is provided, including the number, proportion and recency<sup>9</sup> of collaborative papers between India and other countries, as well as other institutions outside of India.

### 8.1 INTERNATIONAL COLLABORATION ANALYSIS, ALL FIELDS

**Table 8.1-1 Top 20 Collaborating Countries, India, All fields**

Time period: Integrated as 2005-2008, 2009-2012, 2013-2014; Source: Web of Science

Collaborating Country	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
USA	8,276	6.67%	12,549	7.02%	7,810	7.47%
GERMANY	3,453	2.78%	4,780	2.67%	2,824	2.70%
ENGLAND	2,417	1.95%	3,912	2.19%	2,620	2.51%
SOUTH KOREA	1,827	1.47%	3,484	1.95%	2,426	2.32%
FRANCE	1,992	1.61%	3,347	1.87%	1,961	1.88%
JAPAN	2,411	1.94%	2,947	1.65%	1,756	1.68%
CHINA	1,330	1.07%	2,259	1.26%	1,807	1.73%
CANADA	1,263	1.02%	2,334	1.31%	1,459	1.40%
AUSTRALIA	1,082	0.87%	2,117	1.18%	1,608	1.54%
ITALY	1,039	0.84%	2,101	1.18%	1,554	1.49%
SPAIN	646	0.52%	1,682	0.94%	1,323	1.27%
TAIWAN	849	0.68%	1,439	0.81%	997	0.95%
SWITZERLAND	837	0.67%	1,347	0.75%	1,021	0.98%
MALAYSIA	525	0.42%	1,495	0.84%	950	0.91%
RUSSIA	793	0.64%	1,289	0.72%	854	0.82%
NETHERLANDS	685	0.55%	1,277	0.71%	892	0.85%
BRAZIL	597	0.48%	1,198	0.67%	910	0.87%
SAUDI ARABIA	123	0.10%	1,088	0.61%	1,303	1.25%
SWEDEN	584	0.47%	1,044	0.58%	854	0.82%
POLAND	530	0.43%	1,072	0.60%	821	0.79%

India's 20 most frequent collaborators includes all but two of the comparator countries (South Africa and Turkey) chosen for analysis in CHAPTER 4. Of India's 10 most frequent collaborators, only two (South Korea and China) were in the emerging research economies group.

India's three most frequent collaborators for all three time periods were the USA, Germany and England. India's collaboration with the USA and England increased between 2005-2008 and 2013-2014, as indicated by the increase in proportion of collaborative papers between the countries. India's collaboration with Germany decreased slightly between 2005-2008 and 2009-2012, but increased in the period 2013-2014.

<sup>9</sup> Recency is the 'average' year of collaborative papers between India and the collaborating countries. It is calculated by averaging the publications year of collaborative papers between India and each collaborating partner, the higher value the more recently these collaborative papers have published, and vice versa.

## 8.2 INTERNATIONAL COLLABORATION ANALYSIS, BY ESSENTIAL SCIENCE INDICATORS FIELD

### 8.2.1 INTERNATIONAL COLLABORATION IN CHEMISTRY

**Table 8.2.1-1 Top 10 collaborating countries, Chemistry, India**

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	1,019	3.52%	2006.6	1,428	3.78%	2010.6	807	3.53%	2013.5
GERMANY	835	2.88%	2006.6	911	2.41%	2010.4	421	1.84%	2013.6
SOUTH KOREA	315	1.09%	2006.9	692	1.83%	2010.7	536	2.35%	2013.6
JAPAN	407	1.40%	2006.5	463	1.23%	2010.5	277	1.21%	2013.5
MALAYSIA	276	0.95%	2006.8	629	1.66%	2010.4	236	1.03%	2013.5
ENGLAND	388	1.34%	2006.6	435	1.15%	2010.5	245	1.07%	2013.6
FRANCE	285	0.98%	2006.6	429	1.14%	2010.6	259	1.13%	2013.5
SPAIN	220	0.76%	2006.4	336	0.89%	2010.5	270	1.18%	2013.5
ITALY	175	0.60%	2006.6	309	0.82%	2010.5	214	0.94%	2013.6
TAIWAN	182	0.63%	2006.6	285	0.75%	2010.5	204	0.89%	2013.6

India's most frequent collaborator in Chemistry across all three time periods was the USA. India's collaboration with Germany decreased over the time periods analysed. From 2005-2012 Germany was the second most frequent collaborator, but in 2013-2014 it moved into third place. Malaysia is the only country not included in the comparator countries chosen for analysis in CHAPTER 4.

The average recency for India's 10 most frequent collaborators in Chemistry from 2005-2008 was 2006.6, for 2009-2012 it was 2010.5, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Chemistry with its top collaborators.

**Table 8.2.1-2 Top 10 collaborating institutions outside of India, Chemistry, India**

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Univ Sains Malaysia	248	0.86%	412	1.09%	70	0.31%
CNRS	188	0.65%	267	0.71%	143	0.63%
Howard Univ	189	0.65%	288	0.76%	52	0.23%
Darmstadt Univ Technol	155	0.53%	266	0.70%	5	0.02%
Univ Reading	114	0.39%	133	0.35%	43	0.19%
King Saud Univ	9	0.03%	105	0.28%	165	0.72%
Univ Barcelona	97	0.33%	84	0.22%	47	0.21%
Natl Univ Sci & Technol South Korea	69	0.24%	98	0.26%	56	0.25%
Keene State Coll	43	0.15%	131	0.35%	16	0.07%
Max Planck Society	55	0.19%	57	0.15%	53	0.23%

India's top institutional collaborator in Chemistry was Universiti Sains Malaysia, from 2005 to 2012. However, from 2013 to 2014 King Saud University became the top collaborator in this field. The collaboration with King Saud University has greatly increased since 2005-2008, when it was India's tenth most frequent institutional collaborator.

## 8.2.2 INTERNATIONAL COLLABORATION IN PHYSICS

**Table 8.2.2-1 Top 10 collaborating countries, Physics, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	1,599	10.74%	2006.5	2,083	10.66%	2010.7	1,225	10.98%	2013.5
GERMANY	1,129	7.58%	2006.6	1,619	8.28%	2010.7	905	8.11%	2013.5
FRANCE	721	4.84%	2006.6	1,232	6.30%	2010.7	676	6.06%	2013.5
SOUTH KOREA	630	4.23%	2006.7	1,044	5.34%	2010.7	605	5.42%	2013.4
RUSSIA	602	4.04%	2006.5	892	4.56%	2010.8	563	5.05%	2013.5
JAPAN	792	5.32%	2006.5	755	3.86%	2010.5	483	4.33%	2013.5
ENGLAND	495	3.33%	2006.6	908	4.65%	2010.7	596	5.34%	2013.5
CHINA	571	3.84%	2006.5	767	3.92%	2010.8	545	4.89%	2013.5
ITALY	373	2.51%	2006.6	784	4.01%	2010.8	593	5.32%	2013.5
POLAND	349	2.34%	2006.5	591	3.02%	2010.8	495	4.44%	2013.5

India's two most frequent collaborators in Physics for all three time periods were the USA and Germany. India's collaboration with France increased between 2005 and 2014. In 2005-2008, France was the fourth most frequent collaborator, and by 2013-2014 it had moved into third place.

The average recency of collaboration for top 10 collaborating countries in Physics from 2005-2008 was 2006.6, for 2009-2012 it was 2010.7, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Physics with its top collaborators.

**Table 8.2.2-2 Top 10 collaborating institutions outside of India, Physics, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
US Dept Energy	444	2.98%	864	4.42%	596	5.34%
CNRS	445	2.99%	854	4.37%	528	4.73%
Inst High Energy Physics - IHEP	390	2.62%	617	3.16%	411	3.69%
ATOMIC ENER ALT ENER COMMISSION	287	1.93%	629	3.22%	418	3.75%
Alikhanov Inst Theoret & Expt Phys	330	2.22%	538	2.75%	400	3.59%
Joint Inst Nucl Res	281	1.89%	509	2.60%	370	3.32%
Russian Acad Sci	233	1.57%	502	2.57%	424	3.80%
Korea Univ	359	2.41%	469	2.40%	263	2.36%
Ist Nazl Fis Nucl	144	0.97%	494	2.53%	452	4.05%
Univ Chicago	244	1.64%	480	2.46%	336	3.01%

India's top institutional collaborator in Physics from 2005-2008 was CNRS (Centre national de la recherche scientifique) which, from 2009-2014, was dropped to second most frequent collaborator. The US Department of Energy was the second most frequent collaborator between 2005 and 2008, and moved up to most frequent collaborator in 2013-2014. In general, India has collaborated closely with national research institutes in USA, France, Russia and Italy.

## 8.2.3 INTERNATIONAL COLLABORATION IN CLINICAL MEDICINE

**Table 8.2.3-1 Top 10 collaborating countries, Clinical Medicine, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	925	8.63%	2006.8	1,624	8.80%	2010.7	1,140	12.01%	2013.5
ENGLAND	365	3.40%	2006.7	594	3.22%	2010.7	423	4.46%	2013.5
AUSTRALIA	167	1.56%	2006.9	408	2.21%	2010.7	290	3.05%	2013.5
CANADA	135	1.26%	2006.9	342	1.85%	2010.6	279	2.94%	2013.5
GERMANY	111	1.04%	2006.6	263	1.42%	2010.7	219	2.31%	2013.5
CHINA	81	0.76%	2006.9	259	1.40%	2010.8	233	2.45%	2013.5
FRANCE	99	0.92%	2006.8	251	1.36%	2010.7	165	1.74%	2013.6
ITALY	91	0.85%	2006.8	209	1.13%	2010.7	181	1.91%	2013.6
JAPAN	99	0.92%	2006.6	214	1.16%	2010.7	151	1.59%	2013.5
NETHERLANDS	64	0.60%	2006.8	168	0.91%	2010.7	129	1.36%	2013.5

India's four most frequent collaborators in Clinical Medicine for all three time periods were the USA, England, Australia, and Canada. The number and proportion of collaborative papers with these countries increased from 2005-2012.

The average recency of collaboration for top 10 collaborating countries in Clinical Medicine from 2005-2008 was 2006.8, for 2009-2012 it was 2010.7 and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Clinical Medicine with its top collaborators.

**Table 8.2.3-2 Top 10 collaborating institutions outside of India, Clinical Medicine, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Univ London	113	1.05%	228	1.24%	151	1.59%
Harvard Univ	47	0.44%	132	0.72%	143	1.51%
Johns Hopkins Univ	68	0.63%	125	0.68%	88	0.93%
Univ Toronto	37	0.35%	129	0.70%	86	0.91%
US DEPT HLTH HUMAN SERVICES	62	0.58%	118	0.64%	61	0.64%
Univ Melbourne	29	0.27%	119	0.64%	56	0.59%
Univ Coll London	56	0.52%	91	0.49%	57	0.60%
LONDON SCH HYG TROP MED	38	0.35%	91	0.49%	67	0.71%
Natl Inst Hlth (NIH) - USA	45	0.42%	91	0.49%	41	0.43%
Univ Penn	39	0.36%	80	0.43%	55	0.58%

The University of London was India's most frequent institutional collaborator for all three time periods in Clinical Medicine. The proportion of collaborative papers with the University of London increased during every time period. The top 10 collaborating institutions are mainly located in the USA, the UK and Canada.

## 8.2.4 INTERNATIONAL COLLABORATION IN ENGINEERING

Table 8.2.4-1 Top 10 collaborating countries, Engineering, India

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	568	5.12%	2006.7	813	5.11%	2010.7	490	4.80%	2013.5
SOUTH KOREA	121	1.09%	2006.7	252	1.59%	2010.7	165	1.62%	2013.6
ENGLAND	132	1.19%	2006.5	200	1.26%	2010.7	137	1.34%	2013.5
GERMANY	134	1.21%	2006.4	197	1.24%	2010.5	122	1.19%	2013.4
CANADA	117	1.05%	2006.6	185	1.16%	2010.6	104	1.02%	2013.6
CHINA	92	0.83%	2006.7	136	0.86%	2010.6	102	1.00%	2013.5
SINGAPORE	103	0.93%	2006.6	115	0.72%	2011.0	102	1.00%	2013.5
AUSTRALIA	56	0.50%	2006.9	151	0.95%	2010.5	112	1.10%	2013.5
FRANCE	66	0.60%	2006.8	178	1.12%	2010.7	74	0.72%	2013.5
JAPAN	118	1.06%	2006.6	124	0.78%	2010.6	61	0.60%	2013.4

India's top collaborator in Engineering for all three time period was the USA. Germany was the second most frequent collaborator in 2005-2008 time period but fell to fourth place by 2013-2014. India's collaboration with South Korea increased, as South Korea moved from fourth place in 2005-2008 into second place by 2013- 2014. The number of collaborative papers in Engineering with these countries increased from the 2005-2008 to 2009-2012 time period.

The average recency for the top 10 most frequent collaborators in Engineering from 2005-2008 was 2006.6, for 2009-2012 it was 2010.7, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Engineering with its top collaborators.

Table 8.2.4-2 Top 10 collaborating institutions outside of India, Engineering, India

Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Natl Univ Singapore	44	0.40%	38	0.24%	49	0.48%
Nanyang Technol Univ	42	0.38%	53	0.33%	32	0.31%
CNRS	23	0.21%	45	0.28%	16	0.16%
Univ Malaya	2	0.02%	32	0.20%	33	0.32%
Purdue Univ	20	0.18%	29	0.18%	18	0.18%
US Dept Energy	7	0.06%	36	0.23%	23	0.23%
Univ Cent Florida	7	0.06%	32	0.20%	24	0.23%
Texas A&M Univ College Stn	21	0.19%	23	0.14%	17	0.17%
Univ Texas Austin	15	0.14%	17	0.11%	23	0.23%
Georgia Inst Technol	16	0.14%	24	0.15%	14	0.14%

India's most frequent institutional collaborator in Engineering from 2005-2008 and from 2013-2014 was the National University of Singapore. During the period 2009-2012, the National University of Singapore was the fourth most frequent collaborator; the most frequent collaborator was Universiti Malaya.

## 8.2.5 INTERNATIONAL COLLABORATION IN MATERIALS SCIENCE

**Table 8.2.5-1 Top 10 collaborating countries, Materials Science, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	380	3.94%	2006.6	581	4.00%	2010.5	376	4.02%	2013.5
SOUTH KOREA	281	2.91%	2006.8	497	3.42%	2010.6	442	4.72%	2013.5
GERMANY	240	2.49%	2006.6	325	2.24%	2010.5	180	1.92%	2013.5
JAPAN	224	2.32%	2006.5	283	1.95%	2010.6	189	2.02%	2013.6
FRANCE	111	1.15%	2006.8	184	1.27%	2010.5	91	0.97%	2013.4
ENGLAND	97	1.00%	2006.7	155	1.07%	2010.4	104	1.11%	2013.5
SAUDI ARABIA	6	0.06%	2006.8	105	0.72%	2011.0	137	1.46%	2013.4
SINGAPORE	53	0.55%	2006.5	101	0.69%	2010.8	90	0.96%	2013.5
TAIWAN	52	0.54%	2006.4	91	0.63%	2010.6	93	0.99%	2013.5
ITALY	43	0.45%	2006.9	99	0.68%	2010.7	65	0.69%	2013.6

India's most frequent collaborator in Materials Science from 2005-2012 was the USA. South Korea was the second most frequent collaborator in 2005-2008 but became the top collaborator in 2013-2014. Germany was in third place in 2005-2008 and became fourth in 2013-2014 when it was replaced in third place by Japan.

The average recency for the top 10 most frequent collaborators in Materials Science from 2005-2008 was 2006.7, for 2009-2012 it was 2010.6, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Materials Science with its top collaborators.

**Table 8.2.5-2 Top 10 collaborating institutions outside of India, Materials Science, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Natl Univ Sci & Tech S. Korea	69	0.71%	82	0.56%	43	0.46%
CNRS	62	0.64%	88	0.61%	34	0.36%
NIMS	41	0.42%	69	0.47%	40	0.43%
Univ Aveiro	35	0.36%	80	0.55%	32	0.34%
Chonbuk Natl Univ	30	0.31%	45	0.31%	62	0.66%
Natl Univ Singapore	25	0.26%	54	0.37%	49	0.52%
Hanyang Univ	23	0.24%	40	0.28%	46	0.49%
Helmholtz Association	39	0.40%	40	0.28%	25	0.27%
Florida State Univ	21	0.22%	48	0.33%	30	0.32%
King Saud Univ			40	0.28%	51	0.54%

India's most frequent institutional collaborators in Materials Science flipped positions between 2005 and 2014. The National University of Science & Technology of South Korea went from the most frequent collaborator in the period 2005-2008 to fifth place in 2013-2014, and CNRS fell from second to seventh place. King Saud University, however, went from tenth place in the period 2005-2008 to second place in 2013-2014.

## 8.2.6 INTERNATIONAL COLLABORATION IN BIOLOGY &amp; BIOCHEMISTRY

**Table 8.2.6-1 Top 10 collaborating countries, Biology & Biochemistry, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	429	6.43%	2006.6	668	6.40%	2010.6	438	6.49%	2013.5
GERMANY	128	1.92%	2006.4	183	1.75%	2010.8	112	1.66%	2013.6
JAPAN	95	1.42%	2006.4	135	1.29%	2010.5	92	1.36%	2013.6
SOUTH KOREA	66	0.99%	2006.9	124	1.19%	2010.6	121	1.79%	2013.5
ENGLAND	73	1.09%	2006.6	110	1.05%	2010.7	68	1.01%	2013.6
FRANCE	70	1.05%	2006.8	111	1.06%	2010.7	67	0.99%	2013.6
SAUDI ARABIA	3	0.04%	2007.7	75	0.72%	2011.1	83	1.23%	2013.5
ITALY	27	0.40%	2006.5	67	0.64%	2010.7	59	0.87%	2013.6
AUSTRALIA	20	0.30%	2006.5	73	0.70%	2011.0	59	0.87%	2013.6
CANADA	31	0.46%	2006.9	76	0.73%	2010.9	45	0.67%	2013.6

India's top collaborator for all three time periods was the USA. Germany fell from second place in the period 2005-2008 to third place in 2013-2014. South Korea had the opposite trend, going from fourth place in 2005-2008 to become the second most frequent collaborator. In general, the number of collaborative papers increased between 2005-2008 and 2009-2012.

The average recency for the top 10 most frequent collaborators in Biology & Biochemistry from 2005-2008 was 2006.7, for 2009-2012 it was 2010.7, and for 2013-2014 it was 2013.6. This indicates that for every year within a given time period, India published roughly the same output of papers in Biology & Biochemistry with its top collaborators.

**Table 8.2.6-2 Top 10 collaborating institutions outside of India, Biology & Biochemistry, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Johns Hopkins Univ	31	0.46%	39	0.37%	29	0.43%
King Saud Univ			51	0.49%	45	0.67%
US DEPT HLTH HUMAN SERVICES	25	0.37%	37	0.35%	22	0.33%
CNRS	23	0.34%	34	0.33%	27	0.40%
Natl Inst Hlth (NIH) - USA	24	0.36%	33	0.32%	21	0.31%
INSERM	16	0.24%	27	0.26%	22	0.33%
Max Planck Society	18	0.27%	22	0.21%	13	0.19%
Natl Univ Singapore	12	0.18%	13	0.12%	25	0.37%
Harvard Univ	12	0.18%	15	0.14%	21	0.31%
Univ London	9	0.13%	17	0.16%	17	0.25%

India's most frequent collaborator in Biology & Biochemistry overall was the Johns Hopkins University, which ranked first in the period 2005-2008 then fell to second most frequent collaborator. King Saud University, which had no collaborative papers in the period 2005-2008, became the most frequent collaborator between 2009 and 2014.

## 8.2.7 INTERNATIONAL COLLABORATION IN AGRICULTURAL SCIENCES

**Table 8.2.7-1 Top 10 collaborating countries, Agricultural Sciences, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	172	2.41%	2006.8	287	2.96%	2010.6	156	3.32%	2013.5
AUSTRALIA	57	0.80%	2006.5	81	0.84%	2011.0	50	1.06%	2013.6
GERMANY	67	0.94%	2006.7	68	0.70%	2010.8	34	0.72%	2013.4
CANADA	42	0.59%	2006.6	69	0.71%	2010.8	30	0.64%	2013.4
ENGLAND	48	0.67%	2006.7	57	0.59%	2010.5	29	0.62%	2013.6
JAPAN	45	0.63%	2006.4	49	0.51%	2010.7	33	0.70%	2013.5
SOUTH KOREA	29	0.41%	2006.9	54	0.56%	2010.4	23	0.49%	2013.6
CHINA	31	0.43%	2006.7	44	0.45%	2010.7	27	0.57%	2013.5
PHILIPPINES	36	0.50%	2006.9	40	0.41%	2010.8	20	0.43%	2013.5
MEXICO	23	0.32%	2006.7	34	0.35%	2011.0	25	0.53%	2013.4

India's top three collaborators in the periods 2005-2008 and 2013-2014 in Agricultural Sciences were the USA, Australia and Germany. Between 2009 and 2012, the USA and Australia were the two most frequent collaborators, but Germany was moved to fourth place by Canada.

The average recency for the top 10 most frequent collaborators in Agricultural Sciences from 2005-2008 was 2006.7, for 2009-2012 it was 2010.7, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India had roughly the same output of papers in Agricultural Sciences as its top collaborators.

**Table 8.2.7-2 Top 10 collaborating institutions outside of India, Agricultural Sciences, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Int Rice Res Inst	33	0.46%	38	0.39%	23	0.49%
USDA (US Dept Agr)	26	0.36%	27	0.28%	15	0.32%
CIMMYT	16	0.22%	31	0.32%	15	0.32%
Wageningen Univ & Res Ctr	11	0.15%	25	0.26%	10	0.21%
Int Crops Res Inst Semi Arid Trop	12	0.17%	14	0.14%	10	0.21%
Univ Western Australia	11	0.15%	15	0.15%	9	0.19%
Univ Florida	3	0.04%	20	0.21%	11	0.23%
Ohio State Univ	9	0.13%	12	0.12%	13	0.28%
King Saud Univ			17	0.18%	17	0.36%
Cornell Univ	12	0.17%	18	0.19%	4	0.09%

India's three most frequent institutional collaborators in Agricultural Sciences for all three time periods were the International Rice Research Institute, the US Department of Agriculture, and CIMMYT. King Saud University, which had no collaborative papers in the period 2005-2008, became the most frequent collaborator in 2013-2014.



## 8.2.8 INTERNATIONAL COLLABORATION IN PLANT &amp; ANIMAL SCIENCE

**Table 8.2.8-1 Top 10 collaborating countries, Plant & Animal Science, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	292	4.18%	2006.6	377	5.03%	2010.7	228	5.56%	2013.5
GERMANY	113	1.62%	2006.5	131	1.75%	2010.4	76	1.85%	2013.5
ENGLAND	84	1.20%	2006.6	98	1.31%	2010.7	81	1.98%	2013.4
JAPAN	87	1.24%	2006.2	104	1.39%	2010.7	59	1.44%	2013.4
SOUTH KOREA	66	0.94%	2006.6	125	1.67%	2010.7	38	0.93%	2013.5
CHINA	51	0.73%	2006.5	94	1.25%	2010.7	80	1.95%	2013.5
AUSTRALIA	64	0.92%	2006.6	88	1.17%	2010.8	63	1.54%	2013.5
FRANCE	54	0.77%	2006.6	66	0.88%	2010.7	38	0.93%	2013.5
CANADA	48	0.69%	2006.4	58	0.77%	2010.7	32	0.78%	2013.6
SAUDI ARABIA	3	0.04%	2007.3	53	0.71%	2010.8	44	1.07%	2013.4

India's most frequent collaborator for all three time periods in Plant & Animal Science was the USA. Germany was the second most frequent collaborator in 2005-2008 and in 2009-2014, but fell to third place in 2013-2014. Saudi Arabia is the only country not chosen for comparative analysis in CHAPTER 4.

The average recency for the top 10 most frequent collaborators in Plant & Animal Science from 2005-2008 was 2006.6, for 2009-2012 it was 2010.7, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Plant & Animal Science with its top collaborators.

**Table 8.2.8-2 Top 10 collaborating institutions outside of India, Plant & Animal Science, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
USDA (US Dept Agr)	24	0.34%	40	0.53%	21	0.51%
Chinese Acad Sci	13	0.19%	37	0.49%	30	0.73%
King Saud Univ	1	0.01%	38	0.51%	31	0.76%
Jeju Natl Univ			55	0.73%	3	0.07%
Nat Hist Museum London	14	0.20%	25	0.33%	17	0.41%
CIMMYT	14	0.20%	28	0.37%	10	0.24%
Int Rice Res Inst	17	0.24%	21	0.28%	11	0.27%
CNRS	18	0.26%	21	0.28%	10	0.24%
Ghent Univ	9	0.13%	29	0.39%	9	0.22%
CSIRO	12	0.17%	22	0.29%	13	0.32%

India's most frequent collaborator in Plant & Animal Science was the US Department of Agriculture, but it fell from first place in the period 2005-2008 to third place in 2013-2014. Similarly, CNRS, the second most frequent collaborator between 2005 and 2008, fell to seventh place in 2013-2014. King Saud University, which was in seventh place in 2005-2008, was the most frequent collaborator in 2013-2014.

## 8.2.9 INTERNATIONAL COLLABORATION IN PHARMACOLOGY &amp; TOXICOLOGY

**Table 8.2.9-1 Top 10 collaborating countries, Pharmacology & Toxicology, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	249	5.44%	2006.7	437	5.12%	2010.7	272	6.14%	2013.6
SAUDI ARABIA	10	0.22%	2007.3	95	1.11%	2011.3	117	2.64%	2013.6
MALAYSIA	14	0.31%	2007.0	87	1.02%	2011.0	87	1.96%	2013.5
GERMANY	48	1.05%	2006.5	47	0.55%	2010.7	54	1.22%	2013.5
ENGLAND	37	0.81%	2006.9	65	0.76%	2010.5	34	0.77%	2013.7
CANADA	28	0.61%	2006.6	52	0.61%	2010.5	25	0.56%	2013.5
SOUTH KOREA	22	0.48%	2007.4	40	0.47%	2011.0	35	0.79%	2013.5
ITALY	19	0.41%	2007.1	49	0.57%	2010.4	28	0.63%	2013.6
JAPAN	30	0.66%	2006.7	39	0.46%	2010.7	22	0.50%	2013.6
FRANCE	24	0.52%	2006.7	39	0.46%	2010.4	27	0.61%	2013.4

India's top collaborator for all three time periods for Pharmacology & Toxicology was the USA. From 2005 to 2012, the USA and India generally produced several times the number of collaborative papers as did India with its next most frequent collaborator (Germany in 2005-2008, and Saudi Arabia in 2009-2012). Saudi Arabia went from tenth place in the period 2005-2008 to second most frequent collaborator by 2013-2014.

The average recency for the top 10 most frequent collaborators in Pharmacology & Toxicology Science from 2005-2008 was 2006.9, for 2009-2012 it was 2010.7, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Pharmacology & Toxicology with its top collaborators.

**Table 8.2.9-2 Top 10 collaborating institutions outside of India, Pharmacology & Toxicology, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
King Saud Univ	4	0.09%	52	0.61%	55	1.24%
US DEPT HLTH HUMAN SERVICES	13	0.28%	38	0.45%	13	0.29%
Natl Inst Hlth (NIH) - USA	10	0.22%	28	0.33%	11	0.25%
King Abdulaziz Univ			14	0.16%	34	0.77%
Univ Mississippi	7	0.15%	15	0.18%	18	0.41%
KU Leuven	6	0.13%	26	0.30%	8	0.18%
Univ London	20	0.44%	10	0.12%	7	0.16%
Novartis	5	0.11%	15	0.18%	17	0.38%
INT MED UNIV	1	0.02%	23	0.27%	13	0.29%
Natl Univ Singapore	13	0.28%	16	0.19%	7	0.16%

India's number and proportion of collaborative papers with top 10 collaborating institutions in Pharmacology & Toxicology increased for all three time periods. King Saud University went from eighth place in 2005-2008 to most frequent collaborator in 2013-2014. King Abdulaziz University went from tenth place to second place, and the US Department of Health and Human Services went from second place to fifth place.

## 8.2.10 INTERNATIONAL COLLABORATION IN GEOSCIENCES

**Table 8.2.10-1 Top 10 collaborating countries, Geosciences, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	314	7.63%	2006.5	484	9.06%	2010.6	327	10.26%	2013.5
GERMANY	136	3.30%	2006.5	199	3.72%	2010.7	137	4.30%	2013.5
JAPAN	131	3.18%	2006.5	210	3.93%	2010.6	107	3.36%	2013.4
FRANCE	95	2.31%	2006.8	124	2.32%	2010.8	116	3.64%	2013.6
ENGLAND	89	2.16%	2006.5	143	2.68%	2010.6	98	3.07%	2013.5
AUSTRALIA	43	1.04%	2006.6	104	1.95%	2010.6	63	1.98%	2013.5
CANADA	62	1.51%	2006.5	85	1.59%	2010.8	55	1.73%	2013.5
CHINA	23	0.56%	2006.2	82	1.53%	2010.8	71	2.23%	2013.5
NETHERLANDS	20	0.49%	2007.0	63	1.18%	2010.9	24	0.75%	2013.5
SOUTH AFRICA	25	0.61%	2006.6	50	0.94%	2010.6	30	0.94%	2013.5

India's most frequent collaborator for all three time periods for Geosciences was the USA. Germany was the second most frequent collaborator for 2005-2008 and 2013-2014. Japan was the second most frequent collaborator in 2009-2012 and dropped to third place in 2013-2014.

The average recency for the top 10 most frequent collaborators in Geosciences Science from 2005-2008 was 2006.6, for 2009-2012 it was 2010.7, and for 2013-2014 it was 2013.5. This indicates that for every year within a given time period, India published roughly the same output of papers in Geosciences with its top collaborators.

**Table 8.2.10-2 Top 10 collaborating institutions outside of India, Geosciences, India**  
Time period: 2005-2008, 2009-2012, 2013-2014 in aggregate; Source: Web of Science

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
CNRS	51	1.24%	81	1.52%	77	2.42%
NASA	19	0.46%	56	1.05%	27	0.85%
NOAA (Nat'l Oceanic Atmospheric Admin)	25	0.61%	37	0.69%	28	0.88%
PRES Univ Toulouse	15	0.36%	28	0.52%	31	0.97%
Max Planck Society	17	0.41%	33	0.62%	20	0.63%
Univ Paul Sabatier - Toulouse III	15	0.36%	27	0.51%	27	0.85%
US Dept Energy	22	0.53%	12	0.22%	34	1.07%
Univ Tokyo	14	0.34%	40	0.75%	14	0.44%
JAMSTEC	17	0.41%	30	0.56%	17	0.53%
Chinese Acad Sci	10	0.24%	28	0.52%	25	0.78%

India's most frequent collaborator for all three time periods in Geosciences was CNRS. The US Department of Energy became the second biggest collaborating institution in 2013-2014.



**Table 8.3-1 Top 50 Indian national research institutions ranked by betweenness centrality**  
Time Period: 2005-2014

Institution	Betweenness Centrality	Institution	Betweenness Centrality
IIT Kharagpur	2137.34	Natl Inst Technol Rourkela	514.85
IISC Bangalore	2126.33	Thapar Univ	477.72
Univ Delhi	2056.65	IIT Guwahati	467.51
Banaras Hindu Univ	1788.72	Indian Inst Sci Educ Res Kolkata	460.31
IIT Delhi	1662.46	Bose Inst	459.23
IIT Roorkee	1393.28	Jamia Hamdard Univ	442.94
IIT Bombay	1321.94	IACS Jadavpur	438.29
Univ Hyderabad	1319.45	Univ Pune	435.84
Bhabha Atom Res Ctr	1212.01	Aligarh Muslim Univ	427.26
IIT Kanpur	1153.25	Bharathidasan Univ	423.20
Natl Phys Lab - India	1145.21	Pondicherry Univ	419.20
Panjab Univ	996.13	Birla Inst Technol & Sci	417.84
Tata Inst Fund Res	871.84	Jamia Millia Islamia	401.35
Univ Calcutta	860.05	Manipal Univ	399.39
All India Inst Med Sci	799.93	Lucknow Univ	395.24
IIT Madras	793.13	Indian Vet Res Inst	371.12
Anna Univ Chennai	772.45	Univ Allahabad	367.24
Indian Agr Res Inst	767.20	Manipur Univ	361.96
Vellore Inst Technol	754.28	Univ Burdwan	356.94
Indian Inst Chem Technol	665.69	Maharaja Sayajirao Univ Baroda	353.34
Indira Gandhi Ctr Atom Res	647.93	Ctr Cellular & Mol Biol	347.12
Jadavpur Univ	610.49	Natl Inst Technol Durgapur	339.38
Jawaharlal Nehru Univ	575.28	Annamalai Univ	333.34
Natl Chem Lab Pune	531.94	Ctr Inst Med & Aromat Plants	314.33
Indian Stat Inst	527.78	Natl Dairy Res Inst India	312.86

The Indian Institute of Technology Kharagpur has highest betweenness centrality. Of the 50 institutions shown, University of Delhi, Banaras Hindu University, University of Hyderabad, Panjab University and the University of Calcutta are the top five universities which have broader connections with other research institutions in Indian.

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In this project, the institutions with higher betweenness centrality indicate that they have extensively collaborated with other Indian research institutions in this co-authorship network.

## ANNEX 1. COMPARATIVE ANALYSES OF INDIA'S RESEARCH WITH OTHER SELECTED COUNTRIES IN 12 OTHER ESSENTIAL SCIENCE INDICATORS FIELDS

The comparative analyses of India's research with other selected countries for 12 other Essential Science Indicators fields are shown here.

### A 1.1 COMPARATIVE ANALYSES, ENVIRONMENT/ECOLOGY

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	625	687	786	929	1,066	1,153	1,309	1,510	1,605	1,657
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	1,161	1,279	1,446	1,503	1,684	1,887	2,101	2,345	2,680	2,603
<b>CANADA</b>	1,711	1,892	2,006	2,226	2,296	2,348	2,666	2,711	2,859	2,784
<b>SWITZERLAND</b>	522	542	590	735	752	875	886	1,026	1,100	1,111
<b>GERMANY</b>	1,453	1,467	1,731	2,046	1,942	2,214	2,393	2,657	2,800	2,739
<b>ENGLAND</b>	1,579	1,763	1,869	1,984	2,059	2,191	2,370	2,635	2,706	2,719
<b>FRANCE</b>	1,144	1,206	1,366	1,498	1,614	1,664	1,874	2,047	2,217	2,128
<b>ITALY</b>	746	869	969	1,114	1,231	1,206	1,361	1,405	1,579	1,746
<b>JAPAN</b>	880	1,003	1,051	1,150	1,264	1,174	1,194	1,316	1,295	1,221
<b>NETHERLANDS</b>	708	731	862	833	956	1,043	1,063	1,207	1,314	1,326
<b>SWEDEN</b>	684	781	757	765	794	868	874	1,059	1,090	1,126
<b>USA</b>	7,984	8,614	8,865	9,470	9,728	9,805	10,793	11,283	11,790	11,627
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	463	724	600	655	900	1,050	1,268	1,320	1,467	1,466
<b>CHINA</b>	1,399	1,775	2,161	2,552	3,465	3,607	4,549	5,172	6,363	7,104
<b>SPAIN</b>	969	1,136	1,312	1,494	1,618	1,731	2,063	2,263	2,356	2,230
<b>SOUTH KOREA</b>	365	399	478	525	538	622	697	691	814	923
<b>RUSSIA</b>	233	230	287	495	488	484	529	482	509	464
<b>TURKEY</b>	373	414	521	579	640	707	649	704	701	672
<b>TAIWAN</b>	290	342	354	401	438	475	514	546	529	576
<b>SOUTH AFRICA</b>	284	330	388	433	487	502	567	617	688	654

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	2.74%	2.73%	2.89%	3.08%	3.27%	3.42%	3.50%	3.74%	3.71%	3.98%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	5.09%	5.09%	5.32%	4.98%	5.16%	5.60%	5.62%	5.81%	6.20%	6.24%
<b>CANADA</b>	7.50%	7.53%	7.38%	7.38%	7.04%	6.96%	7.14%	6.72%	6.61%	6.68%
<b>SWITZERLAND</b>	2.29%	2.16%	2.17%	2.44%	2.31%	2.59%	2.37%	2.54%	2.54%	2.67%
<b>GERMANY</b>	6.37%	5.84%	6.37%	6.78%	5.95%	6.57%	6.41%	6.58%	6.48%	6.57%
<b>ENGLAND</b>	6.92%	7.02%	6.88%	6.57%	6.31%	6.50%	6.34%	6.53%	6.26%	6.52%
<b>FRANCE</b>	5.02%	4.80%	5.03%	4.96%	4.95%	4.93%	5.02%	5.07%	5.13%	5.11%
<b>ITALY</b>	3.27%	3.46%	3.57%	3.69%	3.77%	3.58%	3.64%	3.48%	3.65%	4.19%
<b>JAPAN</b>	3.86%	3.99%	3.87%	3.81%	3.87%	3.48%	3.20%	3.26%	3.00%	2.93%
<b>NETHERLANDS</b>	3.10%	2.91%	3.17%	2.76%	2.93%	3.09%	2.85%	2.99%	3.04%	3.18%
<b>SWEDEN</b>	3.00%	3.11%	2.79%	2.54%	2.43%	2.57%	2.34%	2.62%	2.52%	2.70%
<b>USA</b>	35.00%	34.28%	32.64%	31.38%	29.82%	29.07%	28.89%	27.96%	27.27%	27.89%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.03%	2.88%	2.21%	2.17%	2.76%	3.11%	3.39%	3.27%	3.39%	3.52%
<b>CHINA</b>	6.13%	7.06%	7.96%	8.46%	10.62%	10.70%	12.18%	12.81%	14.72%	17.04%
<b>SPAIN</b>	4.25%	4.52%	4.83%	4.95%	4.96%	5.13%	5.52%	5.61%	5.45%	5.35%
<b>SOUTH KOREA</b>	1.60%	1.59%	1.76%	1.74%	1.65%	1.84%	1.87%	1.71%	1.88%	2.21%
<b>RUSSIA</b>	1.02%	0.92%	1.06%	1.64%	1.50%	1.44%	1.42%	1.19%	1.18%	1.11%
<b>TURKEY</b>	1.64%	1.65%	1.92%	1.92%	1.96%	2.10%	1.74%	1.74%	1.62%	1.61%
<b>TAIWAN</b>	1.27%	1.36%	1.30%	1.33%	1.34%	1.41%	1.38%	1.35%	1.22%	1.38%
<b>SOUTH AFRICA</b>	1.25%	1.31%	1.43%	1.43%	1.49%	1.49%	1.52%	1.53%	1.59%	1.57%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.83	0.79	0.78	0.80	0.85	0.80	0.73	0.70	0.71
<b>Established Research Economies</b>									
AUSTRALIA	1.30	1.28	1.17	1.27	1.30	1.41	1.52	1.49	1.47
CANADA	1.28	1.24	1.22	1.22	1.24	1.23	1.29	1.21	1.27
SWITZERLAND	1.91	2.06	1.70	1.82	1.74	2.08	1.72	1.81	1.84
GERMANY	1.31	1.29	1.34	1.28	1.21	1.34	1.30	1.47	1.78
ENGLAND	1.38	1.50	1.34	1.59	1.51	1.65	1.54	1.49	1.83
FRANCE	1.41	1.19	1.26	1.35	1.34	1.49	1.34	1.43	1.52
ITALY	0.98	0.91	1.09	0.99	0.99	1.10	0.98	1.13	1.13
JAPAN	0.84	0.79	0.84	0.73	0.77	0.72	0.80	0.88	0.88
NETHERLANDS	1.42	1.52	1.38	1.46	1.40	1.54	1.57	1.59	1.64
SWEDEN	1.34	1.28	1.31	1.42	1.35	1.26	1.38	1.51	1.91
USA	1.40	1.41	1.39	1.43	1.39	1.41	1.46	1.47	1.42
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.87	0.74	0.85	0.85	0.77	0.70	0.60	0.75	0.69
CHINA	0.84	0.88	1.01	0.93	0.85	0.90	0.94	0.93	0.78
SPAIN	1.12	1.22	1.18	1.20	1.23	1.19	1.26	1.23	1.20
SOUTH KOREA	0.75	0.73	0.83	0.71	0.80	0.98	1.04	1.03	0.67
RUSSIA	0.52	0.43	0.42	0.33	0.32	0.33	0.36	0.34	0.50
TURKEY	0.51	0.64	0.52	0.61	0.56	0.49	0.46	0.51	0.40
TAIWAN	0.86	0.80	0.85	0.78	0.81	0.79	0.80	0.88	0.66
SOUTH AFRICA	1.10	0.97	0.94	0.96	0.92	1.04	1.10	0.74	1.06

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.56%	2.54%	5.09%	15.33%	0.64%	2.94%	5.97%	15.14%	0.64%	3.37%	5.06%	13.34%
<b>Established Research Economies</b>												
AUSTRALIA	1.84%	6.61%	12.54%	29.69%	2.02%	8.44%	15.49%	32.26%	2.08%	7.48%	10.81%	23.34%
CANADA	1.62%	7.42%	13.41%	29.80%	1.72%	6.94%	13.42%	29.48%	1.58%	6.82%	10.10%	21.58%
SWITZERLAND	3.43%	11.51%	20.85%	41.48%	3.28%	12.07%	21.45%	43.74%	2.80%	10.49%	14.88%	29.76%
GERMANY	1.57%	6.79%	13.33%	32.67%	1.55%	7.88%	14.82%	33.34%	1.73%	7.67%	11.54%	24.75%
ENGLAND	2.03%	8.87%	16.50%	34.57%	1.99%	9.39%	16.93%	35.95%	2.12%	8.48%	12.29%	24.76%
FRANCE	1.44%	7.04%	12.70%	29.40%	1.93%	7.63%	14.04%	32.55%	1.61%	7.09%	10.98%	23.54%
ITALY	0.68%	4.71%	9.17%	24.88%	1.04%	4.71%	9.36%	25.66%	1.35%	5.71%	8.36%	19.88%
JAPAN	0.49%	3.45%	6.19%	17.92%	0.79%	3.86%	7.64%	18.15%	1.07%	4.53%	6.48%	14.98%
NETHERLANDS	1.85%	9.51%	16.40%	35.16%	2.11%	9.86%	17.90%	37.97%	1.97%	7.95%	12.12%	25.91%
SWEDEN	1.84%	7.77%	15.40%	34.21%	2.39%	8.46%	15.80%	36.08%	2.35%	8.48%	12.27%	25.63%
USA	1.69%	7.61%	13.87%	30.57%	1.77%	7.79%	14.35%	31.09%	1.62%	7.04%	10.29%	21.80%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.90%	3.85%	7.41%	20.48%	0.64%	2.75%	5.84%	15.93%	0.72%	2.69%	4.09%	10.88%
CHINA	0.66%	4.43%	9.21%	22.91%	1.02%	4.82%	9.65%	23.20%	1.06%	4.11%	6.20%	14.48%
SPAIN	1.51%	5.84%	11.40%	30.10%	1.42%	6.29%	11.84%	28.89%	1.26%	5.32%	8.70%	20.39%
SOUTH KOREA	0.34%	2.49%	6.00%	15.73%	1.37%	6.00%	10.44%	22.53%	1.44%	4.89%	6.68%	14.80%
RUSSIA	0.56%	2.09%	3.86%	9.72%	0.45%	1.56%	2.87%	8.17%	0.92%	2.16%	4.11%	9.25%
TURKEY	0.26%	1.27%	4.03%	10.86%	0.22%	1.48%	3.37%	10.04%	0.15%	0.95%	1.89%	7.21%
TAIWAN	0.43%	3.17%	6.13%	17.74%	0.66%	3.60%	6.64%	18.60%	0.81%	2.62%	4.25%	11.13%
SOUTH AFRICA	1.53%	5.57%	9.06%	22.09%	1.15%	5.15%	8.79%	20.89%	1.42%	4.40%	7.00%	15.42%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	16.32%	21.69%	20.48%	22.82%	20.26%	23.68%	25.44%	22.72%	26.60%	25.89%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	40.83%	45.82%	45.99%	42.65%	46.56%	48.22%	51.36%	53.52%	52.16%	56.70%
<b>CANADA</b>	44.48%	45.40%	48.75%	47.93%	48.26%	48.76%	51.61%	53.52%	55.33%	54.71%
<b>SWITZERLAND</b>	62.84%	57.75%	66.27%	62.59%	67.82%	70.86%	70.99%	73.20%	75.09%	75.88%
<b>GERMANY</b>	53.96%	57.40%	56.09%	56.70%	57.36%	60.39%	62.22%	62.82%	64.39%	64.26%
<b>ENGLAND</b>	57.19%	58.82%	63.24%	63.51%	67.22%	68.46%	68.61%	70.97%	72.91%	74.48%
<b>FRANCE</b>	55.59%	54.15%	56.08%	58.14%	60.47%	62.86%	62.49%	65.07%	67.30%	65.98%
<b>ITALY</b>	39.14%	38.09%	45.51%	43.00%	43.38%	47.76%	47.17%	48.40%	49.78%	51.55%
<b>JAPAN</b>	34.43%	38.48%	41.10%	36.70%	41.38%	39.69%	45.64%	47.04%	47.49%	49.30%
<b>NETHERLANDS</b>	61.02%	62.24%	65.78%	65.91%	69.35%	67.88%	68.67%	71.33%	73.90%	71.95%
<b>SWEDEN</b>	50.15%	56.59%	57.20%	58.82%	62.22%	64.40%	64.30%	66.57%	69.72%	68.65%
<b>USA</b>	28.37%	30.14%	32.46%	32.13%	34.43%	36.97%	38.95%	39.94%	41.20%	42.56%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	38.01%	35.22%	44.67%	40.76%	42.00%	33.33%	35.25%	34.24%	35.31%	41.95%
<b>CHINA</b>	27.45%	32.23%	33.50%	32.72%	31.14%	32.27%	33.88%	32.99%	32.39%	33.76%
<b>SPAIN</b>	40.97%	41.90%	42.45%	45.05%	44.93%	47.43%	51.28%	52.76%	54.24%	56.10%
<b>SOUTH KOREA</b>	37.53%	43.11%	39.33%	39.81%	40.15%	39.55%	39.17%	46.31%	42.75%	38.89%
<b>RUSSIA</b>	60.52%	53.04%	45.30%	31.52%	30.53%	27.27%	32.33%	31.95%	39.88%	43.32%
<b>TURKEY</b>	15.28%	16.67%	9.40%	13.82%	14.22%	16.27%	14.64%	15.77%	19.12%	22.17%
<b>TAIWAN</b>	22.07%	22.81%	20.90%	27.68%	27.17%	26.95%	34.44%	32.78%	32.51%	34.03%
<b>SOUTH AFRICA</b>	42.96%	45.76%	39.43%	48.50%	50.92%	48.41%	55.73%	53.00%	52.47%	56.88%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.99	2.07	1.97	2.04	2.15	2.15	2.27	2.12	2.23	2.40
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	3.07	3.09	3.03	3.43	3.28	3.40	3.68	3.67	3.71	3.88
<b>CANADA</b>	3.22	3.12	3.26	3.19	3.23	3.14	3.24	3.34	3.28	3.38
<b>SWITZERLAND</b>	3.80	3.74	3.86	3.82	3.98	4.12	4.28	4.32	4.15	4.42
<b>GERMANY</b>	3.17	3.06	3.14	3.07	3.12	3.34	3.34	3.43	3.45	3.53
<b>ENGLAND</b>	3.90	3.68	3.75	4.00	3.79	3.97	4.01	3.99	3.88	4.06
<b>FRANCE</b>	3.49	3.35	3.36	3.56	3.37	3.61	3.71	3.79	3.95	3.74
<b>ITALY</b>	2.89	2.59	2.85	2.74	2.80	2.80	2.66	2.80	2.86	2.83
<b>JAPAN</b>	2.76	2.65	2.62	2.73	2.82	2.81	3.03	2.81	2.82	3.04
<b>NETHERLANDS</b>	3.48	3.55	3.41	3.41	3.47	3.43	3.67	3.65	3.73	3.75
<b>SWEDEN</b>	3.59	3.39	3.53	3.61	3.65	3.48	3.70	3.76	3.90	3.90
<b>USA</b>	3.53	3.54	3.62	3.81	3.68	3.71	3.86	3.87	3.87	3.85
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.43	2.12	2.73	2.50	2.25	2.08	1.92	2.24	2.23	2.32
<b>CHINA</b>	2.35	2.38	2.40	2.51	2.35	2.50	2.71	2.76	2.73	2.73
<b>SPAIN</b>	2.90	3.01	3.15	3.10	3.15	3.13	3.20	3.26	3.30	3.30
<b>SOUTH KOREA</b>	2.37	2.16	2.35	2.44	2.43	2.68	3.37	3.36	3.11	2.94
<b>RUSSIA</b>	1.86	1.60	1.48	1.02	0.99	1.08	0.97	0.99	1.34	1.60
<b>TURKEY</b>	1.49	1.55	1.56	1.54	1.60	1.61	1.66	1.76	1.70	1.82
<b>TAIWAN</b>	2.83	2.85	2.61	2.88	2.63	2.68	3.04	3.10	3.03	2.66
<b>SOUTH AFRICA</b>	3.12	2.43	2.43	2.47	2.35	2.57	2.75	2.40	2.65	2.77



## A.1.2 COMPARATIVE ANALYSES, MATHEMATICS

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	480	542	691	804	864	843	991	1,033	1,144	1,090
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	579	584	614	677	691	679	722	791	737	729
<b>CANADA</b>	1,275	1,397	1,378	1,563	1,667	1,526	1,560	1,584	1,555	1,422
<b>SWITZERLAND</b>	318	322	322	376	406	348	437	486	539	483
<b>GERMANY</b>	1,768	1,903	2,132	2,304	2,351	2,268	2,524	2,619	2,617	2,376
<b>ENGLAND</b>	1,156	1,284	1,452	1,553	1,631	1,660	1,716	1,724	1,803	1,706
<b>FRANCE</b>	2,329	2,397	2,584	2,716	2,911	3,053	3,002	3,105	3,091	2,713
<b>ITALY</b>	1,398	1,531	1,626	1,777	1,855	1,854	1,874	2,058	2,074	1,881
<b>JAPAN</b>	1,269	1,287	1,439	1,509	1,615	1,593	1,661	1,718	1,692	1,496
<b>NETHERLANDS</b>	355	369	357	408	447	404	395	420	414	340
<b>SWEDEN</b>	318	335	333	349	375	375	368	358	368	355
<b>USA</b>	7,094	7,203	7,796	8,274	8,519	8,190	8,513	8,942	8,552	7,815
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	459	482	527	598	638	700	787	790	843	864
<b>CHINA</b>	3,054	4,549	4,416	5,286	5,954	6,281	6,854	7,897	9,076	9,435
<b>SPAIN</b>	1,136	1,217	1,428	1,477	1,530	1,534	1,556	1,747	1,677	1,594
<b>SOUTH KOREA</b>	597	598	762	817	846	867	957	1,144	1,191	1,047
<b>RUSSIA</b>	1,159	1,224	1,261	1,625	1,686	1,710	1,672	1,690	1,588	1,480
<b>TURKEY</b>	332	390	477	507	575	707	817	873	1,133	934
<b>TAIWAN</b>	394	434	521	586	601	619	653	767	689	569
<b>SOUTH AFRICA</b>	114	141	190	197	219	208	264	301	299	368

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.94%	1.99%	2.31%	2.42%	2.46%	2.37%	2.66%	2.59%	2.82%	2.93%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	2.34%	2.14%	2.05%	2.04%	1.97%	1.91%	1.94%	1.99%	1.82%	1.96%
<b>CANADA</b>	5.15%	5.13%	4.60%	4.71%	4.74%	4.29%	4.19%	3.98%	3.83%	3.83%
<b>SWITZERLAND</b>	1.28%	1.18%	1.08%	1.13%	1.16%	0.98%	1.17%	1.22%	1.33%	1.30%
<b>GERMANY</b>	7.14%	6.99%	7.12%	6.94%	6.69%	6.38%	6.77%	6.58%	6.45%	6.39%
<b>ENGLAND</b>	4.67%	4.71%	4.85%	4.68%	4.64%	4.67%	4.60%	4.33%	4.44%	4.59%
<b>FRANCE</b>	9.40%	8.80%	8.63%	8.18%	8.28%	8.59%	8.06%	7.80%	7.62%	7.30%
<b>ITALY</b>	5.64%	5.62%	5.43%	5.35%	5.28%	5.22%	5.03%	5.17%	5.11%	5.06%
<b>JAPAN</b>	5.12%	4.72%	4.81%	4.54%	4.59%	4.48%	4.46%	4.31%	4.17%	4.03%
<b>NETHERLANDS</b>	1.43%	1.35%	1.19%	1.23%	1.27%	1.14%	1.06%	1.05%	1.02%	0.92%
<b>SWEDEN</b>	1.28%	1.23%	1.11%	1.05%	1.07%	1.05%	0.99%	0.90%	0.91%	0.96%
<b>USA</b>	28.63%	26.44%	26.05%	24.92%	24.24%	23.04%	22.85%	22.46%	21.08%	21.03%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.85%	1.77%	1.76%	1.80%	1.82%	1.97%	2.11%	1.98%	2.08%	2.33%
<b>CHINA</b>	12.33%	16.70%	14.75%	15.92%	16.94%	17.67%	18.39%	19.83%	22.37%	25.39%
<b>SPAIN</b>	4.59%	4.47%	4.77%	4.45%	4.35%	4.32%	4.18%	4.39%	4.13%	4.29%
<b>SOUTH KOREA</b>	2.41%	2.19%	2.55%	2.46%	2.41%	2.44%	2.57%	2.87%	2.94%	2.82%
<b>RUSSIA</b>	4.68%	4.49%	4.21%	4.89%	4.80%	4.81%	4.49%	4.24%	3.91%	3.98%
<b>TURKEY</b>	1.34%	1.43%	1.59%	1.53%	1.64%	1.99%	2.19%	2.19%	2.79%	2.51%
<b>TAIWAN</b>	1.59%	1.59%	1.74%	1.76%	1.71%	1.74%	1.75%	1.93%	1.70%	1.53%
<b>SOUTH AFRICA</b>	0.46%	0.52%	0.63%	0.59%	0.62%	0.59%	0.71%	0.76%	0.74%	0.99%

Average Normalized Citation Impact									
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.68	0.67	0.64	0.64	0.72	0.76	0.86	0.91	0.77
<b>Established Research Economies</b>									
AUSTRALIA	0.91	0.90	0.94	0.98	0.92	1.07	0.93	1.02	1.24
CANADA	0.94	1.05	0.92	1.00	0.94	1.00	1.00	0.91	1.05
SWITZERLAND	1.16	1.34	1.23	1.17	1.16	1.12	1.25	1.11	1.08
GERMANY	0.96	1.10	0.96	1.05	0.90	1.01	1.10	1.03	1.17
ENGLAND	0.98	1.02	1.02	1.02	0.98	1.07	1.07	1.01	1.00
FRANCE	1.15	1.14	1.05	1.07	1.01	1.02	1.03	0.97	1.07
ITALY	1.05	0.98	0.98	1.03	0.98	1.03	1.10	1.21	1.62
JAPAN	0.88	0.77	0.82	0.88	0.75	0.82	0.77	0.78	0.87
NETHERLANDS	0.83	0.87	0.96	0.92	0.88	0.92	0.82	0.80	1.20
SWEDEN	0.93	0.94	0.98	0.90	0.90	0.73	0.84	0.82	1.25
USA	1.14	1.19	1.10	1.18	1.12	1.16	1.10	1.03	1.10
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.85	0.75	0.92	0.74	0.82	0.82	0.76	0.71	0.77
CHINA	0.99	0.84	1.05	1.05	1.05	1.03	1.00	0.97	0.92
SPAIN	0.98	0.99	0.95	0.90	0.96	1.03	1.12	1.09	1.18
SOUTH KOREA	0.79	0.79	0.73	1.02	1.01	1.04	1.10	1.14	0.94
RUSSIA	0.46	0.47	0.48	0.46	0.46	0.54	0.57	0.58	0.55
TURKEY	0.73	1.00	0.81	0.93	0.93	1.17	1.15	1.21	1.41
TAIWAN	0.76	0.95	0.76	1.12	0.96	0.93	0.86	0.83	0.71
SOUTH AFRICA	0.91	1.42	1.01	0.80	0.77	0.76	0.81	0.84	1.08

Proportion of Highly-Cited Papers at four threshold												
Country	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.40%	3.02%	6.16%	16.21%	1.37%	5.33%	9.38%	20.34%	0.90%	4.03%	6.18%	14.19%
<b>Established Research Economies</b>												
AUSTRALIA	1.30%	6.40%	11.70%	26.20%	1.11%	5.86%	11.31%	25.49%	1.91%	5.12%	7.57%	19.37%
CANADA	0.82%	5.40%	10.78%	26.60%	0.87%	5.38%	10.18%	25.17%	1.01%	4.57%	7.26%	18.00%
SWITZERLAND	1.87%	7.62%	14.05%	31.54%	1.43%	7.75%	14.19%	30.89%	1.76%	7.34%	10.27%	21.04%
GERMANY	0.83%	5.48%	11.09%	27.63%	0.90%	5.07%	10.59%	26.07%	0.98%	4.99%	7.55%	18.87%
ENGLAND	1.51%	6.45%	12.45%	28.21%	1.25%	5.84%	11.35%	28.17%	1.05%	4.33%	6.93%	17.41%
FRANCE	1.02%	5.56%	11.08%	26.91%	0.83%	4.98%	10.35%	26.33%	0.95%	4.43%	6.70%	17.14%
ITALY	1.03%	5.10%	9.82%	25.69%	0.88%	5.18%	10.98%	27.69%	1.80%	7.16%	10.24%	21.82%
JAPAN	0.60%	2.85%	6.12%	17.22%	0.39%	2.67%	5.95%	17.05%	0.69%	2.82%	4.27%	12.05%
NETHERLANDS	1.07%	4.90%	10.61%	29.01%	0.72%	3.66%	9.42%	27.19%	1.46%	4.77%	8.62%	18.70%
SWEDEN	1.05%	5.09%	10.34%	24.49%	0.54%	3.46%	8.67%	20.66%	1.52%	5.53%	8.16%	17.98%
USA	1.74%	7.13%	12.79%	28.53%	1.35%	6.15%	11.84%	27.37%	1.23%	4.83%	7.17%	17.69%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.58%	4.31%	8.23%	21.44%	0.58%	3.50%	8.89%	22.16%	0.82%	4.34%	5.80%	16.05%
CHINA	1.02%	5.60%	11.07%	24.92%	1.37%	5.99%	11.22%	25.48%	1.08%	4.20%	6.07%	14.13%
SPAIN	0.76%	4.55%	8.79%	24.63%	1.23%	5.54%	10.55%	25.48%	1.28%	4.86%	7.12%	17.76%
SOUTH KOREA	0.76%	3.39%	7.21%	20.87%	1.76%	5.27%	9.47%	22.29%	1.43%	4.51%	6.30%	15.10%
RUSSIA	0.13%	1.20%	2.70%	9.60%	0.16%	1.07%	3.06%	10.46%	0.55%	2.44%	3.49%	9.52%
TURKEY	0.53%	4.22%	9.61%	22.98%	2.12%	6.83%	12.11%	23.55%	1.89%	6.24%	8.27%	16.45%
TAIWAN	1.29%	5.27%	9.97%	22.79%	0.91%	4.85%	9.20%	23.98%	0.48%	2.54%	3.97%	12.32%
SOUTH AFRICA	1.56%	4.21%	7.17%	21.34%	0.60%	3.33%	6.96%	18.65%	1.80%	4.80%	6.30%	17.39%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	35.83%	34.69%	30.82%	32.09%	35.19%	32.74%	36.23%	38.53%	39.69%	39.08%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	56.99%	55.48%	60.75%	62.33%	59.77%	61.41%	65.37%	63.34%	67.30%	63.10%
<b>CANADA</b>	57.65%	60.99%	57.69%	60.59%	59.21%	59.37%	61.86%	61.24%	63.34%	64.21%
<b>SWITZERLAND</b>	54.72%	58.07%	59.01%	61.17%	62.32%	64.66%	63.62%	67.28%	68.65%	67.08%
<b>GERMANY</b>	49.38%	53.39%	50.09%	53.69%	52.74%	55.82%	53.88%	53.04%	55.14%	57.66%
<b>ENGLAND</b>	52.94%	55.69%	55.79%	55.96%	57.20%	58.01%	58.80%	58.99%	60.84%	61.61%
<b>FRANCE</b>	43.41%	42.76%	45.36%	48.56%	50.84%	48.71%	52.86%	51.92%	53.87%	57.10%
<b>ITALY</b>	40.06%	41.54%	42.37%	43.95%	44.04%	46.39%	44.29%	46.06%	49.04%	50.56%
<b>JAPAN</b>	24.74%	29.29%	26.27%	25.65%	31.83%	29.94%	32.45%	33.29%	32.57%	32.69%
<b>NETHERLANDS</b>	49.30%	60.16%	58.54%	54.41%	58.17%	63.12%	63.04%	64.76%	63.77%	62.65%
<b>SWEDEN</b>	46.86%	45.07%	52.55%	46.99%	50.67%	55.20%	54.89%	60.06%	57.88%	63.66%
<b>USA</b>	36.03%	36.92%	37.19%	37.96%	39.69%	39.34%	41.84%	41.59%	45.03%	45.59%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	45.32%	46.68%	48.39%	44.15%	45.92%	47.14%	45.11%	46.96%	45.55%	47.57%
<b>CHINA</b>	25.97%	20.95%	23.64%	23.97%	24.67%	23.52%	23.18%	23.10%	22.71%	21.90%
<b>SPAIN</b>	40.58%	42.97%	44.68%	44.21%	49.41%	52.22%	52.12%	52.15%	54.32%	55.40%
<b>SOUTH KOREA</b>	37.52%	40.13%	37.93%	39.78%	41.25%	43.25%	44.62%	48.51%	45.84%	47.56%
<b>RUSSIA</b>	32.53%	30.31%	27.36%	25.17%	25.33%	26.73%	26.14%	26.15%	26.95%	28.45%
<b>TURKEY</b>	24.10%	22.31%	29.14%	27.42%	27.30%	25.74%	29.74%	36.20%	34.86%	36.40%
<b>TAIWAN</b>	35.28%	34.33%	35.89%	42.15%	40.93%	43.30%	39.20%	37.29%	38.03%	42.53%
<b>SOUTH AFRICA</b>	49.12%	52.48%	40.53%	49.24%	48.40%	50.00%	55.68%	54.82%	50.17%	58.15%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	0.86	1.02	0.89	0.88	0.83	0.91	0.91	0.84	0.82	0.90
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	0.91	0.93	0.99	0.94	0.95	0.88	0.97	0.95	0.98	0.98
<b>CANADA</b>	0.95	0.96	0.97	1.00	0.98	0.98	0.98	0.91	0.98	0.96
<b>SWITZERLAND</b>	1.04	1.09	1.06	1.05	1.04	1.14	1.08	1.11	1.20	1.16
<b>GERMANY</b>	0.97	0.99	0.97	0.99	0.99	0.98	0.97	0.98	0.97	1.02
<b>ENGLAND</b>	1.06	1.06	1.03	1.03	1.03	1.05	1.04	0.98	1.04	1.05
<b>FRANCE</b>	0.94	0.91	0.90	0.96	0.99	0.98	0.97	0.98	0.99	1.01
<b>ITALY</b>	0.92	1.00	0.99	1.00	0.99	0.99	1.01	0.98	0.96	0.99
<b>JAPAN</b>	0.81	0.82	0.81	0.81	0.84	0.78	0.79	0.77	0.80	0.79
<b>NETHERLANDS</b>	0.98	1.00	1.00	1.02	1.00	0.95	0.92	0.97	1.02	0.90
<b>SWEDEN</b>	0.95	0.93	0.89	0.90	1.00	0.90	0.94	0.91	0.99	1.00
<b>USA</b>	1.10	1.09	1.09	1.10	1.10	1.09	1.09	1.06	1.11	1.05
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	0.89	0.89	0.92	0.94	0.92	0.90	0.90	0.90	0.92	0.90
<b>CHINA</b>	0.90	0.79	1.00	1.03	1.04	1.01	0.98	0.92	0.93	0.95
<b>SPAIN</b>	0.96	0.98	0.94	1.01	1.00	1.04	1.04	1.04	1.04	1.04
<b>SOUTH KOREA</b>	0.87	0.82	0.76	0.89	0.85	0.86	0.93	0.88	0.89	0.88
<b>RUSSIA</b>	0.43	0.38	0.39	0.46	0.44	0.47	0.42	0.43	0.46	0.46
<b>TURKEY</b>	1.12	1.06	0.86	0.89	0.85	0.80	0.92	0.78	0.85	0.79
<b>TAIWAN</b>	1.25	1.12	1.17	1.11	1.09	1.10	1.05	1.09	0.99	1.01
<b>SOUTH AFRICA</b>	0.83	0.79	0.87	0.84	0.94	0.79	0.87	0.79	0.82	0.85

## A 1.3 COMPARATIVE ANALYSES, MOLECULAR BIOLOGY &amp; GENETICS

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	376	453	502	587	653	747	837	1,061	1,004	1,031
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	802	854	1,011	1,014	1,133	1,202	1,327	1,437	1,507	1,507
<b>CANADA</b>	1,546	1,626	1,840	1,893	1,986	2,125	2,181	2,360	2,324	2,126
<b>SWITZERLAND</b>	648	735	747	836	914	937	937	1,055	1,059	1,017
<b>GERMANY</b>	2,713	2,843	3,081	3,139	3,184	3,572	3,592	3,856	3,846	3,642
<b>ENGLAND</b>	2,552	2,665	3,023	3,006	3,083	3,318	3,199	3,475	3,433	3,237
<b>FRANCE</b>	1,954	1,989	2,134	2,217	2,186	2,245	2,277	2,415	2,492	2,315
<b>ITALY</b>	1,287	1,408	1,530	1,606	1,656	1,647	1,751	1,962	2,041	1,865
<b>JAPAN</b>	2,647	2,681	2,855	2,869	2,665	2,609	2,686	2,929	2,838	2,492
<b>NETHERLANDS</b>	834	889	1,014	1,075	1,130	1,272	1,322	1,487	1,465	1,334
<b>SWEDEN</b>	635	688	718	756	791	871	791	867	877	851
<b>USA</b>	13,297	13,810	14,916	15,003	15,125	15,866	16,138	17,092	16,683	15,631
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	407	541	631	716	657	772	796	936	1,010	931
<b>CHINA</b>	943	1,241	1,568	2,165	2,673	3,269	4,012	5,532	6,520	7,131
<b>SPAIN</b>	742	889	1,064	1,171	1,247	1,320	1,436	1,615	1,524	1,466
<b>SOUTH KOREA</b>	513	521	686	893	999	983	1,184	1,311	1,313	1,364
<b>RUSSIA</b>	553	541	590	612	646	674	655	641	656	607
<b>TURKEY</b>	148	184	204	185	202	256	285	317	323	338
<b>TAIWAN</b>	233	305	334	445	501	555	579	611	659	632
<b>SOUTH AFRICA</b>	54	68	77	97	107	102	117	115	130	147

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.33%	1.52%	1.54%	1.72%	1.88%	2.03%	2.19%	2.50%	2.35%	2.62%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	2.83%	2.87%	3.11%	2.98%	3.25%	3.26%	3.47%	3.39%	3.52%	3.83%
<b>CANADA</b>	5.46%	5.46%	5.66%	5.56%	5.70%	5.77%	5.70%	5.57%	5.43%	5.40%
<b>SWITZERLAND</b>	2.29%	2.47%	2.30%	2.45%	2.63%	2.54%	2.45%	2.49%	2.47%	2.58%
<b>GERMANY</b>	9.58%	9.55%	9.48%	9.21%	9.14%	9.70%	9.40%	9.10%	8.98%	9.25%
<b>ENGLAND</b>	9.02%	8.95%	9.30%	8.82%	8.85%	9.01%	8.37%	8.20%	8.02%	8.22%
<b>FRANCE</b>	6.90%	6.68%	6.56%	6.51%	6.28%	6.09%	5.96%	5.70%	5.82%	5.88%
<b>ITALY</b>	4.55%	4.73%	4.71%	4.71%	4.76%	4.47%	4.58%	4.63%	4.77%	4.73%
<b>JAPAN</b>	9.35%	9.00%	8.78%	8.42%	7.65%	7.08%	7.03%	6.91%	6.63%	6.33%
<b>NETHERLANDS</b>	2.95%	2.99%	3.12%	3.15%	3.25%	3.45%	3.46%	3.51%	3.42%	3.39%
<b>SWEDEN</b>	2.24%	2.31%	2.21%	2.22%	2.27%	2.36%	2.07%	2.05%	2.05%	2.16%
<b>USA</b>	46.97%	46.37%	45.88%	44.03%	43.44%	43.07%	42.21%	40.33%	38.97%	39.68%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.44%	1.82%	1.94%	2.10%	1.89%	2.10%	2.08%	2.21%	2.36%	2.36%
<b>CHINA</b>	3.33%	4.17%	4.82%	6.35%	7.68%	8.87%	10.49%	13.05%	15.23%	18.10%
<b>SPAIN</b>	2.62%	2.99%	3.27%	3.44%	3.58%	3.58%	3.76%	3.81%	3.56%	3.72%
<b>SOUTH KOREA</b>	1.81%	1.75%	2.11%	2.62%	2.87%	2.67%	3.10%	3.09%	3.07%	3.46%
<b>RUSSIA</b>	1.95%	1.82%	1.81%	1.80%	1.86%	1.83%	1.71%	1.51%	1.53%	1.54%
<b>TURKEY</b>	0.52%	0.62%	0.63%	0.54%	0.58%	0.69%	0.75%	0.75%	0.75%	0.86%
<b>TAIWAN</b>	0.82%	1.02%	1.03%	1.31%	1.44%	1.51%	1.51%	1.44%	1.54%	1.60%
<b>SOUTH AFRICA</b>	0.19%	0.23%	0.24%	0.28%	0.31%	0.28%	0.31%	0.27%	0.30%	0.37%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.57	0.57	0.56	0.55	0.67	0.53	0.61	0.78	0.63
<b>Established Research Economies</b>									
AUSTRALIA	1.19	1.27	1.54	1.48	1.75	1.80	1.78	1.93	2.01
CANADA	1.29	1.43	1.61	1.61	1.44	1.63	1.42	1.82	1.84
SWITZERLAND	1.69	1.74	1.87	2.02	1.99	2.14	2.50	2.41	1.81
GERMANY	1.38	1.40	1.49	1.59	1.65	1.98	1.82	2.05	2.24
ENGLAND	1.77	1.56	2.95	2.05	2.17	2.78	2.71	2.52	2.55
FRANCE	1.27	1.43	1.56	1.41	1.53	1.63	1.69	2.08	1.68
ITALY	1.02	1.10	1.33	1.35	1.44	1.46	1.48	1.68	1.47
JAPAN	1.15	1.23	1.30	1.21	1.22	1.08	1.25	1.55	1.14
NETHERLANDS	1.55	1.59	1.69	1.66	2.18	2.57	2.27	2.56	2.52
SWEDEN	1.28	1.28	1.55	1.64	1.62	2.24	1.83	1.99	2.24
USA	1.88	1.83	2.12	2.07	2.13	2.25	2.15	2.58	2.12
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.47	0.53	0.49	0.52	0.57	0.55	0.54	0.69	0.42
CHINA	1.17	0.71	1.05	0.82	0.83	0.90	0.90	1.12	0.83
SPAIN	1.13	1.22	1.37	1.31	1.42	1.43	1.40	2.35	1.56
SOUTH KOREA	0.72	0.87	0.84	0.63	0.67	0.78	0.64	1.25	0.86
RUSSIA	0.31	0.34	0.49	0.39	0.31	0.28	0.39	0.46	0.36
TURKEY	0.46	0.51	0.60	0.53	0.64	0.69	0.58	0.62	0.72
TAIWAN	0.86	0.79	0.78	0.89	0.73	0.75	0.79	1.14	0.88
SOUTH AFRICA	0.68	0.98	1.03	1.00	1.27	0.85	1.04	1.54	1.39

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.10%	0.99%	2.40%	7.40%	0.39%	1.58%	3.97%	11.52%	0.49%	1.57%	4.08%	11.70%
<b>Established Research Economies</b>												
AUSTRALIA	1.60%	6.03%	11.14%	26.46%	1.84%	7.18%	12.77%	29.22%	2.19%	6.80%	13.07%	25.68%
CANADA	1.33%	5.68%	11.06%	25.84%	1.64%	6.60%	12.54%	28.18%	1.75%	5.64%	11.82%	24.61%
SWITZERLAND	2.02%	8.26%	16.45%	37.83%	2.65%	10.64%	19.00%	40.15%	2.31%	8.72%	16.71%	32.90%
GERMANY	1.21%	5.92%	11.83%	30.21%	1.61%	7.58%	14.35%	32.20%	1.71%	6.90%	13.77%	27.50%
ENGLAND	1.66%	7.27%	14.17%	33.26%	2.29%	9.75%	17.53%	37.32%	2.25%	8.01%	15.41%	31.17%
FRANCE	1.27%	5.37%	10.92%	28.27%	1.32%	6.84%	13.35%	31.88%	1.73%	6.16%	12.96%	27.56%
ITALY	1.18%	5.14%	9.90%	23.79%	1.60%	6.29%	11.72%	27.58%	1.61%	5.50%	11.21%	24.40%
JAPAN	0.85%	4.28%	8.78%	21.27%	1.07%	4.89%	9.35%	22.91%	1.29%	4.58%	9.21%	19.32%
NETHERLANDS	1.39%	7.40%	14.17%	31.56%	2.78%	10.63%	18.56%	37.67%	3.11%	9.54%	16.72%	31.01%
SWEDEN	1.64%	6.61%	11.87%	28.85%	2.44%	9.22%	15.57%	32.02%	3.41%	8.62%	14.87%	27.89%
USA	1.58%	7.51%	14.25%	32.09%	1.79%	7.99%	15.17%	33.49%	1.84%	6.89%	13.75%	27.81%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.31%	1.48%	2.57%	7.45%	0.47%	1.83%	3.29%	9.36%	0.31%	1.24%	3.35%	9.74%
CHINA	0.74%	2.75%	5.14%	13.89%	0.54%	2.75%	5.90%	15.97%	0.61%	2.42%	5.62%	14.05%
SPAIN	1.01%	4.27%	8.85%	22.89%	1.55%	6.59%	11.73%	27.63%	1.87%	6.52%	12.04%	23.85%
SOUTH KOREA	0.80%	2.41%	4.90%	13.39%	0.76%	2.95%	5.63%	15.23%	0.93%	3.06%	6.24%	13.75%
RUSSIA	0.39%	1.39%	2.83%	7.27%	0.57%	1.68%	2.83%	8.07%	0.87%	2.38%	4.99%	10.06%
TURKEY	0.28%	2.08%	4.02%	10.68%	0.47%	2.64%	4.72%	13.02%	1.21%	2.57%	6.35%	12.56%
TAIWAN	0.61%	2.28%	5.16%	15.26%	0.27%	2.36%	5.39%	15.81%	0.62%	2.32%	5.50%	14.10%
SOUTH AFRICA	1.35%	2.36%	3.72%	15.54%	1.13%	5.22%	7.94%	17.91%	1.81%	6.14%	10.11%	17.69%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	27.13%	27.37%	28.09%	24.53%	24.50%	24.36%	26.52%	26.96%	28.39%	26.19%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	50.50%	53.98%	54.80%	57.30%	59.14%	63.48%	65.49%	64.65%	64.76%	62.31%
<b>CANADA</b>	48.58%	49.82%	50.98%	52.98%	53.63%	53.88%	56.49%	55.51%	58.39%	59.83%
<b>SWITZERLAND</b>	66.67%	67.35%	71.22%	74.28%	69.80%	74.07%	75.88%	74.22%	75.83%	73.84%
<b>GERMANY</b>	52.34%	54.41%	57.87%	58.94%	58.61%	59.80%	61.36%	60.74%	62.09%	63.56%
<b>ENGLAND</b>	57.37%	57.52%	60.93%	60.81%	61.43%	65.04%	65.93%	69.18%	69.56%	70.50%
<b>FRANCE</b>	53.74%	55.86%	59.23%	57.92%	61.71%	61.38%	61.66%	63.60%	66.01%	66.78%
<b>ITALY</b>	49.03%	49.50%	52.55%	51.93%	54.65%	53.13%	56.14%	58.21%	58.16%	58.39%
<b>JAPAN</b>	33.17%	35.81%	33.20%	34.82%	36.70%	38.60%	36.78%	39.50%	39.29%	41.57%
<b>NETHERLANDS</b>	55.28%	61.98%	63.91%	61.30%	63.98%	67.53%	68.91%	71.08%	71.13%	71.74%
<b>SWEDEN</b>	62.20%	64.10%	61.84%	64.68%	68.14%	69.23%	73.58%	76.70%	71.27%	74.62%
<b>USA</b>	30.28%	31.27%	32.66%	34.38%	35.13%	36.58%	37.64%	39.54%	41.77%	42.76%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	32.92%	35.30%	32.65%	34.92%	34.40%	33.94%	36.81%	36.65%	34.36%	40.06%
<b>CHINA</b>	44.86%	40.53%	39.29%	38.01%	36.21%	36.98%	34.72%	33.55%	32.21%	30.74%
<b>SPAIN</b>	50.81%	53.54%	51.79%	53.71%	54.85%	56.97%	59.33%	61.55%	58.99%	63.10%
<b>SOUTH KOREA</b>	36.26%	40.88%	33.38%	29.34%	28.83%	33.67%	36.06%	34.48%	35.26%	34.68%
<b>RUSSIA</b>	39.06%	39.19%	39.32%	36.27%	31.58%	29.67%	33.13%	38.22%	39.63%	39.87%
<b>TURKEY</b>	25.00%	30.98%	30.88%	34.59%	40.59%	40.23%	37.19%	30.60%	40.87%	40.53%
<b>TAIWAN</b>	33.91%	31.15%	37.13%	30.56%	29.14%	35.14%	34.02%	35.52%	35.96%	38.29%
<b>SOUTH AFRICA</b>	64.81%	75.00%	68.83%	72.16%	62.62%	69.61%	70.09%	63.48%	67.69%	70.75%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	3.24	3.18	3.00	3.00	3.05	2.70	2.77	2.92	3.07	3.05
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	5.19	5.57	6.01	5.94	6.51	6.44	6.58	6.91	7.05	6.77
<b>CANADA</b>	6.18	6.55	6.45	6.17	6.55	6.69	6.28	6.88	6.74	6.96
<b>SWITZERLAND</b>	8.06	7.74	7.78	8.12	8.15	8.15	8.44	8.33	8.41	8.49
<b>GERMANY</b>	6.84	6.67	6.85	7.12	7.36	7.29	7.36	7.48	8.14	7.87
<b>ENGLAND</b>	7.62	7.25	8.28	7.97	8.18	8.74	8.96	8.89	9.32	8.73
<b>FRANCE</b>	6.69	6.81	6.94	6.48	6.93	7.10	7.55	7.26	7.48	7.56
<b>ITALY</b>	5.11	5.54	5.53	5.57	5.76	6.12	5.84	5.78	5.72	5.69
<b>JAPAN</b>	5.49	5.71	5.60	5.95	5.99	5.67	5.90	6.03	5.81	5.80
<b>NETHERLANDS</b>	6.57	6.41	6.69	6.67	7.10	8.34	7.94	8.63	8.43	8.02
<b>SWEDEN</b>	5.97	5.66	6.40	6.80	6.95	7.07	7.12	6.91	7.54	8.86
<b>USA</b>	8.09	8.32	8.24	8.21	8.44	8.35	8.30	8.60	8.75	8.76
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.42	2.45	2.35	2.41	2.37	2.40	2.55	2.58	2.69	2.57
<b>CHINA</b>	5.04	4.47	4.80	3.95	4.38	4.50	4.40	4.61	4.41	4.39
<b>SPAIN</b>	5.46	5.99	6.20	6.23	6.46	6.57	6.74	7.08	7.06	7.08
<b>SOUTH KOREA</b>	4.41	4.80	3.86	3.55	3.46	3.67	3.70	4.06	4.10	4.79
<b>RUSSIA</b>	1.80	2.06	2.05	1.78	1.63	1.40	1.72	2.17	2.40	3.40
<b>TURKEY</b>	2.31	2.79	2.73	2.59	2.75	3.64	3.20	2.55	3.15	3.00
<b>TAIWAN</b>	4.11	4.56	4.68	4.22	3.83	3.71	4.36	4.70	4.54	4.64
<b>SOUTH AFRICA</b>	4.25	4.72	4.62	4.36	4.37	4.16	4.05	4.80	4.92	4.33

## A 1.4 COMPARATIVE ANALYSES, COMPUTER SCIENCES

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	604	522	435	546	579	577	756	851	1,085	1,252
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	996	996	611	678	782	737	936	1,025	1,191	1,250
<b>CANADA</b>	1,752	1,832	1,317	1,405	1,519	1,507	1,605	1,719	1,760	1,680
<b>SWITZERLAND</b>	639	598	327	371	370	414	453	502	532	574
<b>GERMANY</b>	2,826	2,799	1,326	1,456	1,503	1,560	1,849	1,835	1,927	1,747
<b>ENGLAND</b>	2,324	2,366	1,475	1,523	1,551	1,686	1,777	1,898	2,206	1,927
<b>FRANCE</b>	2,256	2,264	1,171	1,394	1,412	1,433	1,708	1,758	1,851	1,823
<b>ITALY</b>	1,751	1,634	1,029	1,139	1,124	1,163	1,257	1,355	1,513	1,394
<b>JAPAN</b>	2,032	1,913	1,179	1,240	1,302	1,273	1,246	1,272	1,248	1,063
<b>NETHERLANDS</b>	869	888	460	528	542	590	631	651	711	621
<b>SWEDEN</b>	460	460	253	272	298	295	341	393	475	436
<b>USA</b>	9,763	9,482	6,978	7,159	7,264	7,134	7,566	7,632	8,051	7,265
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	488	457	296	362	337	361	435	468	571	513
<b>CHINA</b>	4,059	4,583	2,112	2,593	3,335	3,935	4,766	5,761	7,292	8,040
<b>SPAIN</b>	1,601	1,561	874	1,008	1,223	1,320	1,520	1,756	2,004	1,909
<b>SOUTH KOREA</b>	2,544	2,669	1,044	1,278	1,426	1,547	1,621	1,876	1,962	1,961
<b>RUSSIA</b>	363	312	231	241	243	255	250	341	379	382
<b>TURKEY</b>	334	382	319	329	409	451	495	516	563	582
<b>TAIWAN</b>	1,024	1,180	1,011	1,323	1,432	1,418	1,645	1,540	1,495	1,396
<b>SOUTH AFRICA</b>	62	95	43	69	75	71	62	68	98	66

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.63%	1.41%	2.00%	2.26%	2.27%	2.18%	2.60%	2.72%	3.17%	3.86%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	2.69%	2.68%	2.81%	2.80%	3.06%	2.79%	3.22%	3.28%	3.48%	3.86%
<b>CANADA</b>	4.74%	4.93%	6.05%	5.80%	5.94%	5.70%	5.52%	5.50%	5.14%	5.19%
<b>SWITZERLAND</b>	1.73%	1.61%	1.50%	1.53%	1.45%	1.57%	1.56%	1.61%	1.55%	1.77%
<b>GERMANY</b>	7.64%	7.54%	6.09%	6.01%	5.88%	5.90%	6.36%	5.87%	5.63%	5.39%
<b>ENGLAND</b>	6.28%	6.37%	6.77%	6.29%	6.07%	6.38%	6.11%	6.07%	6.44%	5.95%
<b>FRANCE</b>	6.10%	6.10%	5.38%	5.76%	5.52%	5.42%	5.88%	5.63%	5.41%	5.63%
<b>ITALY</b>	4.73%	4.40%	4.73%	4.70%	4.40%	4.40%	4.32%	4.34%	4.42%	4.30%
<b>JAPAN</b>	5.49%	5.15%	5.41%	5.12%	5.09%	4.82%	4.29%	4.07%	3.64%	3.28%
<b>NETHERLANDS</b>	2.35%	2.39%	2.11%	2.18%	2.12%	2.23%	2.17%	2.08%	2.08%	1.92%
<b>SWEDEN</b>	1.24%	1.24%	1.16%	1.12%	1.17%	1.12%	1.17%	1.26%	1.39%	1.35%
<b>USA</b>	26.40%	25.53%	32.05%	29.57%	28.42%	27.00%	26.03%	24.43%	23.51%	22.42%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.32%	1.23%	1.36%	1.50%	1.32%	1.37%	1.50%	1.50%	1.67%	1.58%
<b>CHINA</b>	10.97%	12.34%	9.70%	10.71%	13.05%	14.89%	16.40%	18.44%	21.29%	24.81%
<b>SPAIN</b>	4.33%	4.20%	4.01%	4.16%	4.78%	5.00%	5.23%	5.62%	5.85%	5.89%
<b>SOUTH KOREA</b>	6.88%	7.19%	4.79%	5.28%	5.58%	5.86%	5.58%	6.00%	5.73%	6.05%
<b>RUSSIA</b>	0.98%	0.84%	1.06%	1.00%	0.95%	0.97%	0.86%	1.09%	1.11%	1.18%
<b>TURKEY</b>	0.90%	1.03%	1.47%	1.36%	1.60%	1.71%	1.70%	1.65%	1.64%	1.80%
<b>TAIWAN</b>	2.77%	3.18%	4.64%	5.46%	5.60%	5.37%	5.66%	4.93%	4.37%	4.31%
<b>SOUTH AFRICA</b>	0.17%	0.26%	0.20%	0.28%	0.29%	0.27%	0.21%	0.22%	0.29%	0.20%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.69	0.86	0.74	0.79	0.82	0.78	0.95	0.85	0.68
<b>Established Research Economies</b>									
AUSTRALIA	1.07	1.03	1.30	1.09	1.14	1.31	1.22	1.24	1.61
CANADA	1.18	1.09	1.17	1.17	1.16	1.21	1.10	1.06	0.98
SWITZERLAND	1.74	2.60	1.91	2.06	1.33	1.35	1.34	1.10	1.22
GERMANY	1.05	1.04	1.29	1.12	1.11	1.22	1.17	1.09	1.09
ENGLAND	1.18	1.12	1.16	1.07	1.48	1.16	1.19	1.34	1.26
FRANCE	0.99	1.04	0.95	1.07	1.05	1.07	0.97	0.94	0.90
ITALY	0.98	0.89	1.07	0.97	0.99	1.11	1.01	1.12	1.25
JAPAN	0.50	0.53	0.51	0.64	0.57	0.56	0.55	0.58	0.67
NETHERLANDS	1.29	1.22	1.32	1.23	1.17	1.15	1.34	1.12	0.99
SWEDEN	0.86	0.87	0.91	1.14	1.10	1.02	1.06	1.01	1.39
USA	1.67	1.66	1.32	1.44	1.36	1.32	1.30	1.12	0.97
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.58	0.62	0.76	0.82	0.76	0.84	0.82	0.77	0.83
CHINA	0.61	0.58	0.92	1.03	0.94	0.94	0.95	1.05	1.00
SPAIN	0.83	0.78	0.87	0.90	1.33	1.15	1.07	0.95	1.13
SOUTH KOREA	0.39	0.35	0.61	0.59	0.63	0.60	0.63	0.67	0.66
RUSSIA	0.32	0.39	0.32	0.27	0.36	0.45	0.31	0.41	0.63
TURKEY	0.78	0.82	0.95	0.99	1.12	0.79	1.10	1.05	1.02
TAIWAN	0.82	0.82	0.83	0.97	0.83	0.83	0.94	0.83	0.97
SOUTH AFRICA	1.55	1.15	0.55	0.51	0.64	1.78	0.41	0.29	1.71

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.57%	3.27%	7.88%	21.74%	1.05%	4.56%	8.72%	20.85%	0.86%	3.29%	5.39%	12.71%
<b>Established Research Economies</b>												
AUSTRALIA	1.01%	5.82%	11.64%	28.56%	1.35%	6.21%	13.02%	29.45%	2.25%	8.32%	11.72%	22.74%
CANADA	1.09%	6.28%	12.26%	28.99%	1.40%	6.25%	11.91%	25.64%	1.08%	4.74%	7.56%	16.86%
SWITZERLAND	2.64%	9.46%	16.95%	35.56%	1.27%	8.34%	14.49%	30.99%	1.27%	5.15%	8.05%	16.73%
GERMANY	1.26%	5.90%	10.84%	26.80%	1.32%	6.33%	12.36%	26.46%	1.09%	5.25%	8.00%	18.32%
ENGLAND	1.14%	5.85%	11.19%	28.64%	1.68%	6.76%	12.66%	27.03%	1.67%	6.82%	10.02%	19.11%
FRANCE	0.85%	4.86%	9.47%	25.14%	1.01%	4.79%	9.44%	22.80%	0.90%	3.76%	6.07%	14.83%
ITALY	0.81%	4.43%	9.11%	24.89%	0.71%	4.86%	10.66%	24.17%	0.96%	5.57%	8.91%	19.71%
JAPAN	0.41%	2.28%	4.65%	14.46%	0.41%	2.42%	4.48%	11.94%	0.43%	2.73%	4.37%	10.60%
NETHERLANDS	1.46%	6.74%	13.04%	30.82%	1.62%	6.71%	12.63%	27.42%	1.20%	5.86%	8.71%	19.29%
SWEDEN	0.97%	5.26%	10.38%	25.19%	0.90%	5.28%	12.06%	25.40%	0.99%	4.28%	6.92%	16.03%
USA	1.98%	8.51%	15.40%	33.35%	1.67%	6.78%	12.43%	26.11%	1.24%	5.24%	8.40%	17.18%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.25%	2.81%	5.68%	18.71%	0.37%	2.44%	6.62%	17.99%	0.46%	3.04%	4.43%	13.01%
CHINA	0.56%	3.55%	7.59%	18.56%	1.08%	5.51%	10.68%	22.85%	1.48%	5.86%	8.55%	17.02%
SPAIN	0.50%	2.97%	7.47%	21.83%	0.95%	4.85%	10.07%	24.04%	1.20%	5.11%	7.82%	17.94%
SOUTH KOREA	0.20%	1.63%	3.88%	11.13%	0.62%	2.84%	5.97%	13.89%	0.66%	2.93%	4.33%	10.96%
RUSSIA		0.44%	2.18%	8.28%	0.28%	1.29%	3.21%	6.80%	0.66%	2.10%	3.29%	7.88%
TURKEY	0.66%	4.91%	10.04%	25.51%	1.12%	5.45%	10.15%	23.30%	0.96%	4.80%	7.60%	15.90%
TAIWAN	0.35%	4.14%	9.39%	24.24%	0.33%	3.65%	8.05%	20.07%	0.66%	4.01%	6.36%	14.77%
SOUTH AFRICA	1.49%	3.35%	6.69%	22.30%	0.36%	2.17%	5.43%	12.32%		4.88%	7.93%	15.24%



Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	26.16%	31.23%	33.10%	28.21%	27.63%	32.06%	30.03%	30.55%	28.20%	25.80%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	38.96%	41.97%	45.99%	52.36%	51.02%	53.19%	57.37%	59.02%	62.80%	61.44%
<b>CANADA</b>	38.98%	43.89%	46.24%	46.98%	50.03%	50.17%	54.58%	54.22%	59.77%	60.89%
<b>SWITZERLAND</b>	48.51%	53.34%	63.61%	66.31%	66.76%	64.98%	67.99%	66.73%	71.24%	71.60%
<b>GERMANY</b>	33.58%	36.26%	43.89%	44.85%	48.84%	51.73%	52.08%	54.06%	55.37%	55.29%
<b>ENGLAND</b>	38.47%	42.94%	47.05%	52.13%	53.26%	55.99%	59.43%	58.06%	63.37%	67.83%
<b>FRANCE</b>	36.44%	36.31%	44.41%	48.28%	49.08%	54.85%	55.09%	55.63%	56.78%	57.38%
<b>ITALY</b>	30.95%	31.33%	40.23%	40.21%	38.17%	40.58%	44.55%	42.80%	46.73%	47.42%
<b>JAPAN</b>	18.85%	20.70%	23.58%	26.77%	27.19%	29.30%	33.79%	33.81%	35.50%	38.38%
<b>NETHERLANDS</b>	40.74%	42.91%	46.30%	50.95%	53.32%	53.22%	54.52%	56.37%	56.82%	61.19%
<b>SWEDEN</b>	40.22%	41.09%	46.64%	50.00%	57.38%	54.24%	58.65%	53.44%	64.21%	63.30%
<b>USA</b>	27.42%	29.37%	30.41%	32.52%	34.50%	37.78%	40.30%	41.95%	45.76%	48.38%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	29.30%	28.01%	41.55%	38.95%	35.91%	36.29%	39.54%	40.38%	40.81%	42.88%
<b>CHINA</b>	19.17%	22.04%	33.05%	33.47%	32.11%	33.80%	35.63%	35.53%	36.48%	35.58%
<b>SPAIN</b>	32.04%	31.45%	37.99%	39.19%	37.53%	38.94%	38.95%	39.64%	40.87%	45.94%
<b>SOUTH KOREA</b>	14.07%	15.02%	29.60%	27.15%	26.65%	29.22%	32.14%	31.29%	29.71%	29.12%
<b>RUSSIA</b>	28.10%	31.41%	24.24%	24.48%	27.57%	34.51%	34.80%	24.34%	23.22%	25.39%
<b>TURKEY</b>	27.54%	25.13%	28.21%	28.57%	23.47%	28.38%	30.91%	29.65%	33.39%	31.62%
<b>TAIWAN</b>	12.11%	14.49%	13.16%	15.42%	12.64%	17.70%	16.72%	17.53%	20.54%	20.77%
<b>SOUTH AFRICA</b>	37.10%	36.84%	37.21%	42.03%	50.67%	42.25%	46.77%	38.24%	45.92%	54.55%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	0.86	1.22	1.66	1.62	1.69	1.63	1.63	1.61	1.50	1.45
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	0.83	1.19	1.92	1.90	1.94	2.07	1.95	1.97	2.09	2.10
<b>CANADA</b>	0.99	1.21	1.97	1.83	1.93	1.88	1.92	1.95	1.91	1.91
<b>SWITZERLAND</b>	0.80	1.02	2.13	1.98	2.20	2.11	2.18	2.20	2.14	2.30
<b>GERMANY</b>	0.82	0.90	1.87	1.86	1.94	1.90	1.92	1.98	1.93	2.03
<b>ENGLAND</b>	1.00	1.02	1.86	1.93	2.02	1.92	1.97	2.07	2.02	2.10
<b>FRANCE</b>	0.65	0.78	1.58	1.73	1.64	1.71	1.65	1.66	1.72	1.74
<b>ITALY</b>	0.87	0.95	1.73	1.68	1.78	1.65	1.72	1.76	1.84	1.77
<b>JAPAN</b>	0.57	0.55	0.94	0.93	1.06	1.04	1.08	1.07	1.25	1.34
<b>NETHERLANDS</b>	0.76	0.89	1.84	1.69	1.86	2.01	1.84	1.94	1.96	2.13
<b>SWEDEN</b>	0.91	1.24	1.88	1.88	1.95	1.84	1.98	1.74	1.89	1.89
<b>USA</b>	1.33	1.47	2.03	1.98	2.06	2.01	2.09	2.10	2.11	2.14
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	0.78	0.73	1.48	1.57	1.59	1.61	1.74	1.57	1.72	1.72
<b>CHINA</b>	0.44	0.54	1.59	1.57	1.40	1.41	1.45	1.49	1.57	1.62
<b>SPAIN</b>	0.62	0.78	1.75	1.68	1.73	1.82	1.76	1.68	1.75	1.87
<b>SOUTH KOREA</b>	0.38	0.44	1.29	1.24	1.21	1.09	1.16	1.19	1.27	1.27
<b>RUSSIA</b>	0.47	0.44	0.61	0.48	0.73	0.58	0.66	0.55	0.51	0.55
<b>TURKEY</b>	0.72	0.92	1.65	1.50	1.50	1.49	1.41	1.47	1.50	1.54
<b>TAIWAN</b>	1.00	1.00	1.43	1.46	1.38	1.30	1.42	1.41	1.65	1.55
<b>SOUTH AFRICA</b>	1.21	1.32	1.90	1.53	1.89	1.99	1.80	1.36	1.73	1.90

## A 1.5 COMPARATIVE ANALYSES, MICROBIOLOGY

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	308	335	402	532	682	833	932	1,100	922	752
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	405	456	483	517	516	560	570	590	697	669
<b>CANADA</b>	555	594	658	656	658	669	752	792	820	736
<b>SWITZERLAND</b>	253	306	301	285	331	360	410	378	389	399
<b>GERMANY</b>	1,155	1,212	1,298	1,308	1,320	1,426	1,394	1,549	1,520	1,490
<b>ENGLAND</b>	1,007	1,035	1,045	1,077	1,096	1,160	1,204	1,203	1,152	1,077
<b>FRANCE</b>	1,037	1,011	994	1,090	1,073	1,199	1,220	1,279	1,307	1,180
<b>ITALY</b>	402	452	449	561	523	485	548	609	593	604
<b>JAPAN</b>	1,038	979	1,198	1,127	1,040	1,075	1,174	1,207	1,200	1,031
<b>NETHERLANDS</b>	404	395	401	432	419	490	516	550	565	506
<b>SWEDEN</b>	243	251	281	253	251	297	269	290	321	273
<b>USA</b>	4,642	4,637	4,989	4,886	5,003	5,128	5,749	5,943	5,998	5,438
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	386	473	513	571	566	543	698	790	805	768
<b>CHINA</b>	511	620	854	1,020	1,242	1,465	2,118	2,596	2,602	2,447
<b>SPAIN</b>	556	569	565	572	591	579	678	774	700	698
<b>SOUTH KOREA</b>	534	618	714	751	668	667	753	919	788	764
<b>RUSSIA</b>	257	241	223	273	275	267	256	298	281	275
<b>TURKEY</b>	79	69	180	191	186	202	251	257	210	166
<b>TAIWAN</b>	152	138	169	188	202	188	238	233	212	197
<b>SOUTH AFRICA</b>	90	102	117	140	162	168	202	219	210	214

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	2.37%	2.48%	2.77%	3.50%	4.32%	5.03%	5.00%	5.49%	4.73%	4.29%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	3.12%	3.38%	3.33%	3.41%	3.27%	3.38%	3.06%	2.95%	3.58%	3.82%
<b>CANADA</b>	4.28%	4.40%	4.54%	4.32%	4.17%	4.04%	4.04%	3.96%	4.21%	4.20%
<b>SWITZERLAND</b>	1.95%	2.27%	2.08%	1.88%	2.10%	2.17%	2.20%	1.89%	2.00%	2.28%
<b>GERMANY</b>	8.90%	8.99%	8.95%	8.61%	8.36%	8.61%	7.48%	7.74%	7.80%	8.50%
<b>ENGLAND</b>	7.76%	7.67%	7.21%	7.09%	6.94%	7.01%	6.46%	6.01%	5.91%	6.14%
<b>FRANCE</b>	7.99%	7.49%	6.85%	7.18%	6.79%	7.24%	6.55%	6.39%	6.71%	6.73%
<b>ITALY</b>	3.10%	3.35%	3.10%	3.69%	3.31%	2.93%	2.94%	3.04%	3.04%	3.45%
<b>JAPAN</b>	8.00%	7.26%	8.26%	7.42%	6.58%	6.49%	6.30%	6.03%	6.16%	5.88%
<b>NETHERLANDS</b>	3.11%	2.93%	2.76%	2.85%	2.65%	2.96%	2.77%	2.75%	2.90%	2.89%
<b>SWEDEN</b>	1.87%	1.86%	1.94%	1.67%	1.59%	1.79%	1.44%	1.45%	1.65%	1.56%
<b>USA</b>	35.77%	34.38%	34.40%	32.18%	31.67%	30.97%	30.85%	29.68%	30.78%	31.02%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.97%	3.51%	3.54%	3.76%	3.58%	3.28%	3.75%	3.95%	4.13%	4.38%
<b>CHINA</b>	3.94%	4.60%	5.89%	6.72%	7.86%	8.85%	11.37%	12.96%	13.35%	13.96%
<b>SPAIN</b>	4.28%	4.22%	3.90%	3.77%	3.74%	3.50%	3.64%	3.87%	3.59%	3.98%
<b>SOUTH KOREA</b>	4.11%	4.58%	4.92%	4.95%	4.23%	4.03%	4.04%	4.59%	4.04%	4.36%
<b>RUSSIA</b>	1.98%	1.79%	1.54%	1.80%	1.74%	1.61%	1.37%	1.49%	1.44%	1.57%
<b>TURKEY</b>	0.61%	0.51%	1.24%	1.26%	1.18%	1.22%	1.35%	1.28%	1.08%	0.95%
<b>TAIWAN</b>	1.17%	1.02%	1.17%	1.24%	1.28%	1.14%	1.28%	1.16%	1.09%	1.12%
<b>SOUTH AFRICA</b>	0.69%	0.76%	0.81%	0.92%	1.03%	1.01%	1.08%	1.09%	1.08%	1.22%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.57	0.67	0.60	0.61	0.46	0.39	0.43	0.44	0.48
<b>Established Research Economies</b>									
AUSTRALIA	1.13	1.19	1.09	1.14	1.27	1.16	1.24	1.20	1.16
CANADA	1.24	1.15	1.12	0.99	1.01	1.21	1.23	1.14	1.11
SWITZERLAND	1.44	1.32	1.19	1.48	1.54	1.59	1.36	1.51	1.55
GERMANY	1.08	1.17	1.10	1.11	1.14	1.31	1.38	1.25	1.30
ENGLAND	1.28	1.32	1.27	1.31	1.45	1.56	1.51	1.49	1.43
FRANCE	1.11	1.12	1.21	1.18	1.19	1.22	1.28	1.19	1.38
ITALY	0.91	0.86	0.81	0.81	0.77	0.72	0.90	0.94	1.06
JAPAN	0.77	0.78	0.77	0.74	0.75	0.78	0.82	0.93	0.81
NETHERLANDS	1.22	1.47	1.26	1.43	1.27	1.35	1.31	1.56	1.65
SWEDEN	1.38	1.24	1.22	1.05	1.10	1.31	1.32	1.15	1.42
USA	1.37	1.35	1.42	1.48	1.53	1.52	1.48	1.55	1.50
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.80	0.59	0.58	0.53	0.54	0.57	0.60	0.55	0.46
CHINA	0.84	0.69	0.74	0.70	0.63	0.66	0.64	0.64	0.64
SPAIN	0.92	0.93	0.88	1.00	0.98	1.08	0.95	0.99	1.12
SOUTH KOREA	0.49	0.44	0.54	0.53	0.52	0.59	0.54	0.68	0.54
RUSSIA	0.51	0.46	0.38	0.36	0.38	0.38	0.49	0.57	0.57
TURKEY	0.47	0.39	0.24	0.31	0.27	0.25	0.24	0.25	0.31
TAIWAN	0.66	0.80	0.65	0.68	0.61	0.56	0.71	0.69	0.68
SOUTH AFRICA	0.74	1.15	1.06	1.19	1.07	0.84	0.92	0.82	1.06

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.32%	1.33%	3.55%	13.25%	0.08%	0.87%	2.00%	8.60%	0.12%	0.78%	2.93%	8.30%
<b>Established Research Economies</b>												
AUSTRALIA	1.34%	5.96%	11.55%	31.43%	1.61%	7.42%	13.73%	32.51%	1.24%	4.98%	11.35%	24.52%
CANADA	1.10%	6.33%	12.63%	30.69%	1.67%	7.04%	13.55%	32.15%	1.41%	5.46%	11.50%	22.88%
SWITZERLAND	1.83%	7.60%	15.11%	35.98%	2.30%	10.07%	18.53%	41.72%	1.14%	7.23%	15.61%	28.17%
GERMANY	1.35%	6.25%	12.19%	30.04%	1.78%	7.56%	14.52%	33.59%	1.33%	5.81%	12.59%	25.02%
ENGLAND	1.95%	8.43%	15.56%	35.16%	2.59%	10.19%	18.06%	38.41%	1.93%	6.73%	14.04%	27.90%
FRANCE	1.26%	6.75%	12.49%	29.26%	1.47%	7.96%	14.80%	33.03%	1.09%	5.99%	11.58%	23.60%
ITALY	0.86%	3.65%	7.99%	23.02%	0.51%	4.20%	9.70%	25.54%	1.00%	3.93%	8.52%	19.38%
JAPAN	0.60%	2.74%	6.31%	19.16%	0.38%	3.14%	6.87%	19.51%	0.45%	2.73%	5.87%	13.98%
NETHERLANDS	2.51%	8.76%	16.05%	38.30%	2.18%	9.32%	17.67%	39.85%	2.33%	9.06%	16.53%	29.97%
SWEDEN	1.46%	6.61%	12.16%	28.89%	1.99%	8.13%	15.00%	32.88%	1.35%	5.72%	12.79%	23.23%
USA	1.81%	8.28%	15.78%	35.42%	2.01%	9.42%	17.37%	37.43%	1.62%	6.92%	13.72%	26.32%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.51%	2.11%	3.04%	10.96%	0.27%	1.89%	3.89%	12.13%	0.64%	2.10%	4.39%	9.66%
CHINA	0.57%	2.50%	5.52%	15.84%	0.38%	2.13%	4.97%	14.82%	0.53%	2.44%	4.65%	11.21%
SPAIN	0.97%	3.80%	7.65%	23.87%	1.07%	5.03%	10.53%	25.82%	0.72%	4.15%	9.73%	20.10%
SOUTH KOREA	0.19%	0.99%	2.18%	8.33%	0.20%	1.36%	3.23%	10.84%	0.26%	0.90%	2.26%	7.99%
RUSSIA	0.20%	1.31%	3.32%	10.16%	0.55%	2.10%	3.74%	10.68%	0.90%	3.42%	5.40%	10.97%
TURKEY	0.19%	0.39%	0.96%	4.82%	0.11%	0.67%	1.23%	4.13%		0.27%	1.60%	4.79%
TAIWAN	0.15%	2.47%	6.03%	17.16%		2.09%	4.30%	16.61%		0.98%	3.67%	11.49%
SOUTH AFRICA	2.23%	7.80%	12.92%	30.29%	1.33%	5.59%	9.45%	24.77%	1.42%	6.60%	10.38%	22.41%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	25.97%	26.27%	26.37%	19.55%	17.45%	21.01%	18.56%	21.00%	20.17%	24.34%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	52.10%	49.56%	54.66%	55.32%	57.56%	57.68%	54.21%	58.14%	60.26%	55.75%
<b>CANADA</b>	44.68%	40.07%	46.81%	51.37%	48.18%	52.32%	53.06%	50.00%	54.02%	51.36%
<b>SWITZERLAND</b>	65.22%	66.01%	63.79%	67.72%	70.09%	70.28%	71.95%	71.69%	71.72%	71.43%
<b>GERMANY</b>	51.43%	54.21%	54.62%	51.83%	55.45%	57.36%	58.11%	57.00%	62.04%	59.06%
<b>ENGLAND</b>	57.10%	61.06%	62.39%	65.27%	60.22%	65.60%	68.52%	67.83%	70.31%	69.82%
<b>FRANCE</b>	51.11%	55.00%	51.41%	53.94%	53.22%	55.30%	55.66%	57.31%	58.61%	59.07%
<b>ITALY</b>	45.52%	40.93%	42.09%	45.63%	41.87%	47.63%	46.90%	48.77%	52.45%	48.51%
<b>JAPAN</b>	27.17%	34.73%	32.05%	34.61%	35.87%	39.26%	39.52%	38.86%	41.17%	39.77%
<b>NETHERLANDS</b>	56.44%	57.97%	62.59%	63.66%	57.76%	64.49%	65.89%	66.36%	68.67%	68.38%
<b>SWEDEN</b>	60.49%	58.57%	64.77%	63.64%	68.92%	68.35%	69.89%	66.21%	70.72%	75.46%
<b>USA</b>	28.74%	30.62%	32.63%	35.14%	33.38%	35.80%	36.93%	37.71%	39.68%	40.81%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	32.90%	30.02%	29.43%	28.20%	28.80%	32.04%	37.11%	32.78%	35.53%	38.15%
<b>CHINA</b>	41.49%	36.77%	37.82%	39.12%	30.92%	30.51%	28.61%	24.38%	28.55%	29.87%
<b>SPAIN</b>	44.42%	43.41%	48.32%	46.85%	47.04%	50.43%	51.77%	55.81%	57.57%	58.60%
<b>SOUTH KOREA</b>	24.34%	24.11%	25.35%	23.70%	25.45%	25.34%	25.50%	22.85%	25.25%	25.79%
<b>RUSSIA</b>	49.81%	46.06%	47.53%	47.99%	43.27%	43.82%	48.05%	46.98%	44.48%	46.18%
<b>TURKEY</b>	21.52%	27.54%	13.33%	19.90%	14.52%	15.84%	15.94%	15.95%	21.90%	22.29%
<b>TAIWAN</b>	24.34%	28.26%	32.54%	33.51%	24.26%	26.60%	29.41%	29.61%	26.42%	33.50%
<b>SOUTH AFRICA</b>	64.44%	58.82%	70.09%	55.00%	65.43%	57.14%	57.43%	62.10%	70.48%	69.16%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	2.28	2.42	2.21	2.16	1.66	1.69	1.56	1.75	1.88	2.38
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	3.35	3.78	3.81	4.14	4.34	3.95	4.10	4.03	4.23	4.28
<b>CANADA</b>	3.76	3.68	3.67	3.81	3.66	4.20	4.15	4.09	4.27	4.38
<b>SWITZERLAND</b>	4.34	4.17	3.84	5.04	4.59	4.52	4.27	4.64	4.96	4.80
<b>GERMANY</b>	3.66	3.83	3.75	3.74	3.95	4.19	4.28	4.18	4.25	4.28
<b>ENGLAND</b>	4.23	4.35	4.20	4.39	4.60	4.69	4.68	4.65	4.92	5.18
<b>FRANCE</b>	3.96	4.08	4.25	3.77	4.47	4.13	4.46	4.13	4.49	4.53
<b>ITALY</b>	3.17	3.04	2.98	2.91	2.92	2.89	2.92	3.16	3.18	3.02
<b>JAPAN</b>	2.85	2.99	2.83	2.90	3.05	3.18	3.02	3.23	3.27	3.34
<b>NETHERLANDS</b>	4.09	4.79	4.01	4.38	4.38	4.13	4.31	4.47	4.65	4.75
<b>SWEDEN</b>	3.66	4.40	3.74	3.76	3.81	4.26	4.15	3.92	4.50	4.18
<b>USA</b>	4.49	4.41	4.62	4.82	4.96	4.93	4.93	4.98	5.02	5.29
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.31	1.84	1.73	1.83	2.00	2.12	2.22	2.23	2.35	2.49
<b>CHINA</b>	2.71	2.59	2.62	2.72	2.54	2.48	2.43	2.63	2.71	2.95
<b>SPAIN</b>	3.13	3.28	3.28	3.36	3.84	3.92	3.60	3.57	3.58	3.71
<b>SOUTH KOREA</b>	1.91	1.91	2.04	2.03	2.09	2.39	2.36	2.39	2.33	2.25
<b>RUSSIA</b>	2.01	2.01	1.93	1.70	1.78	1.93	1.74	2.09	1.99	2.07
<b>TURKEY</b>	1.88	1.78	1.02	0.96	0.76	0.77	0.84	0.89	1.07	1.38
<b>TAIWAN</b>	3.03	3.12	3.14	3.09	3.02	3.08	3.22	3.30	3.29	3.62
<b>SOUTH AFRICA</b>	2.77	3.81	3.06	3.50	2.94	2.84	2.62	2.77	3.27	4.20

## A 1.6 COMPARATIVE ANALYSES, SOCIAL SCIENCES GENERAL

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	370	410	434	561	770	800	832	882	783	773
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	1,745	2,038	2,479	3,494	3,979	4,397	4,910	5,195	5,636	5,610
<b>CANADA</b>	2,504	2,744	3,075	3,529	4,168	4,508	4,769	4,784	4,942	4,602
<b>SWITZERLAND</b>	520	555	679	729	846	1,017	1,117	1,160	1,180	1,190
<b>GERMANY</b>	1,487	1,683	2,098	2,472	2,785	3,023	3,261	3,600	3,836	3,734
<b>ENGLAND</b>	5,262	5,835	6,327	7,231	8,004	8,513	9,258	10,016	10,434	9,449
<b>FRANCE</b>	931	1,051	1,216	1,524	1,608	1,803	1,943	2,066	1,998	1,798
<b>ITALY</b>	524	666	854	1,095	1,273	1,364	1,506	1,580	1,825	1,772
<b>JAPAN</b>	589	652	694	700	840	916	941	985	1,015	886
<b>NETHERLANDS</b>	1,370	1,486	1,705	2,019	2,430	2,753	2,872	3,198	3,482	3,358
<b>SWEDEN</b>	739	893	933	1,205	1,403	1,626	1,760	1,946	2,017	2,020
<b>USA</b>	20,944	22,133	23,010	26,272	28,219	29,853	31,068	31,812	31,663	30,777
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	407	477	973	1,501	1,620	1,741	1,903	2,179	1,771	1,663
<b>CHINA</b>	632	772	916	1,246	1,608	1,955	2,204	2,466	2,945	3,014
<b>SPAIN</b>	581	802	1,326	1,852	2,207	2,414	2,739	2,876	2,992	2,842
<b>SOUTH KOREA</b>	269	333	385	469	643	780	864	995	1,096	1,187
<b>RUSSIA</b>	251	286	276	273	313	371	399	442	370	345
<b>TURKEY</b>	244	307	517	700	881	1,022	1,219	1,489	1,319	1,152
<b>TAIWAN</b>	348	417	507	672	728	882	1,061	1,230	1,232	1,168
<b>SOUTH AFRICA</b>	440	492	662	880	1,037	1,122	1,195	1,388	1,338	1,453

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	0.90%	0.92%	0.86%	0.92%	1.13%	1.10%	1.07%	1.09%	0.96%	1.03%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	4.26%	4.56%	4.90%	5.76%	5.86%	6.02%	6.33%	6.43%	6.91%	7.45%
<b>CANADA</b>	6.11%	6.13%	6.07%	5.81%	6.14%	6.18%	6.15%	5.93%	6.06%	6.11%
<b>SWITZERLAND</b>	1.27%	1.24%	1.34%	1.20%	1.25%	1.39%	1.44%	1.44%	1.45%	1.58%
<b>GERMANY</b>	3.63%	3.76%	4.14%	4.07%	4.10%	4.14%	4.21%	4.46%	4.71%	4.96%
<b>ENGLAND</b>	12.84%	13.04%	12.50%	11.91%	11.79%	11.66%	11.94%	12.41%	12.80%	12.55%
<b>FRANCE</b>	2.27%	2.35%	2.40%	2.51%	2.37%	2.47%	2.51%	2.56%	2.45%	2.39%
<b>ITALY</b>	1.28%	1.49%	1.69%	1.80%	1.87%	1.87%	1.94%	1.96%	2.24%	2.35%
<b>JAPAN</b>	1.44%	1.46%	1.37%	1.15%	1.24%	1.25%	1.21%	1.22%	1.25%	1.18%
<b>NETHERLANDS</b>	3.34%	3.32%	3.37%	3.33%	3.58%	3.77%	3.70%	3.96%	4.27%	4.46%
<b>SWEDEN</b>	1.80%	2.00%	1.84%	1.99%	2.07%	2.23%	2.27%	2.41%	2.47%	2.68%
<b>USA</b>	51.09%	49.47%	45.46%	43.29%	41.55%	40.89%	40.07%	39.40%	38.84%	40.89%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	0.99%	1.07%	1.92%	2.47%	2.39%	2.38%	2.45%	2.70%	2.17%	2.21%
<b>CHINA</b>	1.54%	1.73%	1.81%	2.05%	2.37%	2.68%	2.84%	3.05%	3.61%	4.00%
<b>SPAIN</b>	1.42%	1.79%	2.62%	3.05%	3.25%	3.31%	3.53%	3.56%	3.67%	3.78%
<b>SOUTH KOREA</b>	0.66%	0.74%	0.76%	0.77%	0.95%	1.07%	1.11%	1.23%	1.34%	1.58%
<b>RUSSIA</b>	0.61%	0.64%	0.55%	0.45%	0.46%	0.51%	0.51%	0.55%	0.45%	0.46%
<b>TURKEY</b>	0.60%	0.69%	1.02%	1.15%	1.30%	1.40%	1.57%	1.84%	1.62%	1.53%
<b>TAIWAN</b>	0.85%	0.93%	1.00%	1.11%	1.07%	1.21%	1.37%	1.52%	1.51%	1.55%
<b>SOUTH AFRICA</b>	1.07%	1.10%	1.31%	1.45%	1.53%	1.54%	1.54%	1.72%	1.64%	1.93%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.59	0.64	0.57	0.60	0.55	0.66	0.63	0.57	0.72
<b>Established Research Economies</b>									
AUSTRALIA	0.96	0.99	1.03	1.01	1.03	1.01	1.02	1.08	1.07
CANADA	1.13	1.10	1.02	1.06	1.08	1.09	1.11	1.05	1.07
SWITZERLAND	1.31	1.15	1.28	1.54	1.36	1.30	1.37	1.71	1.80
GERMANY	0.89	0.87	0.92	0.97	0.96	1.01	1.14	1.19	1.38
ENGLAND	1.18	1.22	1.25	1.29	1.25	1.25	1.24	1.25	1.32
FRANCE	0.89	0.86	0.88	0.94	0.94	0.96	1.02	1.09	1.47
ITALY	0.92	1.10	0.94	0.95	0.97	1.03	1.09	1.26	1.38
JAPAN	0.74	0.75	0.68	0.80	0.81	0.76	0.84	0.88	0.72
NETHERLANDS	1.30	1.36	1.46	1.31	1.37	1.43	1.46	1.39	1.46
SWEDEN	1.04	1.14	1.02	1.06	1.14	1.14	1.16	1.01	1.06
USA	1.23	1.22	1.26	1.27	1.25	1.26	1.24	1.24	1.19
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.65	0.67	0.53	0.43	0.45	0.42	0.44	0.41	0.43
CHINA	0.99	0.90	0.98	0.94	0.95	0.94	1.05	1.11	0.98
SPAIN	0.86	0.89	0.71	0.72	0.71	0.79	0.83	0.92	0.74
SOUTH KOREA	1.07	0.81	0.76	0.78	0.94	0.78	0.86	0.70	0.63
RUSSIA	0.25	0.24	0.30	0.33	0.36	0.28	0.36	0.48	0.34
TURKEY	0.66	0.74	0.67	0.57	0.73	0.70	0.93	1.09	0.56
TAIWAN	1.12	0.82	0.93	0.91	0.97	1.02	0.99	0.88	0.84
SOUTH AFRICA	0.93	0.85	0.81	0.88	0.82	0.98	0.73	0.82	1.01

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.56%	3.89%	7.38%	19.55%	0.58%	3.47%	7.49%	19.43%	0.71%	2.70%	6.04%	19.79%
<b>Established Research Economies</b>												
AUSTRALIA	1.09%	5.27%	10.42%	25.79%	1.21%	5.42%	10.97%	25.97%	1.24%	3.49%	7.95%	23.82%
CANADA	1.38%	5.89%	11.20%	27.50%	1.60%	6.63%	12.52%	28.09%	1.19%	3.82%	8.42%	24.37%
SWITZERLAND	2.66%	10.59%	18.20%	36.77%	3.36%	10.92%	18.55%	35.60%	2.62%	6.92%	13.08%	31.05%
GERMANY	1.16%	5.30%	10.68%	23.09%	1.56%	6.55%	12.24%	25.96%	1.73%	4.60%	10.18%	25.85%
ENGLAND	1.39%	6.40%	12.36%	28.81%	1.51%	6.55%	12.27%	27.82%	1.43%	4.16%	9.27%	25.37%
FRANCE	1.25%	5.93%	10.84%	24.40%	1.81%	7.05%	11.93%	24.57%	1.63%	4.90%	9.72%	24.82%
ITALY	1.15%	7.26%	13.19%	28.64%	1.56%	7.32%	13.30%	29.70%	1.50%	4.92%	10.37%	25.74%
JAPAN	0.34%	3.61%	7.67%	23.00%	1.03%	4.94%	9.80%	23.76%	1.10%	2.42%	6.21%	19.46%
NETHERLANDS	1.88%	8.37%	16.50%	36.87%	2.11%	9.06%	16.64%	35.25%	1.68%	5.25%	11.10%	29.30%
SWEDEN	1.41%	7.27%	14.06%	32.97%	1.63%	7.88%	13.96%	31.58%	1.24%	4.21%	9.02%	25.86%
USA	1.33%	6.15%	11.95%	27.96%	1.44%	6.47%	12.31%	28.21%	1.28%	3.86%	8.70%	24.08%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.60%	2.62%	5.87%	17.18%	0.54%	2.26%	4.47%	13.30%	0.55%	1.63%	3.73%	13.02%
CHINA	1.01%	5.52%	10.96%	27.87%	1.15%	6.00%	12.18%	29.53%	0.84%	3.59%	8.37%	22.92%
SPAIN	0.81%	4.17%	8.55%	19.49%	1.01%	4.29%	8.13%	19.54%	0.89%	2.97%	7.16%	19.25%
SOUTH KOREA	0.48%	4.12%	9.20%	21.36%	0.70%	3.93%	8.23%	20.96%	0.79%	2.06%	4.60%	15.46%
RUSSIA		0.92%	3.41%	7.83%	0.85%	3.02%	4.85%	9.51%	0.42%	1.68%	3.50%	8.67%
TURKEY	0.34%	2.21%	4.92%	15.33%	1.37%	3.06%	4.71%	10.97%	0.20%	0.77%	2.02%	9.55%
TAIWAN	0.87%	4.48%	9.21%	25.10%	0.59%	4.13%	9.13%	24.02%	0.21%	1.83%	4.96%	17.71%
SOUTH AFRICA	0.89%	4.89%	9.34%	21.30%	1.46%	4.85%	9.13%	20.18%	1.11%	3.26%	6.31%	19.10%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	25.14%	31.46%	32.49%	30.66%	28.70%	35.75%	37.62%	38.21%	42.53%	40.88%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	25.96%	28.75%	25.78%	23.84%	26.11%	26.81%	29.51%	29.72%	32.93%	34.28%
<b>CANADA</b>	27.80%	28.28%	30.44%	30.26%	30.76%	32.01%	34.14%	35.72%	37.64%	38.98%
<b>SWITZERLAND</b>	51.54%	54.23%	55.67%	51.58%	52.36%	53.98%	58.46%	56.98%	61.27%	59.50%
<b>GERMANY</b>	26.36%	29.47%	28.60%	29.45%	32.03%	33.94%	34.87%	36.33%	38.58%	40.81%
<b>ENGLAND</b>	27.50%	27.06%	29.46%	30.22%	31.73%	34.61%	34.21%	35.14%	37.22%	40.86%
<b>FRANCE</b>	35.45%	39.11%	37.42%	37.34%	36.50%	41.38%	42.00%	42.55%	49.00%	52.28%
<b>ITALY</b>	42.94%	42.19%	40.98%	39.09%	36.29%	37.68%	36.92%	39.56%	43.45%	43.51%
<b>JAPAN</b>	26.15%	28.99%	29.68%	32.29%	36.67%	35.04%	34.96%	37.66%	37.54%	40.07%
<b>NETHERLANDS</b>	30.00%	31.36%	34.43%	34.82%	37.00%	37.38%	40.29%	43.75%	45.32%	46.46%
<b>SWEDEN</b>	33.29%	35.61%	36.55%	35.35%	37.92%	38.56%	41.02%	39.16%	43.73%	44.31%
<b>USA</b>	11.47%	12.52%	14.01%	14.60%	16.10%	16.76%	17.89%	19.02%	20.76%	21.03%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	33.17%	29.35%	22.61%	16.66%	16.98%	17.23%	17.87%	19.18%	20.67%	23.57%
<b>CHINA</b>	44.94%	44.43%	44.10%	40.69%	43.78%	46.45%	45.15%	45.30%	46.66%	47.18%
<b>SPAIN</b>	29.78%	28.30%	22.85%	23.49%	23.83%	28.21%	27.75%	28.55%	33.49%	35.86%
<b>SOUTH KOREA</b>	40.89%	44.74%	43.90%	41.15%	43.39%	45.00%	41.20%	42.21%	44.71%	41.11%
<b>RUSSIA</b>	22.71%	20.63%	25.00%	23.08%	22.36%	23.45%	24.56%	25.11%	32.70%	28.12%
<b>TURKEY</b>	18.03%	20.85%	14.31%	14.29%	13.73%	14.29%	11.89%	12.69%	15.47%	16.58%
<b>TAIWAN</b>	23.56%	23.26%	19.13%	25.30%	26.92%	25.40%	24.41%	22.20%	23.62%	27.40%
<b>SOUTH AFRICA</b>	33.41%	35.77%	33.84%	34.77%	37.51%	41.27%	38.49%	37.54%	43.42%	45.63%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.52	1.58	1.38	1.34	1.19	1.38	1.35	1.47	1.72	1.46
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	1.78	1.77	1.61	1.48	1.47	1.44	1.44	1.48	1.63	1.60
<b>CANADA</b>	1.77	1.76	1.76	1.66	1.63	1.63	1.67	1.67	1.75	1.77
<b>SWITZERLAND</b>	2.10	2.02	2.13	1.75	1.70	1.71	1.85	1.92	2.17	1.95
<b>GERMANY</b>	1.33	1.42	1.41	1.31	1.37	1.37	1.40	1.43	1.58	1.58
<b>ENGLAND</b>	1.71	1.68	1.71	1.63	1.52	1.49	1.53	1.57	1.66	1.67
<b>FRANCE</b>	1.78	1.90	1.70	1.57	1.48	1.54	1.68	1.66	1.80	2.03
<b>ITALY</b>	2.23	2.18	1.92	1.74	1.61	1.71	1.71	1.67	1.74	1.72
<b>JAPAN</b>	2.11	2.09	1.85	1.90	1.92	1.85	1.76	1.83	1.96	1.87
<b>NETHERLANDS</b>	2.17	2.10	2.08	1.96	1.88	1.86	1.88	1.87	1.93	1.94
<b>SWEDEN</b>	2.26	2.22	2.13	1.86	1.87	1.75	1.77	1.75	1.84	1.78
<b>USA</b>	1.86	1.82	1.86	1.78	1.80	1.78	1.77	1.79	1.87	1.89
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.62	1.64	1.28	1.10	1.06	1.03	1.05	0.91	1.15	1.31
<b>CHINA</b>	1.80	1.79	1.80	1.51	1.57	1.70	1.63	1.71	1.81	1.75
<b>SPAIN</b>	1.89	1.84	1.52	1.31	1.27	1.30	1.24	1.35	1.44	1.45
<b>SOUTH KOREA</b>	1.98	1.84	1.65	1.33	1.52	1.46	1.38	1.38	1.38	1.48
<b>RUSSIA</b>	0.41	0.48	0.61	0.54	0.43	0.45	0.51	0.45	0.62	0.71
<b>TURKEY</b>	1.40	1.57	1.08	0.80	0.70	0.67	0.55	0.42	0.57	0.57
<b>TAIWAN</b>	2.02	1.81	1.83	1.58	1.70	1.64	1.61	1.48	1.68	1.52
<b>SOUTH AFRICA</b>	1.47	1.46	1.37	1.16	1.10	1.20	1.17	1.13	1.32	1.19

## A.1.7 COMPARATIVE ANALYSES, NEUROSCIENCE &amp; BEHAVIOR

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	281	312	366	495	523	623	614	606	704	706
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	1,020	1,147	1,213	1,320	1,539	1,650	1,689	1,798	2,147	2,131
<b>CANADA</b>	2,180	2,324	2,532	2,679	2,746	2,933	2,965	3,014	3,376	3,191
<b>SWITZERLAND</b>	794	877	884	968	1,020	1,056	1,197	1,290	1,446	1,382
<b>GERMANY</b>	3,603	4,019	3,897	4,207	4,481	4,512	4,677	4,995	5,191	4,706
<b>ENGLAND</b>	2,752	2,980	2,952	3,163	3,253	3,460	3,660	3,896	4,139	3,780
<b>FRANCE</b>	1,938	2,139	2,062	2,166	2,344	2,285	2,418	2,587	2,654	2,349
<b>ITALY</b>	2,002	2,196	2,120	2,418	2,407	2,603	2,870	2,817	3,001	2,800
<b>JAPAN</b>	2,894	2,872	2,862	2,879	2,850	2,847	2,929	2,994	3,105	2,854
<b>NETHERLANDS</b>	1,194	1,364	1,352	1,424	1,524	1,771	1,797	2,026	2,029	2,072
<b>SWEDEN</b>	803	757	903	857	827	930	944	1,018	1,084	960
<b>USA</b>	14,577	15,209	15,641	16,269	17,094	17,371	18,380	18,868	19,108	18,064
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	766	843	901	945	1,048	1,012	1,016	1,085	1,192	1,105
<b>CHINA</b>	764	975	1,130	1,895	2,018	2,532	2,977	3,523	4,254	4,438
<b>SPAIN</b>	1,258	1,236	1,401	1,453	1,427	1,557	1,631	1,811	1,824	1,724
<b>SOUTH KOREA</b>	594	586	717	814	848	1,001	1,034	1,222	1,264	1,210
<b>RUSSIA</b>	399	399	404	455	464	523	507	526	580	258
<b>TURKEY</b>	441	519	519	579	612	575	541	585	609	505
<b>TAIWAN</b>	314	369	374	455	468	530	534	546	649	600
<b>SOUTH AFRICA</b>	73	81	71	84	83	87	78	120	122	130

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	0.80%	0.84%	0.97%	1.23%	1.24%	1.43%	1.35%	1.28%	1.41%	1.58%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	2.92%	3.10%	3.21%	3.27%	3.65%	3.79%	3.71%	3.79%	4.29%	4.77%
<b>CANADA</b>	6.24%	6.28%	6.71%	6.64%	6.51%	6.74%	6.52%	6.36%	6.74%	7.14%
<b>SWITZERLAND</b>	2.27%	2.37%	2.34%	2.40%	2.42%	2.43%	2.63%	2.72%	2.89%	3.09%
<b>GERMANY</b>	10.31%	10.87%	10.33%	10.43%	10.62%	10.37%	10.28%	10.53%	10.36%	10.53%
<b>ENGLAND</b>	7.87%	8.06%	7.82%	7.84%	7.71%	7.95%	8.05%	8.22%	8.26%	8.46%
<b>FRANCE</b>	5.54%	5.78%	5.46%	5.37%	5.55%	5.25%	5.32%	5.46%	5.30%	5.25%
<b>ITALY</b>	5.73%	5.94%	5.62%	6.00%	5.70%	5.98%	6.31%	5.94%	5.99%	6.26%
<b>JAPAN</b>	8.28%	7.77%	7.58%	7.14%	6.75%	6.54%	6.44%	6.31%	6.20%	6.38%
<b>NETHERLANDS</b>	3.42%	3.69%	3.58%	3.53%	3.61%	4.07%	3.95%	4.27%	4.05%	4.63%
<b>SWEDEN</b>	2.30%	2.05%	2.39%	2.13%	1.96%	2.14%	2.08%	2.15%	2.16%	2.15%
<b>USA</b>	41.70%	41.13%	41.45%	40.34%	40.51%	39.93%	40.40%	39.79%	38.14%	40.41%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.19%	2.28%	2.39%	2.34%	2.48%	2.33%	2.23%	2.29%	2.38%	2.47%
<b>CHINA</b>	2.19%	2.64%	2.99%	4.70%	4.78%	5.82%	6.54%	7.43%	8.49%	9.93%
<b>SPAIN</b>	3.60%	3.34%	3.71%	3.60%	3.38%	3.58%	3.59%	3.82%	3.64%	3.86%
<b>SOUTH KOREA</b>	1.70%	1.58%	1.90%	2.02%	2.01%	2.30%	2.27%	2.58%	2.52%	2.71%
<b>RUSSIA</b>	1.14%	1.08%	1.07%	1.13%	1.10%	1.20%	1.11%	1.11%	1.16%	0.58%
<b>TURKEY</b>	1.26%	1.40%	1.38%	1.44%	1.45%	1.32%	1.19%	1.23%	1.22%	1.13%
<b>TAIWAN</b>	0.90%	1.00%	0.99%	1.13%	1.11%	1.22%	1.17%	1.15%	1.30%	1.34%
<b>SOUTH AFRICA</b>	0.21%	0.22%	0.19%	0.21%	0.20%	0.20%	0.17%	0.25%	0.24%	0.29%



Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.51	0.54	0.67	0.55	0.58	0.52	0.51	0.70	0.62
<b>Established Research Economies</b>									
AUSTRALIA	1.13	1.09	1.26	1.31	1.22	1.31	1.52	1.33	1.39
CANADA	1.31	1.27	1.33	1.33	1.31	1.26	1.41	1.34	1.34
SWITZERLAND	1.44	1.33	1.40	1.37	1.45	1.54	1.59	1.56	1.55
GERMANY	1.22	1.22	1.22	1.21	1.22	1.32	1.37	1.45	1.56
ENGLAND	1.74	1.67	1.60	1.74	1.76	1.76	1.78	1.80	1.86
FRANCE	1.13	0.99	1.28	1.18	1.21	1.18	1.24	1.24	1.38
ITALY	1.05	0.96	1.09	1.02	1.13	1.16	1.27	1.29	1.33
JAPAN	0.79	0.78	0.82	0.85	0.79	0.89	0.82	0.78	0.85
NETHERLANDS	1.38	1.40	1.38	1.41	1.51	1.53	1.54	1.64	1.52
SWEDEN	1.29	1.47	1.20	1.38	1.25	1.32	1.49	1.50	1.29
USA	1.58	1.57	1.63	1.63	1.63	1.65	1.70	1.63	1.66
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.55	0.58	0.52	0.62	0.65	0.69	0.70	0.78	0.82
CHINA	0.74	0.78	0.81	0.68	0.70	0.72	0.74	0.73	0.71
SPAIN	0.83	0.87	0.87	0.97	0.97	1.08	1.13	1.16	1.21
SOUTH KOREA	0.75	0.78	0.73	0.80	0.80	0.73	0.76	0.79	0.70
RUSSIA	0.22	0.19	0.24	0.23	0.18	0.20	0.25	0.23	0.20
TURKEY	0.50	0.44	0.52	0.39	0.34	0.39	0.40	0.46	0.53
TAIWAN	0.56	0.69	0.75	0.83	0.81	0.85	0.77	0.84	0.70
SOUTH AFRICA	0.64	0.59	0.83	1.00	0.72	1.00	1.01	0.77	1.30

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.14%	0.96%	2.68%	10.66%	0.21%	1.18%	2.83%	10.02%	0.28%	1.91%	4.33%	11.42%
<b>Established Research Economies</b>												
AUSTRALIA	0.98%	4.19%	9.19%	25.87%	1.38%	5.48%	10.70%	28.01%	1.24%	6.10%	10.94%	23.45%
CANADA	1.26%	5.88%	12.16%	29.11%	1.40%	6.25%	11.91%	28.84%	1.37%	5.73%	10.26%	22.69%
SWITZERLAND	1.39%	7.10%	14.11%	33.07%	2.26%	9.18%	15.54%	33.42%	1.80%	7.60%	12.73%	26.17%
GERMANY	1.18%	5.72%	11.06%	27.48%	1.48%	6.60%	12.75%	29.05%	1.20%	5.99%	11.08%	24.18%
ENGLAND	2.20%	8.80%	16.74%	35.87%	2.25%	9.59%	17.33%	36.66%	1.96%	8.11%	14.00%	28.73%
FRANCE	1.13%	5.15%	10.45%	25.42%	1.38%	6.03%	11.32%	26.72%	1.44%	5.94%	10.63%	22.73%
ITALY	0.86%	4.81%	9.28%	23.97%	1.11%	5.54%	10.79%	27.30%	0.95%	4.91%	9.74%	23.20%
JAPAN	0.51%	2.69%	5.76%	16.65%	0.55%	2.80%	5.96%	16.65%	0.76%	2.95%	5.57%	14.38%
NETHERLANDS	1.24%	7.22%	13.54%	32.47%	1.94%	8.32%	15.69%	35.33%	1.66%	6.85%	12.19%	25.60%
SWEDEN	1.51%	6.63%	11.99%	29.07%	1.91%	7.77%	13.69%	31.27%	1.66%	6.21%	11.40%	26.37%
USA	1.68%	7.88%	14.72%	33.32%	1.70%	7.65%	14.32%	32.70%	1.53%	6.41%	11.86%	24.92%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.29%	1.51%	3.24%	10.71%	0.29%	2.33%	4.71%	13.99%	0.52%	2.13%	5.18%	14.45%
CHINA	0.44%	2.35%	5.06%	16.39%	0.36%	2.38%	5.33%	17.15%	0.40%	2.32%	5.00%	13.59%
SPAIN	0.69%	3.35%	7.29%	20.12%	1.04%	4.84%	9.41%	23.59%	1.01%	4.85%	9.70%	21.73%
SOUTH KOREA	0.30%	2.69%	5.64%	16.67%	0.34%	2.29%	4.99%	15.96%	0.44%	2.51%	5.17%	12.89%
RUSSIA	0.12%	0.97%	1.87%	5.55%	0.10%	0.99%	1.63%	4.60%	0.48%	1.79%	3.58%	8.00%
TURKEY	0.10%	0.83%	1.90%	6.80%	0.22%	0.95%	2.12%	6.61%	0.54%	1.80%	3.50%	8.62%
TAIWAN	0.40%	1.79%	4.30%	13.10%	0.19%	1.83%	4.96%	16.36%	0.16%	1.36%	3.92%	13.21%
SOUTH AFRICA	0.65%	3.88%	6.47%	15.53%	0.82%	3.26%	6.79%	19.57%	0.40%	4.76%	6.75%	21.03%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	25.62%	21.47%	20.49%	18.99%	18.36%	17.34%	18.89%	20.96%	23.86%	23.09%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	39.61%	40.19%	45.51%	45.98%	46.52%	48.24%	49.97%	47.72%	52.45%	51.43%
<b>CANADA</b>	42.98%	47.20%	45.14%	46.85%	46.83%	48.45%	48.77%	51.13%	51.13%	53.40%
<b>SWITZERLAND</b>	66.62%	65.22%	68.78%	65.29%	67.75%	69.60%	71.51%	72.02%	72.27%	74.31%
<b>GERMANY</b>	42.52%	43.00%	43.34%	44.35%	45.75%	47.70%	50.67%	52.33%	52.71%	54.36%
<b>ENGLAND</b>	51.38%	53.05%	55.32%	58.05%	60.04%	61.27%	64.26%	64.96%	66.13%	68.99%
<b>FRANCE</b>	42.52%	41.09%	44.71%	46.72%	45.01%	47.75%	48.14%	50.25%	53.81%	54.92%
<b>ITALY</b>	39.81%	37.61%	40.14%	39.62%	42.29%	42.14%	43.59%	46.04%	48.98%	47.54%
<b>JAPAN</b>	22.39%	23.26%	24.67%	26.57%	27.12%	27.40%	27.79%	26.89%	28.41%	26.52%
<b>NETHERLANDS</b>	46.57%	49.19%	48.00%	49.58%	50.07%	53.47%	54.98%	58.88%	59.24%	58.69%
<b>SWEDEN</b>	54.30%	56.01%	58.58%	61.03%	58.28%	61.72%	62.39%	66.40%	64.76%	68.75%
<b>USA</b>	26.13%	26.89%	27.83%	28.98%	29.12%	30.42%	31.07%	31.61%	34.21%	34.82%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	22.45%	24.91%	25.53%	24.87%	26.72%	29.74%	29.53%	32.81%	32.47%	40.09%
<b>CHINA</b>	42.67%	40.51%	40.97%	32.03%	34.94%	33.53%	33.32%	31.93%	32.56%	32.99%
<b>SPAIN</b>	30.76%	34.47%	34.19%	36.82%	37.49%	44.19%	43.78%	44.12%	47.59%	48.84%
<b>SOUTH KOREA</b>	29.97%	28.16%	27.75%	28.62%	29.13%	29.37%	28.82%	30.20%	30.14%	33.55%
<b>RUSSIA</b>	27.07%	26.82%	24.75%	22.42%	20.47%	19.31%	20.51%	18.44%	23.10%	54.65%
<b>TURKEY</b>	17.69%	15.22%	16.18%	16.58%	13.89%	14.26%	16.64%	17.44%	18.56%	21.98%
<b>TAIWAN</b>	21.66%	26.56%	24.60%	29.23%	27.35%	27.74%	28.46%	31.14%	33.44%	28.00%
<b>SOUTH AFRICA</b>	61.64%	54.32%	64.79%	72.62%	55.42%	68.97%	69.23%	59.17%	71.31%	73.08%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	2.48	2.88	2.63	2.50	2.29	2.30	2.24	2.45	2.54	2.56
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	4.14	4.15	4.18	4.19	4.18	4.08	4.17	4.22	4.31	4.29
<b>CANADA</b>	4.36	4.33	4.44	4.10	4.25	4.19	4.48	4.33	4.25	4.45
<b>SWITZERLAND</b>	4.80	4.99	4.87	4.55	4.98	5.23	4.95	5.12	5.02	5.12
<b>GERMANY</b>	4.22	4.33	4.27	4.15	4.26	4.49	4.59	4.60	4.57	4.73
<b>ENGLAND</b>	5.55	5.58	5.28	5.46	5.38	5.43	5.30	5.42	5.29	5.40
<b>FRANCE</b>	4.29	4.15	4.57	4.46	4.49	4.30	4.49	4.46	4.55	4.87
<b>ITALY</b>	4.17	3.93	4.27	3.92	3.96	3.97	4.04	3.97	3.98	4.15
<b>JAPAN</b>	3.82	3.77	3.82	3.71	3.61	3.87	3.67	3.62	3.68	3.82
<b>NETHERLANDS</b>	4.53	4.76	4.64	4.67	4.89	4.81	4.82	4.94	4.83	4.88
<b>SWEDEN</b>	4.20	4.43	4.26	4.45	4.44	4.46	4.49	4.53	4.49	4.67
<b>USA</b>	4.99	5.06	5.05	5.11	5.01	5.05	5.11	5.11	5.09	5.10
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.61	2.76	2.52	2.74	2.67	2.86	2.71	2.91	3.00	3.05
<b>CHINA</b>	3.38	3.52	3.64	2.82	3.05	2.95	2.87	2.98	3.12	3.38
<b>SPAIN</b>	3.53	3.65	3.57	3.67	3.89	3.94	3.82	3.88	4.01	4.21
<b>SOUTH KOREA</b>	3.32	3.49	3.17	3.34	3.20	3.19	3.11	3.53	3.31	3.28
<b>RUSSIA</b>	0.86	0.99	1.08	0.96	0.82	0.79	0.78	0.73	0.81	2.67
<b>TURKEY</b>	2.23	2.24	2.11	1.93	1.65	1.64	1.70	1.62	1.64	1.88
<b>TAIWAN</b>	3.14	3.54	3.43	3.48	3.39	3.50	3.63	3.70	3.56	3.61
<b>SOUTH AFRICA</b>	2.91	2.75	3.81	3.17	2.72	3.39	3.77	3.03	3.66	3.42

## A 1.8 COMPARATIVE ANALYSES, IMMUNOLOGY

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	276	295	355	471	529	501	571	606	658	680
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	604	654	730	802	818	853	914	1,002	1,079	994
<b>CANADA</b>	782	808	883	972	937	1,064	1,075	1,159	1,127	1,071
<b>SWITZERLAND</b>	504	561	571	614	649	685	814	823	826	738
<b>GERMANY</b>	1,327	1,371	1,408	1,539	1,644	1,616	1,576	1,741	1,701	1,687
<b>ENGLAND</b>	1,580	1,688	1,781	1,828	1,869	1,949	2,008	2,145	2,241	2,093
<b>FRANCE</b>	1,181	1,193	1,317	1,344	1,456	1,479	1,596	1,540	1,637	1,505
<b>ITALY</b>	841	798	952	1,032	1,043	1,027	1,095	1,226	1,306	1,189
<b>JAPAN</b>	1,218	1,146	1,200	1,211	1,237	1,169	1,207	1,280	1,227	1,101
<b>NETHERLANDS</b>	674	666	745	827	812	874	943	1,026	1,103	1,037
<b>SWEDEN</b>	511	529	510	603	584	585	636	652	689	642
<b>USA</b>	7,653	7,702	7,749	8,382	8,180	8,523	9,012	9,210	9,225	8,666
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	322	394	592	578	566	683	691	751	825	825
<b>CHINA</b>	454	568	758	873	1,098	1,321	1,506	1,781	2,156	2,264
<b>SPAIN</b>	612	741	769	833	806	853	979	972	1,023	970
<b>SOUTH KOREA</b>	227	265	287	328	368	473	523	612	575	590
<b>RUSSIA</b>	60	71	83	59	66	95	97	75	78	89
<b>TURKEY</b>	185	196	169	189	173	175	180	218	237	232
<b>TAIWAN</b>	172	216	213	276	305	362	362	379	375	364
<b>SOUTH AFRICA</b>	155	195	269	268	304	380	418	488	489	482

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.59%	1.65%	1.88%	2.34%	2.55%	2.31%	2.52%	2.57%	2.70%	3.10%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	3.49%	3.66%	3.86%	3.98%	3.95%	3.93%	4.03%	4.25%	4.43%	4.53%
<b>CANADA</b>	4.51%	4.52%	4.67%	4.83%	4.52%	4.91%	4.74%	4.92%	4.62%	4.88%
<b>SWITZERLAND</b>	2.91%	3.14%	3.02%	3.05%	3.13%	3.16%	3.59%	3.49%	3.39%	3.36%
<b>GERMANY</b>	7.66%	7.68%	7.44%	7.65%	7.93%	7.45%	6.95%	7.39%	6.98%	7.68%
<b>ENGLAND</b>	9.12%	9.45%	9.41%	9.08%	9.02%	8.99%	8.85%	9.11%	9.19%	9.53%
<b>FRANCE</b>	6.81%	6.68%	6.96%	6.68%	7.02%	6.82%	7.03%	6.54%	6.72%	6.85%
<b>ITALY</b>	4.85%	4.47%	5.03%	5.13%	5.03%	4.74%	4.83%	5.21%	5.36%	5.42%
<b>JAPAN</b>	7.03%	6.42%	6.34%	6.02%	5.97%	5.39%	5.32%	5.43%	5.03%	5.01%
<b>NETHERLANDS</b>	3.89%	3.73%	3.94%	4.11%	3.92%	4.03%	4.16%	4.36%	4.53%	4.72%
<b>SWEDEN</b>	2.95%	2.96%	2.70%	3.00%	2.82%	2.70%	2.80%	2.77%	2.83%	2.92%
<b>USA</b>	44.16%	43.13%	40.96%	41.64%	39.47%	39.31%	39.72%	39.10%	37.85%	39.47%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.86%	2.21%	3.13%	2.87%	2.73%	3.15%	3.05%	3.19%	3.38%	3.76%
<b>CHINA</b>	2.62%	3.18%	4.01%	4.34%	5.30%	6.09%	6.64%	7.56%	8.85%	10.31%
<b>SPAIN</b>	3.53%	4.15%	4.06%	4.14%	3.89%	3.93%	4.31%	4.13%	4.20%	4.42%
<b>SOUTH KOREA</b>	1.31%	1.48%	1.52%	1.63%	1.78%	2.18%	2.30%	2.60%	2.36%	2.69%
<b>RUSSIA</b>	0.35%	0.40%	0.44%	0.29%	0.32%	0.44%	0.43%	0.32%	0.32%	0.41%
<b>TURKEY</b>	1.07%	1.10%	0.89%	0.94%	0.83%	0.81%	0.79%	0.93%	0.97%	1.06%
<b>TAIWAN</b>	0.99%	1.21%	1.13%	1.37%	1.47%	1.67%	1.60%	1.61%	1.54%	1.66%
<b>SOUTH AFRICA</b>	0.89%	1.09%	1.42%	1.33%	1.47%	1.75%	1.84%	2.07%	2.01%	2.20%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.60	0.61	0.67	0.55	0.61	0.70	0.68	0.66	0.53
<b>Established Research Economies</b>									
AUSTRALIA	1.14	1.31	1.26	1.38	1.39	1.43	1.55	1.53	1.71
CANADA	1.12	1.32	1.22	1.37	1.19	1.21	1.20	1.19	1.07
SWITZERLAND	1.47	1.57	1.58	1.64	1.68	1.62	1.76	1.66	2.09
GERMANY	1.21	1.37	1.23	1.37	1.33	1.27	1.35	1.47	1.43
ENGLAND	1.31	1.23	1.38	1.49	1.36	1.53	1.43	1.57	1.71
FRANCE	1.25	1.27	1.45	1.43	1.43	1.34	1.33	1.37	1.49
ITALY	1.13	1.12	1.26	1.20	1.06	1.20	1.24	1.23	1.11
JAPAN	1.24	1.22	1.08	1.24	0.98	1.14	1.09	0.93	1.01
NETHERLANDS	1.22	1.13	1.20	1.37	1.38	1.29	1.48	1.39	1.61
SWEDEN	0.93	0.93	1.12	1.06	0.97	1.06	1.16	1.39	1.28
USA	1.66	1.59	1.63	1.63	1.66	1.59	1.65	1.69	1.62
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.72	0.80	0.61	0.76	0.69	0.74	0.67	0.72	0.56
CHINA	0.74	0.71	0.79	0.81	0.87	0.89	0.77	0.79	0.75
SPAIN	0.95	0.79	0.92	1.00	0.95	0.96	0.94	1.09	1.07
SOUTH KOREA	0.75	0.71	0.83	0.90	0.83	0.77	0.69	0.69	0.54
RUSSIA	0.83	0.79	0.61	1.41	0.66	0.70	0.59	0.83	0.91
TURKEY	0.46	0.55	0.60	0.72	0.70	0.70	0.63	0.70	0.43
TAIWAN	0.75	0.72	0.78	0.77	0.67	0.66	0.64	0.75	0.60
SOUTH AFRICA	1.42	1.39	1.18	1.58	1.20	1.27	1.29	1.38	0.99

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.07%	1.07%	2.93%	11.10%	0.27%	1.45%	3.94%	12.01%	0.45%	2.69%	5.31%	11.36%
<b>Established Research Economies</b>												
AUSTRALIA	1.33%	6.34%	12.54%	29.71%	1.67%	8.03%	14.75%	32.90%	1.83%	8.97%	13.94%	25.90%
CANADA	1.13%	6.10%	11.38%	28.48%	1.30%	6.02%	11.92%	27.34%	1.18%	6.05%	10.37%	20.20%
SWITZERLAND	1.60%	8.98%	16.49%	36.18%	2.73%	10.54%	19.35%	37.70%	1.98%	9.97%	16.37%	28.01%
GERMANY	1.17%	6.77%	13.11%	30.03%	1.54%	7.21%	14.25%	30.76%	1.71%	8.21%	13.55%	23.41%
ENGLAND	1.35%	6.94%	12.93%	29.79%	1.67%	7.95%	14.63%	31.82%	2.08%	8.93%	14.58%	26.70%
FRANCE	1.11%	5.82%	11.94%	29.39%	1.33%	6.41%	12.40%	28.28%	1.72%	7.57%	12.22%	21.93%
ITALY	1.24%	5.63%	10.63%	26.66%	1.32%	6.58%	12.34%	28.31%	0.92%	6.65%	11.30%	21.68%
JAPAN	1.36%	5.47%	10.01%	22.87%	1.23%	4.68%	8.89%	20.85%	1.20%	4.17%	8.12%	16.88%
NETHERLANDS	1.03%	5.87%	12.19%	30.84%	1.48%	7.99%	14.56%	32.04%	1.87%	7.85%	13.83%	23.64%
SWEDEN	0.60%	4.64%	9.01%	24.52%	1.18%	5.49%	10.42%	25.15%	1.65%	6.39%	11.50%	20.36%
USA	1.66%	7.60%	14.17%	32.44%	1.76%	7.85%	14.68%	31.94%	1.57%	7.28%	12.11%	23.77%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.32%	1.59%	4.35%	14.90%	0.26%	2.42%	4.98%	14.38%	0.55%	2.85%	4.91%	11.70%
CHINA	0.26%	2.07%	5.13%	16.02%	0.35%	2.47%	5.49%	16.11%	0.43%	2.85%	5.43%	12.69%
SPAIN	0.61%	3.52%	7.21%	20.47%	0.86%	4.71%	9.22%	22.30%	1.05%	6.57%	10.84%	21.53%
SOUTH KOREA	0.45%	2.71%	5.60%	16.62%	0.56%	1.82%	4.71%	15.08%	0.60%	2.06%	4.03%	10.90%
RUSSIA	0.37%	1.47%	4.76%	15.75%	0.60%	3.60%	6.91%	14.71%		7.19%	8.98%	17.37%
TURKEY	0.41%	1.35%	3.38%	10.15%	0.67%	4.42%	6.57%	13.54%	1.71%	6.82%	8.10%	14.07%
TAIWAN	0.23%	1.25%	3.65%	15.96%	0.07%	1.70%	3.98%	12.07%	0.27%	2.30%	4.33%	10.01%
SOUTH AFRICA	1.13%	6.43%	13.42%	33.71%	0.69%	6.35%	12.70%	30.82%	1.24%	5.15%	9.06%	21.01%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	31.16%	28.81%	28.73%	26.11%	30.25%	33.13%	36.95%	38.61%	38.91%	40.59%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	47.52%	46.02%	50.27%	50.87%	52.20%	53.34%	53.83%	54.99%	60.89%	59.66%
<b>CANADA</b>	45.91%	52.35%	48.58%	53.60%	52.51%	51.41%	51.35%	53.84%	56.34%	57.89%
<b>SWITZERLAND</b>	64.09%	67.38%	69.70%	72.96%	70.26%	72.26%	71.99%	75.58%	78.69%	76.02%
<b>GERMANY</b>	50.34%	51.93%	52.98%	54.52%	54.87%	55.69%	58.06%	59.16%	58.91%	61.71%
<b>ENGLAND</b>	52.22%	54.62%	58.90%	61.49%	63.83%	64.65%	66.43%	69.09%	71.08%	71.52%
<b>FRANCE</b>	46.66%	47.28%	52.92%	54.46%	51.58%	52.27%	53.13%	54.16%	57.79%	58.94%
<b>ITALY</b>	43.28%	43.73%	42.96%	45.25%	43.43%	46.84%	47.21%	47.88%	48.24%	48.28%
<b>JAPAN</b>	29.97%	31.59%	32.42%	33.03%	34.36%	35.50%	35.46%	35.86%	36.10%	39.96%
<b>NETHERLANDS</b>	55.04%	52.70%	54.09%	58.04%	59.85%	59.50%	64.48%	62.18%	63.55%	66.73%
<b>SWEDEN</b>	52.25%	53.69%	63.14%	62.35%	61.13%	61.71%	64.94%	62.73%	67.63%	69.31%
<b>USA</b>	29.17%	31.15%	33.22%	33.49%	35.09%	36.91%	38.49%	38.96%	41.85%	43.79%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	45.96%	44.42%	37.50%	41.52%	39.05%	42.61%	44.72%	44.61%	43.27%	41.33%
<b>CHINA</b>	35.68%	35.74%	35.49%	38.37%	32.33%	35.12%	34.66%	32.23%	33.07%	31.63%
<b>SPAIN</b>	33.66%	31.98%	37.32%	39.50%	35.48%	37.51%	36.36%	42.28%	41.64%	45.67%
<b>SOUTH KOREA</b>	29.96%	32.08%	33.45%	32.93%	32.07%	31.29%	23.90%	28.10%	29.57%	29.15%
<b>RUSSIA</b>	80.00%	76.06%	84.34%	79.66%	84.85%	66.32%	69.07%	76.00%	70.51%	70.79%
<b>TURKEY</b>	17.84%	21.43%	22.49%	19.58%	26.01%	21.71%	31.11%	30.28%	24.05%	33.62%
<b>TAIWAN</b>	22.09%	16.67%	24.88%	18.12%	20.98%	20.44%	20.44%	23.22%	21.87%	23.63%
<b>SOUTH AFRICA</b>	75.48%	80.51%	71.75%	70.90%	68.09%	73.68%	77.51%	79.71%	84.66%	80.08%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	3.10	3.46	2.93	2.71	2.81	2.76	2.91	2.96	2.87	3.06
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	5.15	5.28	5.65	5.24	5.59	5.24	5.20	5.17	5.57	5.16
<b>CANADA</b>	5.17	5.38	4.71	4.84	4.93	4.65	4.32	4.45	4.23	4.21
<b>SWITZERLAND</b>	5.99	5.74	5.90	6.06	5.84	5.66	5.44	5.39	5.58	5.65
<b>GERMANY</b>	4.97	5.09	4.91	4.97	4.98	5.13	5.01	5.16	5.00	5.14
<b>ENGLAND</b>	5.21	4.93	5.30	5.02	5.25	5.30	4.99	5.09	5.13	5.58
<b>FRANCE</b>	5.25	5.38	5.56	5.40	5.25	4.96	5.03	5.06	4.98	5.25
<b>ITALY</b>	4.91	4.45	4.55	4.36	4.32	4.40	4.38	4.12	3.92	3.91
<b>JAPAN</b>	4.98	4.83	4.71	4.90	4.56	4.50	4.49	4.08	4.13	4.57
<b>NETHERLANDS</b>	5.15	4.72	4.77	4.74	4.93	4.74	4.93	4.71	4.82	5.15
<b>SWEDEN</b>	4.07	4.07	4.27	4.14	4.35	4.54	4.31	4.40	4.32	4.27
<b>USA</b>	6.10	6.00	6.01	5.89	5.91	5.67	5.67	5.83	5.54	5.62
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	3.85	3.59	2.79	2.91	3.10	3.00	3.13	3.15	3.13	3.10
<b>CHINA</b>	3.92	3.50	3.83	3.54	3.41	3.33	3.44	3.40	3.61	3.59
<b>SPAIN</b>	4.05	3.86	3.97	3.98	4.07	3.81	3.67	3.90	3.98	3.96
<b>SOUTH KOREA</b>	3.98	3.75	3.97	3.65	3.84	3.50	3.48	3.14	3.35	3.37
<b>RUSSIA</b>	4.33	3.33	3.70	3.57	3.54	3.73	3.38	2.98	3.84	3.92
<b>TURKEY</b>	2.70	2.74	2.65	2.79	3.05	2.56	2.46	2.66	2.67	2.74
<b>TAIWAN</b>	3.76	3.70	3.73	3.60	3.24	3.27	3.39	3.37	3.39	3.44
<b>SOUTH AFRICA</b>	5.07	4.56	4.52	3.93	4.00	4.27	4.11	4.23	4.09	4.34

## A 1.9 COMPARATIVE ANALYSES, SPACE SCIENCES

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	275	374	379	405	425	441	555	573	608	620
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	507	531	475	538	608	644	833	918	952	872
<b>CANADA</b>	551	627	674	744	779	974	937	1,012	999	877
<b>SWITZERLAND</b>	333	350	387	340	452	515	528	542	521	493
<b>GERMANY</b>	1,668	1,863	1,912	2,014	2,178	2,459	2,593	2,883	2,772	2,507
<b>ENGLAND</b>	1,610	1,780	1,768	1,737	1,941	2,165	2,244	2,303	2,319	2,149
<b>FRANCE</b>	1,309	1,331	1,465	1,505	1,719	1,932	1,882	1,996	1,921	1,769
<b>ITALY</b>	1,147	1,265	1,346	1,220	1,449	1,571	1,582	1,583	1,575	1,433
<b>JAPAN</b>	724	796	862	944	985	989	1,054	1,124	1,066	1,034
<b>NETHERLANDS</b>	576	610	579	555	647	802	803	900	911	801
<b>SWEDEN</b>	204	256	218	259	284	421	352	376	340	353
<b>USA</b>	5,394	5,615	5,668	5,595	6,062	6,291	6,342	6,757	6,582	5,912
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	219	253	273	257	246	327	313	310	365	390
<b>CHINA</b>	560	696	753	930	1,105	868	1,015	1,120	1,248	1,226
<b>SPAIN</b>	693	741	826	822	1,011	1,278	1,209	1,346	1,282	1,154
<b>SOUTH KOREA</b>	164	158	229	220	270	317	331	360	358	361
<b>RUSSIA</b>	812	796	798	907	885	820	978	918	937	900
<b>TURKEY</b>	74	82	73	51	67	85	87	116	122	110
<b>TAIWAN</b>	81	91	156	154	187	226	274	276	263	241
<b>SOUTH AFRICA</b>	103	119	124	122	147	168	203	250	322	312

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	2.46%	3.19%	3.23%	3.33%	3.32%	3.50%	4.12%	4.06%	4.37%	5.02%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	4.53%	4.54%	4.05%	4.42%	4.75%	5.11%	6.18%	6.51%	6.85%	7.06%
<b>CANADA</b>	4.93%	5.36%	5.75%	6.11%	6.09%	7.73%	6.95%	7.18%	7.19%	7.10%
<b>SWITZERLAND</b>	2.98%	2.99%	3.30%	2.79%	3.53%	4.09%	3.92%	3.84%	3.75%	3.99%
<b>GERMANY</b>	14.92%	15.91%	16.31%	16.54%	17.02%	19.52%	19.23%	20.45%	19.94%	20.30%
<b>ENGLAND</b>	14.40%	15.20%	15.08%	14.26%	15.17%	17.19%	16.64%	16.33%	16.68%	17.40%
<b>FRANCE</b>	11.71%	11.37%	12.49%	12.36%	13.43%	15.34%	13.96%	14.16%	13.82%	14.33%
<b>ITALY</b>	10.26%	10.81%	11.48%	10.02%	11.32%	12.47%	11.73%	11.23%	11.33%	11.60%
<b>JAPAN</b>	6.48%	6.80%	7.35%	7.75%	7.70%	7.85%	7.82%	7.97%	7.67%	8.37%
<b>NETHERLANDS</b>	5.15%	5.21%	4.94%	4.56%	5.06%	6.37%	5.96%	6.38%	6.55%	6.49%
<b>SWEDEN</b>	1.82%	2.19%	1.86%	2.13%	2.22%	3.34%	2.61%	2.67%	2.45%	2.86%
<b>USA</b>	48.25%	47.96%	48.34%	45.94%	47.37%	49.94%	47.03%	47.92%	47.35%	47.87%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.96%	2.16%	2.33%	2.11%	1.92%	2.60%	2.32%	2.20%	2.63%	3.16%
<b>CHINA</b>	5.01%	5.95%	6.42%	7.64%	8.64%	6.89%	7.53%	7.94%	8.98%	9.93%
<b>SPAIN</b>	6.20%	6.33%	7.04%	6.75%	7.90%	10.15%	8.97%	9.55%	9.22%	9.34%
<b>SOUTH KOREA</b>	1.47%	1.35%	1.95%	1.81%	2.11%	2.52%	2.45%	2.55%	2.58%	2.92%
<b>RUSSIA</b>	7.26%	6.80%	6.81%	7.45%	6.92%	6.51%	7.25%	6.51%	6.74%	7.29%
<b>TURKEY</b>	0.66%	0.70%	0.62%	0.42%	0.52%	0.67%	0.65%	0.82%	0.88%	0.89%
<b>TAIWAN</b>	0.72%	0.78%	1.33%	1.26%	1.46%	1.79%	2.03%	1.96%	1.89%	1.95%
<b>SOUTH AFRICA</b>	0.92%	1.02%	1.06%	1.00%	1.15%	1.33%	1.51%	1.77%	2.32%	2.53%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.53	0.55	0.41	0.47	0.57	0.51	0.57	0.51	0.54
<b>Established Research Economies</b>									
AUSTRALIA	1.34	1.29	1.26	1.50	1.33	1.39	1.55	1.44	1.39
CANADA	1.35	1.76	1.75	1.60	1.95	1.65	2.50	1.45	1.90
SWITZERLAND	1.55	1.81	1.90	1.65	1.94	1.87	1.67	1.63	1.51
GERMANY	1.74	1.59	1.61	1.65	1.80	1.65	1.66	1.52	1.61
ENGLAND	1.52	1.61	1.59	1.50	1.62	1.67	1.86	1.46	1.65
FRANCE	1.56	1.90	1.78	1.54	1.84	1.98	2.18	1.54	1.78
ITALY	1.34	1.33	1.47	1.53	2.08	2.15	1.95	1.63	1.45
JAPAN	1.25	1.27	1.36	1.21	1.40	1.37	1.13	1.14	1.14
NETHERLANDS	1.39	1.43	1.47	1.49	1.56	1.78	1.66	1.48	1.61
SWEDEN	1.31	1.21	1.16	1.20	2.84	2.57	1.54	1.75	1.48
USA	1.79	1.89	1.95	1.85	2.19	2.02	2.29	1.84	2.03
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.97	0.74	0.92	1.05	0.74	0.71	1.26	0.85	0.90
CHINA	0.53	0.63	0.53	0.60	0.64	0.68	0.70	0.74	0.70
SPAIN	1.13	1.14	1.25	1.32	1.36	1.67	1.86	1.34	1.45
SOUTH KOREA	1.10	0.70	0.99	0.90	1.04	0.88	0.77	0.81	0.82
RUSSIA	0.55	0.53	0.55	0.50	0.63	0.53	0.58	0.52	0.56
TURKEY	0.35	0.53	0.53	0.43	0.37	0.52	0.37	0.57	0.71
TAIWAN	0.81	0.96	0.91	0.95	0.75	0.85	1.21	0.84	1.20
SOUTH AFRICA	0.78	1.24	0.97	2.04	2.00	1.29	1.30	1.08	1.07

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.35%	1.47%	3.14%	10.82%	0.45%	1.81%	4.06%	11.84%	0.49%	1.71%	3.66%	13.36%
<b>Established Research Economies</b>												
AUSTRALIA	2.10%	8.43%	14.87%	33.06%	2.13%	8.79%	16.45%	35.86%	2.03%	8.55%	15.30%	35.20%
CANADA	2.62%	9.86%	17.68%	36.33%	3.03%	12.21%	19.53%	40.95%	2.56%	9.22%	16.74%	34.59%
SWITZERLAND	2.98%	11.42%	19.65%	42.06%	2.90%	12.37%	21.65%	42.96%	1.58%	8.68%	15.38%	37.87%
GERMANY	2.29%	9.12%	16.84%	36.49%	2.17%	9.81%	17.25%	37.48%	1.93%	7.46%	14.43%	33.95%
ENGLAND	2.41%	8.82%	15.85%	35.49%	2.24%	9.51%	16.94%	38.99%	2.24%	8.12%	15.02%	34.47%
FRANCE	1.55%	8.11%	14.53%	34.14%	1.93%	8.58%	15.18%	35.18%	1.95%	7.89%	13.77%	32.85%
ITALY	1.51%	6.61%	12.56%	31.44%	2.02%	8.31%	14.99%	33.61%	1.36%	6.62%	13.36%	32.01%
JAPAN	1.62%	6.37%	11.37%	25.41%	1.78%	6.29%	11.97%	27.10%	1.38%	5.19%	10.38%	25.81%
NETHERLANDS	1.68%	8.58%	16.81%	37.24%	2.70%	11.01%	18.75%	41.24%	2.28%	9.23%	16.59%	36.92%
SWEDEN	1.39%	5.55%	12.38%	31.48%	2.58%	9.21%	16.47%	37.19%	2.02%	7.50%	13.13%	30.30%
USA	1.70%	7.72%	14.59%	33.44%	1.78%	7.85%	14.79%	34.34%	1.65%	6.95%	13.39%	31.18%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	1.00%	3.89%	6.79%	17.96%	1.00%	2.93%	5.94%	17.31%	0.66%	4.11%	7.42%	20.53%
CHINA	0.37%	2.42%	4.25%	13.58%	0.83%	3.41%	6.06%	16.36%	0.81%	2.75%	5.98%	17.99%
SPAIN	1.30%	5.65%	11.52%	29.82%	2.21%	8.55%	14.95%	33.65%	1.60%	7.10%	13.38%	30.34%
SOUTH KOREA	1.43%	6.36%	10.25%	24.51%	0.70%	3.83%	7.28%	21.60%	0.97%	3.20%	6.54%	19.19%
RUSSIA	0.39%	1.93%	4.50%	11.74%	0.47%	2.44%	4.69%	12.00%	0.44%	2.34%	4.25%	11.00%
TURKEY	0.36%	1.43%	2.14%	11.79%	0.28%	2.25%	4.23%	12.68%	1.72%	3.88%	6.47%	14.66%
TAIWAN	1.04%	4.56%	8.92%	23.24%	1.45%	6.54%	11.32%	24.92%	1.39%	6.55%	12.50%	27.18%
SOUTH AFRICA	2.78%	9.19%	13.68%	25.21%	1.95%	8.46%	14.97%	33.07%	1.26%	7.26%	13.25%	30.91%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	45.82%	44.39%	44.85%	47.90%	49.65%	53.74%	44.86%	47.47%	49.84%	48.87%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	75.94%	80.79%	82.95%	85.32%	87.17%	86.18%	87.39%	86.27%	86.76%	88.76%
<b>CANADA</b>	74.23%	83.57%	83.38%	81.32%	85.37%	85.83%	86.98%	86.96%	86.59%	86.77%
<b>SWITZERLAND</b>	88.29%	89.14%	91.21%	86.76%	93.14%	94.17%	92.61%	93.73%	94.24%	94.12%
<b>GERMANY</b>	85.37%	84.27%	83.73%	82.57%	87.10%	88.74%	88.70%	87.79%	89.39%	90.59%
<b>ENGLAND</b>	78.39%	80.45%	80.60%	82.04%	83.31%	87.39%	85.74%	86.89%	88.87%	88.55%
<b>FRANCE</b>	83.58%	84.52%	86.28%	83.59%	88.19%	89.54%	89.16%	88.28%	89.28%	91.29%
<b>ITALY</b>	76.63%	75.26%	78.97%	78.20%	82.75%	86.31%	83.82%	86.29%	86.86%	85.69%
<b>JAPAN</b>	58.29%	62.06%	67.17%	64.19%	66.40%	70.88%	65.37%	70.55%	70.17%	71.95%
<b>NETHERLANDS</b>	87.15%	89.67%	91.71%	89.01%	91.65%	93.02%	93.28%	93.44%	92.97%	94.38%
<b>SWEDEN</b>	85.78%	87.89%	89.45%	88.80%	92.25%	92.40%	92.05%	93.35%	93.53%	95.75%
<b>USA</b>	55.77%	57.72%	61.17%	60.32%	63.13%	64.97%	66.26%	67.60%	67.97%	68.98%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	59.82%	65.22%	58.61%	68.09%	68.29%	61.16%	71.57%	73.55%	78.90%	76.92%
<b>CHINA</b>	44.82%	43.82%	43.56%	44.30%	41.45%	54.72%	50.64%	55.71%	52.48%	51.88%
<b>SPAIN</b>	84.85%	81.92%	85.59%	84.18%	85.26%	89.44%	90.24%	87.30%	89.70%	90.38%
<b>SOUTH KOREA</b>	81.10%	78.48%	73.80%	74.55%	73.33%	82.97%	78.85%	81.39%	78.49%	78.67%
<b>RUSSIA</b>	58.13%	56.91%	56.64%	55.90%	52.54%	54.15%	55.42%	57.52%	56.14%	57.22%
<b>TURKEY</b>	45.95%	51.22%	64.38%	47.06%	59.70%	68.24%	60.92%	62.93%	60.66%	60.00%
<b>TAIWAN</b>	86.42%	78.02%	87.18%	81.82%	79.14%	88.05%	85.40%	89.13%	89.35%	91.29%
<b>SOUTH AFRICA</b>	75.73%	79.83%	84.68%	83.61%	85.03%	83.33%	89.66%	91.60%	92.24%	88.46%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	3.53	3.15	2.98	3.24	3.39	3.37	3.12	3.32	3.27	3.24
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	4.52	5.20	4.71	5.14	5.08	5.08	5.13	5.32	5.60	5.44
<b>CANADA</b>	4.74	5.20	5.04	4.95	5.91	4.81	5.35	5.11	5.57	5.28
<b>SWITZERLAND</b>	4.87	4.94	5.59	5.67	5.14	5.30	5.19	5.05	5.18	5.54
<b>GERMANY</b>	4.90	4.84	4.86	4.93	4.90	4.82	4.92	4.99	5.02	4.98
<b>ENGLAND</b>	4.93	5.10	4.73	4.82	4.88	4.70	4.88	4.93	5.35	4.98
<b>FRANCE</b>	5.68	5.38	4.92	4.49	5.11	4.98	5.00	4.92	4.83	5.28
<b>ITALY</b>	5.02	4.72	5.08	5.08	5.68	5.33	5.39	5.42	5.31	5.45
<b>JAPAN</b>	4.62	5.22	4.28	4.05	4.50	4.46	4.33	4.43	4.67	5.17
<b>NETHERLANDS</b>	5.03	4.54	4.95	5.12	5.13	4.92	5.11	5.29	5.21	5.45
<b>SWEDEN</b>	4.51	4.44	4.39	4.05	6.33	5.53	4.90	5.08	4.81	5.26
<b>USA</b>	5.80	5.72	5.71	5.45	5.74	5.45	5.71	5.59	5.68	5.67
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	4.17	4.35	3.65	3.84	3.79	3.15	4.78	4.84	4.23	4.50
<b>CHINA</b>	3.05	3.21	2.92	2.60	2.84	3.72	3.54	3.98	4.00	4.06
<b>SPAIN</b>	4.20	4.80	4.76	5.15	5.18	4.95	5.32	5.08	4.87	5.10
<b>SOUTH KOREA</b>	4.46	5.18	5.03	4.51	4.78	4.40	4.41	4.46	4.95	4.76
<b>RUSSIA</b>	2.13	2.13	2.34	2.19	2.56	2.32	2.44	2.49	2.53	2.85
<b>TURKEY</b>	2.47	3.18	3.22	3.91	3.02	2.90	3.35	3.30	3.33	3.98
<b>TAIWAN</b>	4.75	4.82	4.39	4.32	4.39	4.68	3.98	4.74	4.61	4.99
<b>SOUTH AFRICA</b>	4.03	5.28	4.19	4.56	5.21	5.14	4.72	5.26	4.96	5.54



## A 1.10 COMPARATIVE ANALYSES, ECONOMICS &amp; BUSINESS

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	72	95	133	164	161	179	176	234	239	207
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	581	593	900	1,101	1,196	1,365	1,409	1,564	1,693	1,541
<b>CANADA</b>	795	814	969	1,134	1,211	1,324	1,274	1,305	1,382	1,228
<b>SWITZERLAND</b>	195	227	254	378	417	476	483	538	621	541
<b>GERMANY</b>	689	863	977	1,300	1,445	1,609	1,770	1,949	2,174	2,122
<b>ENGLAND</b>	1,683	1,742	2,165	2,297	2,487	2,584	2,633	2,938	3,039	2,830
<b>FRANCE</b>	482	530	615	896	876	1,052	1,126	1,192	1,333	1,230
<b>ITALY</b>	351	377	505	684	735	813	880	1,020	1,029	1,053
<b>JAPAN</b>	269	329	360	406	476	494	475	542	553	494
<b>NETHERLANDS</b>	522	580	636	813	885	951	1,021	1,081	1,074	1,028
<b>SWEDEN</b>	257	247	296	399	435	421	521	503	513	584
<b>USA</b>	6,175	6,531	7,136	8,300	8,738	8,725	9,011	9,144	9,047	8,158
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	53	58	79	191	222	236	226	275	289	265
<b>CHINA</b>	315	422	530	721	859	960	1,168	1,454	1,677	1,667
<b>SPAIN</b>	452	551	785	999	999	1,106	1,237	1,297	1,273	1,166
<b>SOUTH KOREA</b>	164	241	299	357	355	457	495	552	588	548
<b>RUSSIA</b>	25	31	32	45	55	62	68	77	77	77
<b>TURKEY</b>	110	117	118	164	248	297	287	368	327	335
<b>TAIWAN</b>	232	250	340	450	502	591	690	803	799	646
<b>SOUTH AFRICA</b>	52	108	134	182	164	186	175	212	202	194

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	0.57%	0.69%	0.82%	0.83%	0.76%	0.80%	0.76%	0.95%	0.98%	0.96%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	4.60%	4.34%	5.52%	5.58%	5.68%	6.12%	6.05%	6.33%	6.97%	7.14%
<b>CANADA</b>	6.30%	5.95%	5.94%	5.75%	5.75%	5.94%	5.47%	5.28%	5.69%	5.69%
<b>SWITZERLAND</b>	1.54%	1.66%	1.56%	1.92%	1.98%	2.14%	2.07%	2.18%	2.56%	2.51%
<b>GERMANY</b>	5.46%	6.31%	5.99%	6.59%	6.86%	7.22%	7.60%	7.89%	8.95%	9.83%
<b>ENGLAND</b>	13.33%	12.73%	13.28%	11.65%	11.81%	11.59%	11.30%	11.90%	12.51%	13.11%
<b>FRANCE</b>	3.82%	3.87%	3.77%	4.54%	4.16%	4.72%	4.83%	4.83%	5.49%	5.70%
<b>ITALY</b>	2.78%	2.76%	3.10%	3.47%	3.49%	3.65%	3.78%	4.13%	4.24%	4.88%
<b>JAPAN</b>	2.13%	2.41%	2.21%	2.06%	2.26%	2.22%	2.04%	2.19%	2.28%	2.29%
<b>NETHERLANDS</b>	4.13%	4.24%	3.90%	4.12%	4.20%	4.27%	4.38%	4.38%	4.42%	4.76%
<b>SWEDEN</b>	2.04%	1.81%	1.82%	2.02%	2.07%	1.89%	2.24%	2.04%	2.11%	2.70%
<b>USA</b>	48.91%	47.74%	43.76%	42.09%	41.49%	39.14%	38.68%	37.03%	37.24%	37.78%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	0.42%	0.42%	0.48%	0.97%	1.05%	1.06%	0.97%	1.11%	1.19%	1.23%
<b>CHINA</b>	2.49%	3.09%	3.25%	3.66%	4.08%	4.31%	5.01%	5.89%	6.90%	7.72%
<b>SPAIN</b>	3.58%	4.03%	4.81%	5.07%	4.74%	4.96%	5.31%	5.25%	5.24%	5.40%
<b>SOUTH KOREA</b>	1.30%	1.76%	1.83%	1.81%	1.69%	2.05%	2.12%	2.24%	2.42%	2.54%
<b>RUSSIA</b>	0.20%	0.23%	0.20%	0.23%	0.26%	0.28%	0.29%	0.31%	0.32%	0.36%
<b>TURKEY</b>	0.87%	0.86%	0.72%	0.83%	1.18%	1.33%	1.23%	1.49%	1.35%	1.55%
<b>TAIWAN</b>	1.84%	1.83%	2.08%	2.28%	2.38%	2.65%	2.96%	3.25%	3.29%	2.99%
<b>SOUTH AFRICA</b>	0.41%	0.79%	0.82%	0.92%	0.78%	0.83%	0.75%	0.86%	0.83%	0.90%

Average Normalized Citation Impact									
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.44	0.50	0.78	0.60	0.55	0.63	0.47	0.75	0.96
<b>Established Research Economies</b>									
AUSTRALIA	0.78	0.81	0.76	0.86	0.87	0.82	0.90	0.85	0.97
CANADA	0.97	0.93	1.04	1.09	0.97	1.03	1.18	1.06	0.91
SWITZERLAND	0.97	1.65	1.47	1.37	1.23	1.18	1.36	1.32	1.13
GERMANY	0.79	0.89	0.86	0.96	0.93	0.98	1.11	1.08	1.13
ENGLAND	1.13	1.10	1.07	1.21	1.19	1.14	1.29	1.16	1.21
FRANCE	0.65	0.75	0.81	0.76	0.81	0.89	0.86	0.82	0.86
ITALY	0.86	0.93	0.75	0.90	0.92	0.96	0.82	0.96	1.09
JAPAN	0.41	0.52	0.50	0.44	0.47	0.50	0.45	0.63	0.71
NETHERLANDS	1.06	1.02	1.03	1.19	1.18	1.23	1.25	1.19	1.43
SWEDEN	0.87	0.95	1.12	0.95	1.06	1.00	1.14	1.04	1.40
USA	1.39	1.36	1.39	1.36	1.37	1.37	1.39	1.32	1.20
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.70	0.62	0.51	0.59	0.29	0.44	0.38	0.39	0.24
CHINA	1.11	0.89	1.00	1.16	0.98	1.06	1.03	1.02	0.83
SPAIN	0.80	0.70	0.60	0.65	0.72	0.85	0.92	0.82	0.68
SOUTH KOREA	0.59	0.57	0.59	0.65	0.64	0.53	0.61	0.63	0.44
RUSSIA	0.55	0.43	0.43	0.57	0.45	0.34	0.69	0.64	0.66
TURKEY	0.69	0.65	0.76	0.73	0.72	0.68	0.56	0.54	0.49
TAIWAN	0.71	0.55	0.61	0.65	0.68	0.67	0.72	0.56	0.73
SOUTH AFRICA	0.35	0.39	0.37	0.39	0.48	0.36	0.35	0.41	0.39

Proportion of Highly-Cited Papers at four threshold												
Country	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	1.08%	3.23%	5.60%	13.36%	0.27%	2.67%	5.47%	18.00%	0.45%	3.59%	4.26%	14.57%
<b>Established Research Economies</b>												
AUSTRALIA	0.63%	3.34%	7.50%	20.63%	0.58%	3.98%	8.20%	22.33%	0.90%	4.33%	5.84%	19.51%
CANADA	1.10%	5.79%	11.07%	27.67%	1.41%	5.98%	11.65%	28.14%	0.96%	6.13%	7.51%	20.92%
SWITZERLAND	1.71%	7.59%	12.90%	30.93%	1.62%	6.84%	13.17%	30.09%	1.12%	6.97%	9.12%	24.61%
GERMANY	0.42%	3.81%	8.38%	22.43%	0.96%	4.77%	9.46%	25.16%	0.95%	4.56%	6.31%	20.58%
ENGLAND	0.94%	4.74%	10.52%	28.38%	1.28%	6.10%	11.33%	28.09%	1.19%	5.96%	7.67%	24.62%
FRANCE	0.59%	3.41%	7.81%	20.69%	0.80%	3.84%	8.20%	22.00%	0.86%	4.02%	5.62%	18.42%
ITALY	0.52%	3.44%	7.15%	20.34%	0.75%	3.92%	8.12%	21.81%	1.01%	5.19%	6.68%	19.79%
JAPAN	0.07%	1.03%	2.13%	9.46%	0.30%	2.01%	3.47%	9.96%	1.24%	4.39%	5.25%	14.52%
NETHERLANDS	0.86%	6.04%	12.47%	30.89%	1.50%	6.73%	13.46%	33.27%	1.19%	6.28%	7.90%	25.40%
SWEDEN	0.58%	4.67%	9.59%	25.02%	1.17%	6.01%	11.49%	27.18%	1.19%	7.02%	8.66%	22.52%
USA	1.70%	7.80%	14.56%	32.93%	1.80%	8.05%	14.27%	31.23%	1.11%	5.98%	7.70%	23.12%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	1.05%	4.20%	6.04%	14.96%	0.42%	1.15%	2.61%	9.70%	0.36%	0.90%	1.08%	9.21%
CHINA	1.31%	5.48%	11.87%	29.38%	1.35%	5.70%	10.29%	26.50%	0.66%	4.81%	6.01%	19.89%
SPAIN	0.32%	2.62%	6.03%	17.26%	0.91%	3.56%	7.03%	19.42%	0.66%	4.10%	5.41%	17.84%
SOUTH KOREA	0.28%	3.30%	6.03%	17.25%	0.32%	2.74%	5.59%	16.08%	0.26%	2.64%	3.17%	12.68%
RUSSIA		1.50%	3.01%	11.28%		0.38%	3.44%	10.69%		1.30%	1.95%	11.69%
TURKEY	0.39%	3.73%	7.86%	18.86%	0.50%	2.75%	5.00%	14.00%	0.15%	1.81%	2.27%	10.27%
TAIWAN	0.16%	2.59%	5.03%	15.57%	0.46%	1.97%	5.18%	16.55%	0.48%	3.25%	3.88%	15.16%
SOUTH AFRICA		1.26%	1.89%	5.46%		0.68%	2.04%	7.60%		2.27%	3.54%	9.85%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	29.17%	43.16%	33.83%	40.85%	44.72%	46.37%	48.30%	53.85%	52.72%	51.69%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	39.41%	37.94%	38.67%	39.33%	43.31%	41.83%	47.41%	46.74%	48.43%	53.15%
<b>CANADA</b>	47.80%	46.68%	51.19%	51.50%	52.68%	54.68%	57.22%	60.00%	62.37%	62.54%
<b>SWITZERLAND</b>	51.28%	59.91%	56.30%	57.94%	56.35%	66.18%	60.04%	65.06%	69.24%	69.13%
<b>GERMANY</b>	44.56%	44.50%	43.30%	48.92%	49.55%	52.83%	49.66%	51.72%	50.74%	52.50%
<b>ENGLAND</b>	42.31%	48.05%	48.13%	52.33%	54.44%	55.42%	57.96%	60.25%	61.27%	64.81%
<b>FRANCE</b>	46.27%	49.06%	51.06%	53.01%	54.68%	53.42%	52.84%	55.45%	55.06%	59.67%
<b>ITALY</b>	41.88%	45.62%	43.96%	46.49%	46.39%	47.85%	48.98%	52.16%	51.60%	56.70%
<b>JAPAN</b>	27.51%	31.31%	30.56%	29.56%	30.04%	28.54%	34.53%	35.79%	39.06%	39.47%
<b>NETHERLANDS</b>	48.28%	48.62%	49.69%	55.72%	56.27%	57.73%	60.24%	61.24%	62.66%	63.42%
<b>SWEDEN</b>	35.02%	36.44%	38.18%	41.60%	47.36%	45.84%	47.98%	48.71%	57.70%	54.97%
<b>USA</b>	23.11%	25.07%	26.71%	29.13%	30.00%	31.68%	33.07%	36.33%	39.06%	40.08%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	39.62%	44.83%	36.71%	37.17%	26.58%	36.02%	31.42%	33.09%	32.18%	42.64%
<b>CHINA</b>	57.14%	60.90%	58.11%	57.42%	59.84%	59.79%	58.05%	60.94%	58.26%	61.13%
<b>SPAIN</b>	32.74%	32.67%	30.32%	33.33%	34.53%	34.18%	36.38%	39.40%	42.73%	45.45%
<b>SOUTH KOREA</b>	50.61%	46.89%	50.17%	52.10%	52.68%	51.86%	48.48%	54.53%	53.23%	51.28%
<b>RUSSIA</b>	60.00%	54.84%	59.38%	68.89%	61.82%	35.48%	72.06%	59.74%	55.84%	68.83%
<b>TURKEY</b>	35.45%	43.59%	45.76%	46.34%	34.27%	32.32%	42.51%	38.86%	41.59%	43.28%
<b>TAIWAN</b>	28.88%	27.20%	20.88%	22.89%	26.49%	26.23%	27.10%	25.03%	28.91%	29.57%
<b>SOUTH AFRICA</b>	25.00%	29.63%	19.40%	29.67%	26.83%	30.65%	34.29%	30.66%	32.67%	39.69%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.31	1.31	0.97	1.06	1.05	0.98	0.96	0.93	1.07	1.21
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	1.33	1.23	1.17	1.10	1.09	1.07	1.15	1.13	1.28	1.21
<b>CANADA</b>	1.55	1.60	1.58	1.45	1.48	1.51	1.53	1.52	1.53	1.50
<b>SWITZERLAND</b>	1.31	1.64	1.57	1.39	1.54	1.36	1.59	1.41	1.54	1.47
<b>GERMANY</b>	1.19	1.14	1.17	1.10	1.18	1.12	1.13	1.18	1.24	1.19
<b>ENGLAND</b>	1.54	1.48	1.45	1.45	1.43	1.44	1.40	1.45	1.51	1.57
<b>FRANCE</b>	1.13	1.14	1.22	1.15	1.14	1.20	1.20	1.12	1.15	1.29
<b>ITALY</b>	1.25	1.24	1.14	1.24	1.16	1.09	1.04	1.04	1.19	1.15
<b>JAPAN</b>	0.93	0.96	0.80	0.85	0.96	0.79	0.81	0.95	0.94	0.90
<b>NETHERLANDS</b>	1.62	1.47	1.51	1.42	1.55	1.47	1.48	1.41	1.55	1.51
<b>SWEDEN</b>	1.30	1.36	1.48	1.31	1.50	1.35	1.30	1.40	1.33	1.38
<b>USA</b>	1.86	1.90	1.89	1.79	1.80	1.78	1.79	1.74	1.80	1.86
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.01	0.97	1.08	0.80	0.52	0.56	0.57	0.61	0.58	0.84
<b>CHINA</b>	1.53	1.36	1.35	1.45	1.34	1.38	1.21	1.20	1.27	1.23
<b>SPAIN</b>	1.15	1.08	0.95	0.89	0.97	1.02	0.90	0.96	1.06	1.11
<b>SOUTH KOREA</b>	1.02	0.90	0.95	0.93	1.00	0.84	0.85	0.88	1.00	0.89
<b>RUSSIA</b>	1.19	0.96	1.29	0.72	0.91	0.55	0.96	0.86	1.09	1.09
<b>TURKEY</b>	0.89	0.89	1.07	0.99	0.72	0.81	0.67	0.73	0.78	0.79
<b>TAIWAN</b>	0.94	0.98	0.89	0.89	0.88	0.80	0.79	0.78	0.90	0.92
<b>SOUTH AFRICA</b>	0.51	0.50	0.41	0.42	0.53	0.48	0.54	0.58	0.65	0.58

## A 1.11 COMPARATIVE ANALYSES, PSYCHIATRY/PSYCHOLOGY

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	55	95	88	79	107	156	131	164	173	176
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	1,036	1,215	1,379	1,566	1,713	1,872	1,998	2,231	2,526	2,625
<b>CANADA</b>	1,685	1,840	2,050	2,121	2,377	2,469	2,637	2,838	2,929	2,771
<b>SWITZERLAND</b>	316	364	458	535	594	632	682	790	831	876
<b>GERMANY</b>	1,620	1,732	2,104	2,226	2,313	2,549	2,822	2,960	3,241	3,138
<b>ENGLAND</b>	2,400	2,682	3,049	3,114	3,301	3,463	3,750	3,913	4,263	4,139
<b>FRANCE</b>	548	518	680	836	912	927	1,083	1,109	1,126	1,064
<b>ITALY</b>	473	530	670	728	840	936	1,075	1,193	1,218	1,266
<b>JAPAN</b>	404	439	505	474	552	572	653	711	755	686
<b>NETHERLANDS</b>	994	1,099	1,353	1,468	1,586	1,798	1,954	2,108	2,134	2,162
<b>SWEDEN</b>	351	363	412	431	438	457	537	576	695	734
<b>USA</b>	11,612	12,568	13,116	14,246	14,928	15,062	16,144	16,952	17,517	17,027
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	146	179	288	422	422	468	463	553	525	549
<b>CHINA</b>	243	297	397	469	597	695	830	1,047	1,189	1,345
<b>SPAIN</b>	599	696	823	999	1,125	1,225	1,452	1,471	1,539	1,466
<b>SOUTH KOREA</b>	104	137	157	215	271	268	355	410	470	536
<b>RUSSIA</b>	85	82	97	91	154	148	153	187	147	125
<b>TURKEY</b>	187	189	243	367	475	349	343	380	368	421
<b>TAIWAN</b>	138	170	255	276	331	364	450	472	497	469
<b>SOUTH AFRICA</b>	101	136	124	227	223	266	269	362	339	314

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	0.25%	0.39%	0.33%	0.27%	0.35%	0.49%	0.38%	0.45%	0.46%	0.50%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	4.69%	5.02%	5.17%	5.38%	5.53%	5.86%	5.79%	6.17%	6.64%	7.38%
<b>CANADA</b>	7.63%	7.61%	7.68%	7.28%	7.67%	7.73%	7.64%	7.84%	7.70%	7.80%
<b>SWITZERLAND</b>	1.43%	1.50%	1.72%	1.84%	1.92%	1.98%	1.97%	2.18%	2.19%	2.46%
<b>GERMANY</b>	7.33%	7.16%	7.88%	7.65%	7.47%	7.98%	8.17%	8.18%	8.52%	8.83%
<b>ENGLAND</b>	10.86%	11.09%	11.43%	10.69%	10.65%	10.84%	10.86%	10.81%	11.21%	11.64%
<b>FRANCE</b>	2.48%	2.14%	2.55%	2.87%	2.94%	2.90%	3.14%	3.06%	2.96%	2.99%
<b>ITALY</b>	2.14%	2.19%	2.51%	2.50%	2.71%	2.93%	3.11%	3.30%	3.20%	3.56%
<b>JAPAN</b>	1.83%	1.81%	1.89%	1.63%	1.78%	1.79%	1.89%	1.96%	1.99%	1.93%
<b>NETHERLANDS</b>	4.50%	4.54%	5.07%	5.04%	5.12%	5.63%	5.66%	5.83%	5.61%	6.08%
<b>SWEDEN</b>	1.59%	1.50%	1.54%	1.48%	1.41%	1.43%	1.55%	1.59%	1.83%	2.06%
<b>USA</b>	52.55%	51.95%	49.15%	48.93%	48.18%	47.13%	46.75%	46.85%	46.08%	47.90%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	0.66%	0.74%	1.08%	1.45%	1.36%	1.46%	1.34%	1.53%	1.38%	1.54%
<b>CHINA</b>	1.10%	1.23%	1.49%	1.61%	1.93%	2.17%	2.40%	2.89%	3.13%	3.78%
<b>SPAIN</b>	2.71%	2.88%	3.08%	3.43%	3.63%	3.83%	4.20%	4.06%	4.05%	4.12%
<b>SOUTH KOREA</b>	0.47%	0.57%	0.59%	0.74%	0.87%	0.84%	1.03%	1.13%	1.24%	1.51%
<b>RUSSIA</b>	0.38%	0.34%	0.36%	0.31%	0.50%	0.46%	0.44%	0.52%	0.39%	0.35%
<b>TURKEY</b>	0.85%	0.78%	0.91%	1.26%	1.53%	1.09%	0.99%	1.05%	0.97%	1.18%
<b>TAIWAN</b>	0.62%	0.70%	0.96%	0.95%	1.07%	1.14%	1.30%	1.30%	1.31%	1.32%
<b>SOUTH AFRICA</b>	0.46%	0.56%	0.46%	0.78%	0.72%	0.83%	0.78%	1.00%	0.89%	0.88%

Country	Average Normalized Citation Impact								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.96	0.55	0.60	0.81	0.61	0.85	1.09	0.62	0.55
<b>Established Research Economies</b>									
AUSTRALIA	1.00	1.14	0.99	1.13	1.11	1.07	1.08	1.13	1.09
CANADA	1.12	1.14	1.10	1.18	1.13	1.19	1.11	1.13	1.20
SWITZERLAND	0.96	0.92	1.26	1.02	1.17	1.15	1.10	1.19	1.41
GERMANY	0.83	0.88	1.01	0.99	1.08	1.16	1.18	1.15	1.24
ENGLAND	1.19	1.26	1.19	1.32	1.34	1.29	1.31	1.39	1.31
FRANCE	0.93	0.82	0.75	0.74	0.84	0.76	0.89	0.86	0.94
ITALY	0.94	0.83	0.80	0.85	1.04	1.03	1.04	0.91	1.09
JAPAN	0.55	0.59	0.50	0.65	0.63	0.67	0.63	0.59	0.77
NETHERLANDS	1.17	1.26	1.23	1.32	1.24	1.40	1.36	1.24	1.23
SWEDEN	1.08	0.99	0.90	0.98	1.09	1.19	1.09	1.38	1.01
USA	1.33	1.37	1.37	1.33	1.32	1.32	1.35	1.29	1.19
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	0.81	0.55	0.85	0.59	0.53	0.54	0.64	0.61	0.64
CHINA	0.86	0.79	0.98	0.92	0.88	0.87	0.91	0.81	0.70
SPAIN	0.62	0.65	0.80	0.78	0.81	0.80	0.79	0.80	0.86
SOUTH KOREA	0.92	0.90	0.93	0.75	0.72	0.71	0.80	0.70	0.46
RUSSIA	0.27	0.17	0.25	0.28	0.18	0.26	0.20	0.39	0.44
TURKEY	0.55	0.44	0.53	0.36	0.23	0.33	0.29	0.34	0.30
TAIWAN	0.88	0.83	0.88	0.71	0.71	0.68	0.71	0.69	0.57
SOUTH AFRICA	0.67	0.57	0.53	0.50	0.54	0.60	0.56	0.63	0.64

Country	Proportion of Highly-Cited Papers at four threshold											
	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	#VALUE!	3.15%	6.62%	17.67%	1.43%	4.84%	7.89%	20.97%	0.29%	2.01%	5.44%	10.03%
<b>Established Research Economies</b>												
AUSTRALIA	0.79%	4.70%	10.26%	27.27%	1.01%	4.89%	10.07%	26.55%	0.83%	4.89%	10.13%	15.26%
CANADA	1.17%	6.11%	11.90%	28.60%	1.38%	5.82%	11.29%	27.45%	1.09%	5.25%	10.56%	15.86%
SWITZERLAND	1.49%	6.40%	12.67%	27.62%	1.67%	7.08%	12.90%	29.24%	1.58%	6.74%	13.30%	18.57%
GERMANY	0.74%	4.46%	9.37%	22.86%	1.23%	5.80%	11.23%	26.72%	1.13%	5.67%	11.52%	16.38%
ENGLAND	1.26%	6.18%	12.62%	30.59%	1.69%	7.17%	13.65%	30.54%	1.51%	6.95%	12.72%	18.21%
FRANCE	0.89%	3.64%	7.44%	18.90%	1.19%	4.71%	8.53%	20.32%	0.96%	4.47%	8.86%	12.69%
ITALY	0.67%	4.12%	8.50%	23.99%	1.36%	6.26%	11.75%	26.73%	1.33%	5.48%	11.35%	16.22%
JAPAN	0.27%	2.20%	3.95%	12.57%	0.56%	2.97%	5.59%	14.95%	0.83%	3.05%	6.25%	10.69%
NETHERLANDS	1.65%	6.41%	12.92%	32.11%	1.72%	7.33%	14.16%	32.94%	1.19%	6.52%	12.85%	18.20%
SWEDEN	1.03%	5.39%	9.44%	23.96%	1.74%	7.52%	14.19%	30.63%	1.12%	6.72%	13.51%	18.89%
USA	1.45%	6.67%	12.55%	28.81%	1.39%	6.29%	11.88%	27.48%	1.06%	5.53%	10.75%	15.79%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL	0.87%	3.67%	7.92%	15.65%	0.89%	3.67%	6.30%	15.22%	1.49%	4.28%	8.94%	11.36%
CHINA	0.78%	4.20%	8.25%	22.62%	0.54%	3.66%	7.70%	20.45%	0.36%	2.88%	6.39%	10.58%
SPAIN	0.45%	3.14%	6.45%	15.43%	0.68%	3.32%	6.58%	16.88%	0.63%	3.26%	7.59%	11.01%
SOUTH KOREA	0.16%	3.92%	7.34%	18.92%	0.46%	2.45%	5.44%	17.25%	0.50%	2.09%	5.57%	8.35%
RUSSIA		0.85%	1.97%	5.63%		1.40%	2.34%	5.76%		0.37%	2.94%	5.51%
TURKEY	0.20%	1.52%	2.64%	10.65%	0.06%	0.84%	1.55%	5.69%	0.38%	1.52%	3.80%	5.20%
TAIWAN	0.24%	3.10%	4.89%	15.38%	0.25%	1.73%	3.96%	14.35%	0.31%	2.28%	4.55%	7.76%
SOUTH AFRICA	0.17%	2.38%	6.29%	13.95%	0.80%	3.75%	6.79%	11.70%	0.77%	3.06%	6.43%	10.26%

Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	52.73%	44.21%	43.18%	59.49%	45.79%	57.69%	58.78%	54.88%	56.07%	57.95%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	32.82%	35.31%	34.37%	34.67%	38.41%	40.54%	41.09%	41.69%	44.02%	46.13%
<b>CANADA</b>	39.23%	39.51%	40.59%	42.72%	44.01%	42.32%	45.16%	45.21%	46.16%	48.39%
<b>SWITZERLAND</b>	55.70%	56.04%	63.32%	58.88%	62.46%	59.97%	64.52%	66.33%	67.51%	69.06%
<b>GERMANY</b>	30.43%	30.89%	31.51%	34.91%	39.56%	40.09%	42.06%	42.84%	45.63%	46.18%
<b>ENGLAND</b>	39.42%	42.80%	44.08%	47.46%	48.86%	49.29%	49.97%	53.08%	55.59%	58.25%
<b>FRANCE</b>	35.04%	37.26%	37.94%	35.05%	40.35%	42.18%	44.60%	45.45%	49.64%	47.18%
<b>ITALY</b>	46.72%	46.23%	44.03%	46.84%	45.71%	50.21%	46.79%	45.10%	50.74%	49.29%
<b>JAPAN</b>	29.70%	25.97%	28.32%	29.11%	28.44%	26.75%	30.47%	32.21%	32.32%	35.71%
<b>NETHERLANDS</b>	37.32%	38.22%	37.55%	38.96%	41.17%	44.72%	45.70%	49.43%	53.80%	54.35%
<b>SWEDEN</b>	35.04%	34.44%	39.32%	44.78%	45.21%	47.48%	49.16%	52.95%	52.81%	55.59%
<b>USA</b>	15.91%	17.02%	18.92%	19.47%	20.44%	21.64%	22.65%	24.43%	25.10%	27.05%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	43.84%	37.99%	30.90%	34.36%	33.65%	33.33%	36.93%	35.26%	41.33%	51.18%
<b>CHINA</b>	52.67%	50.17%	52.64%	54.16%	55.11%	56.98%	58.67%	56.16%	56.69%	52.42%
<b>SPAIN</b>	26.21%	30.89%	35.72%	32.73%	33.60%	35.18%	35.88%	36.78%	38.73%	44.54%
<b>SOUTH KOREA</b>	61.54%	51.82%	55.41%	44.65%	46.13%	42.91%	47.61%	45.85%	46.81%	50.00%
<b>RUSSIA</b>	32.94%	26.83%	21.65%	25.27%	9.74%	17.57%	21.57%	29.95%	33.33%	50.40%
<b>TURKEY</b>	25.13%	15.87%	19.34%	17.44%	16.63%	18.91%	18.95%	24.74%	25.54%	25.42%
<b>TAIWAN</b>	31.88%	20.59%	19.22%	23.91%	23.87%	26.37%	26.44%	32.63%	31.39%	31.77%
<b>SOUTH AFRICA</b>	39.60%	35.29%	33.06%	31.28%	34.98%	42.11%	34.20%	38.67%	41.30%	64.33%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	3.14	2.76	2.83	3.25	2.78	2.56	2.93	2.24	2.28	2.71
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	2.95	2.81	2.79	2.91	2.64	2.59	2.60	2.64	2.60	2.64
<b>CANADA</b>	2.88	2.88	2.80	2.85	2.77	2.66	2.72	2.60	2.67	2.64
<b>SWITZERLAND</b>	2.75	2.77	2.70	2.54	2.77	2.67	2.61	2.49	2.76	2.75
<b>GERMANY</b>	2.41	2.29	2.24	2.44	2.47	2.59	2.55	2.47	2.61	2.63
<b>ENGLAND</b>	3.23	3.36	3.17	3.19	3.20	3.12	3.07	3.11	3.05	3.14
<b>FRANCE</b>	2.27	2.30	2.22	1.99	2.05	2.06	2.29	2.28	2.38	2.49
<b>ITALY</b>	3.21	2.59	2.51	2.42	2.66	2.50	2.59	2.28	2.56	2.51
<b>JAPAN</b>	2.20	2.21	2.13	2.28	2.24	2.41	2.37	2.39	2.57	2.77
<b>NETHERLANDS</b>	3.11	3.17	3.04	3.01	2.83	3.10	3.02	2.98	3.02	3.00
<b>SWEDEN</b>	2.66	2.84	2.58	2.57	2.59	2.77	2.54	3.06	2.62	2.79
<b>USA</b>	3.20	3.16	3.07	2.87	2.93	2.87	2.87	2.88	2.77	2.76
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	2.82	2.51	2.14	1.86	1.74	1.76	1.92	1.87	2.35	2.63
<b>CHINA</b>	2.72	2.46	2.67	2.46	2.42	2.63	2.70	2.66	2.57	2.75
<b>SPAIN</b>	2.07	1.92	2.20	2.10	1.93	2.04	2.19	2.06	2.21	2.32
<b>SOUTH KOREA</b>	2.82	2.85	2.37	2.15	2.15	2.19	2.25	2.35	2.26	2.14
<b>RUSSIA</b>	1.02	0.82	0.88	0.87	0.42	0.66	0.58	0.82	1.00	1.36
<b>TURKEY</b>	1.71	1.49	1.70	1.05	0.73	0.95	1.01	1.21	1.36	1.36
<b>TAIWAN</b>	2.61	2.52	2.12	1.87	2.09	2.31	2.28	2.21	2.45	2.58
<b>SOUTH AFRICA</b>	1.41	1.54	1.22	1.15	1.12	1.23	1.12	1.23	1.35	1.90

## A.1.12 COMPARATIVE ANALYSES, MULTIDISCIPLINARY

Country	Number of Papers									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	138	128	115	90	119	103	118	109	133	136
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	38	40	34	47	57	65	82	115	162	136
<b>CANADA</b>	41	52	50	73	70	97	99	148	159	137
<b>SWITZERLAND</b>	36	47	35	36	53	68	58	83	102	104
<b>GERMANY</b>	96	102	115	103	135	144	153	262	280	268
<b>ENGLAND</b>	149	141	145	149	176	217	235	290	360	291
<b>FRANCE</b>	66	89	73	74	84	101	100	153	200	144
<b>ITALY</b>	47	54	47	48	61	54	80	122	127	109
<b>JAPAN</b>	65	84	65	70	72	81	112	189	227	172
<b>NETHERLANDS</b>	27	24	32	34	40	45	52	86	97	84
<b>SWEDEN</b>	24	31	34	33	40	36	46	85	87	66
<b>USA</b>	772	742	745	816	859	973	1,113	1,315	1,464	1,251
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	18	19	14	33	24	24	48	68	81	68
<b>CHINA</b>	95	108	92	109	116	146	372	342	555	559
<b>SPAIN</b>	19	28	30	46	42	54	66	102	114	105
<b>SOUTH KOREA</b>	15	11	20	14	27	27	42	41	61	92
<b>RUSSIA</b>	15	18	11	15	12	13	13	18	24	25
<b>TURKEY</b>	3	1	7	5	4	4	4	10	26	9
<b>TAIWAN</b>	14	5	10	10	14	13	28	38	55	56
<b>SOUTH AFRICA</b>	32	29	17	28	16	11	31	28	43	31

Country	Share of World Output									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	9.75%	8.99%	7.89%	5.61%	6.89%	5.49%	5.04%	3.75%	3.69%	4.74%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	2.68%	2.81%	2.33%	2.93%	3.30%	3.46%	3.50%	3.96%	4.50%	4.74%
<b>CANADA</b>	2.90%	3.65%	3.43%	4.55%	4.05%	5.17%	4.23%	5.09%	4.41%	4.77%
<b>SWITZERLAND</b>	2.54%	3.30%	2.40%	2.24%	3.07%	3.62%	2.48%	2.86%	2.83%	3.62%
<b>GERMANY</b>	6.78%	7.16%	7.89%	6.42%	7.82%	7.68%	6.53%	9.02%	7.77%	9.34%
<b>ENGLAND</b>	10.52%	9.90%	9.95%	9.29%	10.19%	11.57%	10.03%	9.98%	9.99%	10.14%
<b>FRANCE</b>	4.66%	6.25%	5.01%	4.61%	4.86%	5.38%	4.27%	5.27%	5.55%	5.02%
<b>ITALY</b>	3.32%	3.79%	3.23%	2.99%	3.53%	2.88%	3.41%	4.20%	3.53%	3.80%
<b>JAPAN</b>	4.59%	5.90%	4.46%	4.36%	4.17%	4.32%	4.78%	6.51%	6.30%	5.99%
<b>NETHERLANDS</b>	1.91%	1.69%	2.20%	2.12%	2.32%	2.40%	2.22%	2.96%	2.69%	2.93%
<b>SWEDEN</b>	1.69%	2.18%	2.33%	2.06%	2.32%	1.92%	1.96%	2.93%	2.42%	2.30%
<b>USA</b>	54.52%	52.11%	51.13%	50.87%	49.74%	51.87%	47.50%	45.27%	40.64%	43.59%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	1.27%	1.33%	0.96%	2.06%	1.39%	1.28%	2.05%	2.34%	2.25%	2.37%
<b>CHINA</b>	6.71%	7.58%	6.31%	6.80%	6.72%	7.78%	15.88%	11.77%	15.41%	19.48%
<b>SPAIN</b>	1.34%	1.97%	2.06%	2.87%	2.43%	2.88%	2.82%	3.51%	3.16%	3.66%
<b>SOUTH KOREA</b>	1.06%	0.77%	1.37%	0.87%	1.56%	1.44%	1.79%	1.41%	1.69%	3.21%
<b>RUSSIA</b>	1.06%	1.26%	0.75%	0.94%	0.69%	0.69%	0.55%	0.62%	0.67%	0.87%
<b>TURKEY</b>	0.21%	0.07%	0.48%	0.31%	0.23%	0.21%	0.17%	0.34%	0.72%	0.31%
<b>TAIWAN</b>	0.99%	0.35%	0.69%	0.62%	0.81%	0.69%	1.20%	1.31%	1.53%	1.95%
<b>SOUTH AFRICA</b>	2.26%	2.04%	1.17%	1.75%	0.93%	0.59%	1.32%	0.96%	1.19%	1.08%

Average Normalized Citation Impact									
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
INDIA	0.17	0.23	0.16	0.13	0.20	0.35	0.26	0.90	0.39
<b>Established Research Economies</b>									
AUSTRALIA	0.96	2.46	2.69	4.34	1.61	3.08	2.05	1.99	1.10
CANADA	2.76	2.29	2.14	3.57	2.62	4.79	3.02	2.80	2.09
SWITZERLAND	4.94	1.26	2.27	2.90	3.28	2.72	2.94	2.63	2.81
GERMANY	1.84	2.04	2.27	2.41	2.17	3.05	2.63	2.16	2.02
ENGLAND	1.99	2.39	2.62	2.30	2.27	3.47	2.16	3.83	1.80
FRANCE	2.66	2.88	1.48	2.05	2.81	2.96	1.73	2.14	1.36
ITALY	2.82	2.17	1.11	2.33	1.44	3.29	1.02	2.64	0.79
JAPAN	1.51	1.45	1.64	1.86	2.40	2.53	1.69	1.55	1.01
NETHERLANDS	2.72	2.86	2.14	1.59	2.74	3.21	2.04	3.50	1.52
SWEDEN	2.25	2.24	2.10	1.73	3.82	2.74	1.79	2.74	1.45
USA	2.98	3.30	2.58	2.84	2.71	4.20	3.20	5.02	3.14
<b>BRICS and other emerging Research Economies</b>									
BRAZIL	1.23	1.15	1.09	0.48	1.17	0.76	1.14	0.85	0.52
CHINA	1.27	0.57	0.92	0.69	0.69	2.20	0.70	1.72	0.96
SPAIN	1.41	2.84	1.52	1.64	2.22	4.76	4.74	3.34	1.81
SOUTH KOREA	1.61	2.89	3.77	1.55	7.55	2.89	1.79	3.16	0.67
RUSSIA	0.37	0.82	1.32	1.14	0.89	3.64	0.32	1.96	0.82
TURKEY	0.48	0.25	0.21	0.58	0.47	0.36	1.43	3.47	0.51
TAIWAN	0.54	0.64	1.22	1.19	1.72	1.20	0.44	1.25	0.76
SOUTH AFRICA	0.43	0.49	0.71	1.43	0.38	1.58	1.76	1.07	2.58

Proportion of Highly-Cited Papers at four threshold												
Country	2005-2008				2009-2012				2013-2014			
	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%	Top1%	Top5%	Top10%	Top25%
INDIA	0.42%	0.42%	1.70%	0.45%	0.89%	1.56%	2.90%	0.74%	1.12%	3.72%		
<b>Established Research Economies</b>												
AUSTRALIA	3.14%	10.06%	14.47%	32.70%	1.57%	9.72%	17.87%	35.11%	2.01%	7.38%	13.76%	26.51%
CANADA	2.31%	9.72%	18.52%	37.96%	3.62%	10.63%	19.32%	37.44%	2.70%	9.46%	13.51%	30.07%
SWITZERLAND	1.95%	11.69%	16.88%	35.06%	3.82%	15.65%	27.86%	47.33%	2.43%	11.65%	22.33%	39.81%
GERMANY	0.72%	8.17%	16.35%	38.94%	2.31%	8.07%	16.86%	36.46%	2.19%	8.39%	14.05%	31.75%
ENGLAND	2.05%	9.08%	17.12%	37.84%	2.72%	8.93%	15.80%	37.15%	1.54%	8.29%	13.67%	31.80%
FRANCE	0.66%	7.62%	13.91%	35.10%	2.97%	9.36%	17.81%	37.90%	2.62%	7.56%	12.79%	31.40%
ITALY	1.53%	6.12%	10.71%	26.02%	2.21%	6.94%	11.99%	29.97%	1.27%	3.39%	6.36%	21.19%
JAPAN	0.35%	9.15%	14.79%	30.28%	2.20%	5.95%	13.66%	33.48%	1.50%	3.76%	6.27%	20.55%
NETHERLANDS		5.98%	10.26%	42.74%	4.04%	13.90%	21.97%	36.77%	2.21%	8.84%	16.02%	32.60%
SWEDEN	3.28%	7.38%	14.75%	44.26%	4.35%	9.66%	15.94%	37.20%	1.96%	9.80%	15.03%	33.99%
USA	1.92%	7.97%	15.28%	36.13%	2.16%	8.80%	16.13%	36.69%	1.88%	8.80%	14.92%	32.49%
<b>BRICS and other emerging Research Economies</b>												
BRAZIL		5.95%	9.52%	14.29%	1.22%	6.71%	8.54%	18.90%		2.01%	4.70%	14.09%
CHINA	0.99%	1.98%	4.70%	11.39%	1.33%	4.00%	7.07%	16.19%	0.45%	3.77%	5.75%	16.07%
SPAIN	0.81%	4.88%	8.94%	30.08%	2.65%	9.47%	17.05%	36.74%	3.20%	7.76%	10.96%	24.66%
SOUTH KOREA	1.67%	5.00%	11.67%	36.67%	4.38%	10.22%	18.98%	35.04%		0.65%	1.96%	11.11%
RUSSIA		3.39%	6.78%	22.03%		10.71%	19.64%	32.14%		4.08%	12.24%	32.65%
TURKEY			6.25%		4.55%	9.09%	18.18%	22.73%		2.86%	2.86%	11.43%
TAIWAN		2.56%	10.26%	23.08%	2.15%	3.23%	7.53%	19.35%		6.31%	9.01%	16.22%
SOUTH AFRICA	0.94%	4.72%	5.66%	11.32%		10.47%	13.95%	24.42%	1.35%	2.70%	2.70%	14.86%



Percentage of International Collaborative Papers										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	7.97%	10.94%	8.70%	12.22%	21.01%	10.68%	22.03%	12.84%	15.04%	27.21%
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	63.16%	62.50%	67.65%	63.83%	57.89%	73.85%	82.93%	68.70%	69.14%	75.00%
<b>CANADA</b>	80.49%	78.85%	70.00%	68.49%	70.00%	73.20%	64.65%	66.89%	68.55%	63.50%
<b>SWITZERLAND</b>	69.44%	55.32%	85.71%	80.56%	66.04%	79.41%	81.03%	79.52%	81.37%	82.69%
<b>GERMANY</b>	69.79%	76.47%	70.43%	63.11%	71.11%	75.00%	69.28%	67.94%	70.71%	74.63%
<b>ENGLAND</b>	51.01%	67.38%	66.21%	63.76%	64.77%	72.81%	74.04%	74.83%	74.17%	75.95%
<b>FRANCE</b>	75.76%	71.91%	75.34%	71.62%	64.29%	74.26%	70.00%	77.12%	77.50%	76.39%
<b>ITALY</b>	61.70%	61.11%	74.47%	66.67%	60.66%	70.37%	68.75%	71.31%	64.57%	71.56%
<b>JAPAN</b>	52.31%	58.33%	50.77%	51.43%	54.17%	45.68%	53.57%	44.44%	40.97%	45.93%
<b>NETHERLANDS</b>	88.89%	62.50%	65.63%	79.41%	57.50%	84.44%	84.62%	70.93%	73.20%	79.76%
<b>SWEDEN</b>	70.83%	90.32%	82.35%	72.73%	65.00%	75.00%	80.43%	83.53%	77.01%	84.85%
<b>USA</b>	32.25%	38.01%	33.29%	34.44%	34.46%	40.80%	41.78%	45.10%	46.65%	48.36%
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	77.78%	57.89%	35.71%	42.42%	33.33%	20.83%	41.67%	41.18%	38.27%	38.24%
<b>CHINA</b>	25.26%	32.41%	33.70%	35.78%	31.90%	49.32%	32.53%	47.37%	41.98%	40.43%
<b>SPAIN</b>	89.47%	75.00%	80.00%	65.22%	73.81%	77.78%	65.15%	63.73%	70.18%	63.81%
<b>SOUTH KOREA</b>	66.67%	90.91%	75.00%	85.71%	66.67%	77.78%	61.90%	46.34%	49.18%	44.57%
<b>RUSSIA</b>	53.33%	72.22%	90.91%	66.67%	66.67%	100.00%	76.92%	88.89%	79.17%	88.00%
<b>TURKEY</b>	33.33%	100.00%		20.00%	50.00%	50.00%	25.00%	50.00%	15.38%	55.56%
<b>TAIWAN</b>	35.71%	100.00%	60.00%	80.00%	57.14%	84.62%	21.43%	39.47%	49.09%	48.21%
<b>SOUTH AFRICA</b>	34.38%	34.48%	29.41%	46.43%	43.75%	54.55%	67.74%	64.29%	74.42%	61.29%

Average Impact Factor										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	1.60	1.44	1.99	1.36	2.04	2.03	2.11	4.13	2.05	2.35
<b>Established Research Economies</b>										
<b>AUSTRALIA</b>	15.67	19.46	15.59	13.80	11.60	16.02	10.20	9.19	7.54	9.63
<b>CANADA</b>	19.28	17.19	14.01	15.89	12.81	17.72	14.63	10.39	8.77	8.99
<b>SWITZERLAND</b>	25.45	11.22	11.78	18.08	16.78	15.39	16.51	11.08	15.55	13.16
<b>GERMANY</b>	18.69	20.13	13.95	14.62	15.09	15.54	12.08	10.89	11.51	11.29
<b>ENGLAND</b>	20.22	21.28	18.91	13.77	14.90	13.58	12.45	12.90	9.82	12.19
<b>FRANCE</b>	20.82	17.75	12.64	11.38	15.86	12.98	11.25	8.98	10.00	10.88
<b>ITALY</b>	13.30	9.98	12.34	7.01	9.80	9.90	6.42	7.92	6.34	6.52
<b>JAPAN</b>	17.56	16.18	16.56	14.04	17.43	13.83	12.14	8.22	7.99	7.70
<b>NETHERLANDS</b>	22.19	21.06	14.10	15.01	12.92	13.17	9.87	11.17	11.32	10.13
<b>SWEDEN</b>	18.62	17.07	16.04	15.20	15.56	17.19	8.21	9.09	8.74	11.65
<b>USA</b>	19.65	18.95	15.98	15.77	17.26	16.51	14.59	14.70	11.94	12.80
<b>BRICS and other emerging Research Economies</b>										
<b>BRAZIL</b>	14.39	10.67	4.13	3.18	6.74	3.24	3.33	5.00	3.26	4.04
<b>CHINA</b>	6.25	4.63	5.87	3.97	5.68	10.28	4.34	6.87	5.98	5.98
<b>SPAIN</b>	21.18	17.47	14.44	9.83	20.48	18.80	14.86	9.81	6.90	9.21
<b>SOUTH KOREA</b>	20.10	21.32	11.94	11.85	18.73	10.11	10.74	8.38	5.56	5.68
<b>RUSSIA</b>	10.91	13.54	21.04	10.27	10.63	15.77	2.46	8.66	8.55	11.10
<b>TURKEY</b>	3.67	4.00	2.21	3.31	6.75	2.33	4.27	5.42	2.51	4.83
<b>TAIWAN</b>	6.58	19.43	6.25	12.57	10.82	6.03	3.42	6.42	6.12	4.59
<b>SOUTH AFRICA</b>	6.90	4.81	7.67	2.92	1.79	8.50	9.47	5.49	5.17	5.15

## ANNEX 2. INTERNATIONAL COLLABORATION ANALYSIS OF INDIA'S RESEARCH IN 12 OTHER ESSENTIAL SCIENCE INDICATORS FIELDS

The analyses of India's collaborating countries and institutions for 12 other Essential Science Indicators fields are shown here.

### A 2.1 INTERNATIONAL COLLABORATION IN ENVIRONMENT/ECOLOGY

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	185	6.11%	2006.7	349	6.93%	2010.8	257	7.88%	2013.5
ENGLAND	59	1.95%	2006.8	135	2.68%	2010.7	103	3.16%	2013.5
GERMANY	72	2.38%	2006.8	106	2.10%	2010.7	73	2.24%	2013.5
SOUTH KOREA	62	2.05%	2007.1	68	1.35%	2010.4	67	2.05%	2013.4
AUSTRALIA	20	0.66%	2006.9	100	1.98%	2010.8	60	1.84%	2013.6
CHINA	32	1.06%	2006.8	82	1.63%	2010.6	66	2.02%	2013.5
FRANCE	51	1.68%	2006.8	84	1.67%	2010.6	38	1.16%	2013.3
JAPAN	40	1.32%	2006.8	83	1.65%	2010.6	44	1.35%	2013.4
CANADA	26	0.86%	2006.7	73	1.45%	2011.0	55	1.69%	2013.4
NETHERLANDS	21	0.69%	2006.6	58	1.15%	2010.5	34	1.04%	2013.4

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Chinese Acad Sci	15	0.50%	41	0.81%	34	1.04%
CNRS	25	0.83%	41	0.81%	22	0.67%
Texas A&M Univ College Stn	12	0.40%	30	0.60%	8	0.25%
Wageningen Univ & Res Ctr	5	0.17%	23	0.46%	15	0.46%
CIRAD	17	0.56%	16	0.32%	10	0.31%
Natl Univ Singapore	7	0.23%	18	0.36%	17	0.52%
Univ Sys Ohio	8	0.26%	16	0.32%	15	0.46%
Univ Montpellier II	15	0.50%	15	0.30%	9	0.28%
PRES SUD DE FRANCE	15	0.50%	15	0.30%	9	0.28%
Swiss Federal Institutes of Technology Domain	3	0.10%	18	0.36%	15	0.46%

### A 2.2 INTERNATIONAL COLLABORATION IN MATHEMATICS

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	250	9.93%	2006.6	292	7.83%	2010.6	178	7.97%	2013.5
CHINA	57	2.26%	2006.8	129	3.46%	2010.7	87	3.89%	2013.4
CANADA	78	3.10%	2006.5	100	2.68%	2010.7	50	2.24%	2013.5
SAUDI ARABIA	29	1.15%	2007.0	85	2.28%	2011.2	103	4.61%	2013.4
SOUTH KOREA	41	1.63%	2006.7	86	2.31%	2010.6	64	2.86%	2013.4
GERMANY	70	2.78%	2006.4	91	2.44%	2010.3	27	1.21%	2013.5
TURKEY	22	0.87%	2007.1	73	1.96%	2010.8	69	3.09%	2013.5
FRANCE	55	2.19%	2006.4	63	1.69%	2010.4	30	1.34%	2013.6
ENGLAND	43	1.71%	2006.8	42	1.13%	2010.6	30	1.34%	2013.6
SPAIN	21	0.83%	2006.9	44	1.18%	2010.7	45	2.01%	2013.4

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
King Abdulaziz Univ	8	0.32%	35	0.94%	69	3.09%
King Fahd Univ Petr & Minerals	19	0.75%	35	0.94%	19	0.85%
Univ Sains Malaysia	6	0.24%	31	0.83%	14	0.63%
Univ Belgrade			16	0.43%	28	1.25%
Shanghai Normal Univ	3	0.12%	26	0.70%	10	0.45%
CNRS	10	0.40%	14	0.38%	10	0.45%
Univ Victoria	13	0.52%	9	0.24%	8	0.36%
Hunan Normal Univ	3	0.12%	16	0.43%	11	0.49%
Univ Babes Bolyai	7	0.28%	14	0.38%	5	0.22%
Natl Sun Yat Sen Univ	5	0.20%	18	0.48%	2	0.09%

### A 2.3 INTERNATIONAL COLLABORATION IN MOLECULAR BIOLOGY & GENETICS

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	262	13.66%	2006.7	434	13.16%	2010.7	271	13.32%	2013.5
GERMANY	63	3.28%	2006.5	122	3.70%	2010.6	70	3.44%	2013.5
ENGLAND	50	2.61%	2006.5	110	3.34%	2010.8	65	3.19%	2013.4
JAPAN	66	3.44%	2006.7	81	2.46%	2010.6	48	2.36%	2013.4
FRANCE	49	2.55%	2006.8	69	2.09%	2010.5	51	2.51%	2013.4
AUSTRALIA	22	1.15%	2006.5	59	1.79%	2010.8	55	2.70%	2013.5
CANADA	23	1.20%	2007.1	51	1.55%	2010.6	40	1.97%	2013.5
CHINA	22	1.15%	2006.7	45	1.36%	2010.9	36	1.77%	2013.4
ITALY	25	1.30%	2006.6	38	1.15%	2010.6	30	1.47%	2013.6
NETHERLANDS	11	0.57%	2006.8	47	1.43%	2010.8	25	1.23%	2013.6

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
US DEPT HLTH HUMAN SERVICES	28	1.46%	32	0.97%	23	1.13%
Natl Inst Hlth (NIH) - USA	26	1.36%	26	0.79%	20	0.98%
Harvard Univ	10	0.52%	33	1.00%	27	1.33%
INSERM	14	0.73%	38	1.15%	17	0.84%
Univ London	8	0.42%	34	1.03%	14	0.69%
Johns Hopkins Univ	20	1.04%	20	0.61%	16	0.79%
CNRS	15	0.78%	26	0.79%	11	0.54%
US Dept Energy	13	0.68%	24	0.73%	12	0.59%
Univ Cambridge	7	0.36%	26	0.79%	15	0.74%
Natl Univ Singapore	6	0.31%	30	0.91%	10	0.49%

## A 2.4 INTERNATIONAL COLLABORATION IN COMPUTER SCIENCES

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	320	15.19%	2006.5	382	13.83%	2010.6	238	10.18%	2013.5
CANADA	40	1.90%	2006.4	72	2.61%	2010.8	58	2.48%	2013.6
FRANCE	40	1.90%	2006.4	64	2.32%	2010.8	37	1.58%	2013.6
ENGLAND	27	1.28%	2006.7	48	1.74%	2010.7	61	2.61%	2013.5
SINGAPORE	39	1.85%	2006.3	43	1.56%	2010.8	41	1.75%	2013.5
CHINA	18	0.85%	2006.1	40	1.45%	2010.6	55	2.35%	2013.7
GERMANY	37	1.76%	2006.3	40	1.45%	2011.1	29	1.24%	2013.4
AUSTRALIA	28	1.33%	2006.3	36	1.30%	2010.6	38	1.63%	2013.5
SOUTH KOREA	20	0.95%	2006.5	37	1.34%	2010.9	33	1.41%	2013.5
JAPAN	21	1.00%	2006.2	23	0.83%	2010.7	15	0.64%	2013.5

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
IBM	29	1.38%	21	0.76%	10	0.43%
Nanyang Technol Univ	8	0.38%	25	0.90%	20	0.86%
Natl Univ Singapore	23	1.09%	15	0.54%	15	0.64%
Univ Calif San Diego	22	1.04%	8	0.29%	6	0.26%
Univ Illinois Urbana-Champaign	11	0.52%	12	0.43%	10	0.43%
MIT	12	0.57%	11	0.40%	10	0.43%
US Dept Energy	12	0.57%	13	0.47%	7	0.30%
INRIA	11	0.52%	14	0.51%	7	0.30%
Univ Waterloo	14	0.66%	6	0.22%	10	0.43%
Univ Texas Austin	4	0.19%	17	0.62%	8	0.34%

## A 2.5 INTERNATIONAL COLLABORATION IN MICROBIOLOGY

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	139	8.81%	2006.7	234	6.60%	2010.7	118	7.05%	2013.5
GERMANY	55	3.49%	2006.5	70	1.97%	2010.7	37	2.21%	2013.4
JAPAN	61	3.87%	2006.7	68	1.92%	2010.7	25	1.49%	2013.6
SOUTH KOREA	22	1.40%	2006.8	73	2.06%	2010.5	36	2.15%	2013.5
ENGLAND	42	2.66%	2006.7	51	1.44%	2010.8	27	1.61%	2013.6
FRANCE	26	1.65%	2006.5	31	0.87%	2010.9	17	1.02%	2013.5
CHINA	18	1.14%	2007.1	28	0.79%	2010.8	22	1.31%	2013.5
AUSTRALIA	12	0.76%	2006.8	31	0.87%	2010.6	17	1.02%	2013.5
TAIWAN	6	0.38%	2006.5	40	1.13%	2010.9	9	0.54%	2013.3
BANGLADESH	22	1.40%	2006.7	20	0.56%	2009.9	7	0.42%	2013.6

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
US DEPT HLTH HUMAN SERVICES	28	1.78%	32	0.90%	16	0.96%
Natl Inst Hlth (NIH) - USA	14	0.89%	16	0.45%	12	0.72%
Intl Ctr Diarrhoeal Dis Res	15	0.95%	16	0.45%	5	0.30%
Natl Chung Hsing Univ	4	0.25%	26	0.73%	5	0.30%
Ctr Dis Control Prevent - USA	12	0.76%	14	0.39%	5	0.30%
Johns Hopkins Univ	7	0.44%	16	0.45%	6	0.36%
Yunnan Univ	6	0.38%	8	0.23%	14	0.84%
Natl Kaohsiung Marine Univ			25	0.70%	1	0.06%
Sapporo Med Univ	14	0.89%	11	0.31%		
Justus Liebig Univ Giessen	3	0.19%	17	0.48%	5	0.30%

## A 2.6 INTERNATIONAL COLLABORATION IN SOCIAL SCIENCES GENERAL

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	268	15.10%	2006.7	546	16.63%	2010.7	277	17.80%	2013.5
ENGLAND	103	5.80%	2006.5	252	7.67%	2010.6	156	10.03%	2013.5
AUSTRALIA	29	1.63%	2006.8	110	3.35%	2010.6	66	4.24%	2013.4
CANADA	31	1.75%	2007.0	103	3.14%	2010.9	44	2.83%	2013.5
SWITZERLAND	38	2.14%	2006.6	63	1.92%	2010.5	36	2.31%	2013.6
NETHERLANDS	22	1.24%	2006.7	55	1.67%	2010.8	38	2.44%	2013.5
FRANCE	28	1.58%	2006.9	30	0.91%	2010.8	36	2.31%	2013.5
BELGIUM	15	0.85%	2007.1	45	1.37%	2010.3	26	1.67%	2013.5
SWEDEN	10	0.56%	2006.8	41	1.25%	2010.7	33	2.12%	2013.4
SOUTH AFRICA	11	0.62%	2007.0	35	1.07%	2010.6	32	2.06%	2013.7

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Univ London	47	2.65%	97	2.95%	78	5.01%
LONDON SCH HYG TROP MED	34	1.92%	59	1.80%	45	2.89%
Johns Hopkins Univ	35	1.97%	65	1.98%	37	2.38%
Harvard Univ	17	0.96%	44	1.34%	39	2.51%
World Hlth Org	25	1.41%	38	1.16%	21	1.35%
US DEPT HLTH HUMAN SERVICES	27	1.52%	28	0.85%	11	0.71%
US Dept Energy	14	0.79%	32	0.97%	8	0.51%
Univ Coll London	6	0.34%	24	0.73%	22	1.41%
Univ Oxford	6	0.34%	21	0.64%	23	1.48%
Univ Calif Berkeley	13	0.73%	29	0.88%	7	0.45%

## A 2.7 INTERNATIONAL COLLABORATION IN NEUROSCIENCE &amp; BEHAVIOR

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	193	13.27%	2006.7	236	9.97%	2010.6	171	12.13%	2013.5
ENGLAND	38	2.61%	2006.6	61	2.58%	2010.6	47	3.33%	2013.4
GERMANY	28	1.93%	2006.8	46	1.94%	2010.6	46	3.26%	2013.6
CANADA	19	1.31%	2006.8	47	1.99%	2010.4	37	2.62%	2013.4
AUSTRALIA	11	0.76%	2006.8	36	1.52%	2010.8	30	2.13%	2013.4
ITALY	8	0.55%	2006.5	37	1.56%	2010.6	31	2.20%	2013.5
JAPAN	16	1.10%	2006.5	32	1.35%	2010.9	17	1.21%	2013.5
FRANCE	6	0.41%	2007.3	24	1.01%	2010.9	24	1.70%	2013.6
CHINA	8	0.55%	2006.8	26	1.10%	2011.0	20	1.42%	2013.5
NETHERLANDS	3	0.21%	2007.0	22	0.93%	2010.8	18	1.28%	2013.3

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Univ London	16	1.10%	26	1.10%	22	1.56%
Univ Coll London	9	0.62%	17	0.72%	18	1.28%
Univ Toronto	6	0.41%	17	0.72%	14	0.99%
Johns Hopkins Univ	12	0.83%	15	0.63%	9	0.64%
Harvard Univ	6	0.41%	15	0.63%	13	0.92%
US DEPT HLTH HUMAN SERVICES	13	0.89%	5	0.21%	14	0.99%
Natl Inst Hlth (NIH) - USA	12	0.83%	5	0.21%	13	0.92%
INSERM	6	0.41%	12	0.51%	8	0.57%
Univ Penn	7	0.48%	11	0.46%	7	0.50%
Univ Calgary	5	0.34%	13	0.55%	7	0.50%

## A 2.8 INTERNATIONAL COLLABORATION IN IMMUNOLOGY

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	222	15.89%	2006.7	381	17.26%	2010.6	285	21.30%	2013.5
ENGLAND	60	4.29%	2006.6	143	6.48%	2010.7	90	6.73%	2013.5
FRANCE	39	2.79%	2006.8	86	3.90%	2010.8	63	4.71%	2013.5
SWITZERLAND	30	2.15%	2006.8	95	4.30%	2011.0	55	4.11%	2013.4
CANADA	36	2.58%	2007.0	78	3.53%	2010.6	52	3.89%	2013.4
AUSTRALIA	24	1.72%	2006.7	68	3.08%	2010.9	47	3.51%	2013.5
GERMANY	16	1.15%	2007.0	54	2.45%	2010.9	42	3.14%	2013.6
BELGIUM	16	1.15%	2007.4	54	2.45%	2011.1	41	3.06%	2013.6
CHINA	25	1.79%	2007.0	39	1.77%	2010.6	32	2.39%	2013.7
THAILAND	15	1.07%	2006.7	46	2.08%	2010.8	35	2.62%	2013.6

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
US DEPT HLTH HUMAN SERVICES	46	3.29%	98	4.44%	94	7.03%
Natl Inst Hlth (NIH) - USA	27	1.93%	53	2.40%	56	4.19%
World Hlth Org	23	1.65%	55	2.49%	40	2.99%
Univ London	23	1.65%	55	2.49%	39	2.91%
Ctr Dis Control Prevent - USA	26	1.86%	51	2.31%	38	2.84%
Johns Hopkins Univ	38	2.72%	31	1.40%	37	2.77%
LONDON SCH HYG TROP MED	20	1.43%	35	1.59%	26	1.94%
GlaxoSmithKline	2	0.14%	34	1.54%	42	3.14%
NATL INST ALLERGY INFECTIOUS DIS (NIAID)	13	0.93%	31	1.40%	29	2.17%
Harvard Univ	8	0.57%	30	1.36%	32	2.39%

## A 2.9 INTERNATIONAL COLLABORATION IN SPACE SCIENCES

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	294	20.52%	2006.6	504	25.28%	2010.6	302	24.59%	2013.5
GERMANY	118	8.23%	2006.8	204	10.23%	2010.8	170	13.84%	2013.5
FRANCE	129	9.00%	2006.5	200	10.03%	2010.5	111	9.04%	2013.5
ENGLAND	92	6.42%	2006.7	151	7.57%	2010.6	118	9.61%	2013.5
ITALY	88	6.14%	2006.8	122	6.12%	2010.7	85	6.92%	2013.4
JAPAN	76	5.30%	2006.6	107	5.37%	2010.7	60	4.89%	2013.5
SPAIN	48	3.35%	2006.9	122	6.12%	2010.7	57	4.64%	2013.4
AUSTRALIA	53	3.70%	2006.6	104	5.22%	2010.7	69	5.62%	2013.5
RUSSIA	43	3.00%	2006.7	96	4.81%	2010.5	61	4.97%	2013.5
CANADA	35	2.44%	2006.6	79	3.96%	2010.8	68	5.54%	2013.4

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
CNRS	71	4.95%	159	7.97%	92	7.49%
Max Planck Society	58	4.05%	136	6.82%	107	8.71%
NASA	49	3.42%	137	6.87%	82	6.68%
Caltech	24	1.67%	88	4.41%	68	5.54%
Russian Acad Sci	37	2.58%	71	3.56%	47	3.83%
Harvard Univ	34	2.37%	55	2.76%	63	5.13%
European So Observ	48	3.35%	56	2.81%	36	2.93%
Goddard Space Flight Ctr	27	1.88%	65	3.26%	45	3.66%
US Dept Energy	32	2.23%	50	2.51%	53	4.32%
Smithsonian Inst	29	2.02%	49	2.46%	50	4.07%

## A 2.10 INTERNATIONAL COLLABORATION IN ECONOMICS &amp; BUSINESS

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	85	18.32%	2006.9	167	22.27%	2010.6	111	24.89%	2013.4
ENGLAND	29	6.25%	2007.3	56	7.47%	2010.8	49	10.99%	2013.4
AUSTRALIA	6	1.29%	2007.0	31	4.13%	2010.7	19	4.26%	2013.6
CHINA	16	3.45%	2006.6	22	2.93%	2010.5	15	3.36%	2013.5
GERMANY	9	1.94%	2006.6	23	3.07%	2011.1	19	4.26%	2013.5
CANADA	8	1.72%	2006.8	26	3.47%	2010.7	7	1.57%	2013.7
JAPAN	12	2.59%	2006.9	19	2.53%	2010.6	6	1.35%	2013.2
NETHERLANDS	8	1.72%	2006.6	17	2.27%	2010.5	11	2.47%	2013.8
FRANCE	2	0.43%	2006.5	17	2.27%	2010.9	14	3.14%	2013.4
SINGAPORE	1	0.22%	2008.0	16	2.13%	2010.8	12	2.69%	2013.6

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Univ Texas San Antonio	8	1.72%	15	2.00%	4	0.90%
World Bank	5	1.08%	5	0.67%	5	1.12%
Monash Univ	2	0.43%	6	0.80%	6	1.35%
INT FOOD POLICY RES INST	5	1.08%	6	0.80%	3	0.67%
City Univ Hong Kong	8	1.72%	4	0.53%	2	0.45%
Natl Univ Singapore	1	0.22%	7	0.93%	5	1.12%
Univ Manchester			5	0.67%	7	1.57%
Univ London	2	0.43%	4	0.53%	6	1.35%
Georgia State Univ	1	0.22%	4	0.53%	7	1.57%
Harvard Univ	1	0.22%	8	1.07%	3	0.67%

## A 2.11 INTERNATIONAL COLLABORATION ANALYSES, PSYCHIATRY/PsYCHOLOGY

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	69	21.77%	2006.8	170	30.47%	2010.6	107	30.66%	2013.5
ENGLAND	54	17.03%	2006.9	68	12.19%	2010.7	49	14.04%	2013.6
AUSTRALIA	29	9.15%	2006.6	46	8.24%	2010.5	23	6.59%	2013.5
CHINA	11	3.47%	2006.6	45	8.06%	2010.8	22	6.30%	2013.5
GERMANY	13	4.10%	2007.0	34	6.09%	2010.7	18	5.16%	2013.7
CANADA	17	5.36%	2006.4	29	5.20%	2010.8	18	5.16%	2013.7
JAPAN	8	2.52%	2006.8	32	5.73%	2010.9	15	4.30%	2013.4
BRAZIL	7	2.21%	2005.9	28	5.02%	2010.4	17	4.87%	2013.5
SWITZERLAND	13	4.10%	2006.5	28	5.02%	2010.7	11	3.15%	2013.4
NETHERLANDS	6	1.89%	2007.3	26	4.66%	2011.0	19	5.44%	2013.6



Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Univ London	29	9.15%	43	7.71%	25	7.16%
Kings Coll London	16	5.05%	25	4.48%	16	4.58%
LONDON SCH HYG TROP MED	14	4.42%	20	3.58%	16	4.58%
Harvard Univ	4	1.26%	27	4.84%	13	3.72%
Peking Univ	3	0.95%	17	3.05%	7	2.01%
Chinese Univ Hong Kong	3	0.95%	19	3.41%	5	1.43%
Univ Melbourne	5	1.58%	12	2.15%	5	1.43%
KU Leuven	1	0.32%	16	2.87%	5	1.43%
Univ Pittsburgh	7	2.21%	6	1.08%	8	2.29%
Natl Univ Singapore	3	0.95%	10	1.79%	8	2.29%

## A 2.12 INTERNATIONAL COLLABORATION ANALYSES, MULTIDISCIPLINARY

Collaborating Country	Number, proportion, and recency of collaborative papers								
	2005-2008			2009-2012			2013-2014		
	N	%	Recency	N	%	Recency	N	%	Recency
USA	25	5.31%	2006.6	43	9.58%	2010.3	28	10.41%	2013.7
ENGLAND	7	1.49%	2006.3	15	3.34%	2010.7	5	1.86%	2013.6
GERMANY	3	0.64%	2005.7	13	2.90%	2010.2	4	1.49%	2013.8
FRANCE	4	0.85%	2005.8	11	2.45%	2010.3	5	1.86%	2013.6
JAPAN	6	1.27%	2006.2	5	1.11%	2011.6	5	1.86%	2013.6
AUSTRALIA	3	0.64%	2005.7	6	1.34%	2010.7	5	1.86%	2013.4
CANADA	2	0.42%	2007.0	5	1.11%	2010.6	6	2.23%	2013.8
ITALY	1	0.21%	2005.0	8	1.78%	2010.8	2	0.74%	2013.0
BELGIUM	4	0.85%	2006.0	5	1.11%	2010.6			
CHINA	1	0.21%	2005.0	6	1.34%	2011.2	2	0.74%	2014.0

Collaborating Organization	Number and proportion of collaborative papers					
	2005-2008		2009-2012		2013-2014	
	N	%	N	%	N	%
Johns Hopkins Univ	2	0.42%	5	1.11%	4	1.49%
Harvard Univ	4	0.85%	4	0.89%	3	1.12%
Univ London	1	0.21%	5	1.11%	2	0.74%
US DEPT HLTH HUMAN SERVICES			5	1.11%	3	1.12%
Max Planck Society	2	0.42%	5	1.11%		
Univ Washington			5	1.11%	1	0.37%
CNRS	2	0.42%	1	0.22%	3	1.12%
Wildlife Conservat Soc			5	1.11%		
Cornell Univ	2	0.42%	3	0.67%		
Natl Inst Hlth (NIH) - USA			4	0.89%	1	0.37%

### ANNEX 3. LIST OF INDIAN NATIONAL RESEARCH INSTITUTIONS INCLUDED IN THE COLLABORATION NETWORK ANALYSIS

Here is the list of 288 national research institutions in India included in the collaboration network analysis.

Institution Name	Institution Name	Institution Name
Acharya Nagarjuna Univ	Indian Inst Astrophys	Natl Inst Oceanog
Agharkar Res Inst	Indian Inst Chem Biol	Natl Inst Plant Genome Res
Alagappa Univ	Indian Inst Chem Technol	Natl Inst Sci Commun & Informat Resources
Aligarh Muslim Univ	Indian Inst Geomagnetism	Natl Inst Sci Technol & Dev Studies
All India Inst Med Sci	Indian Inst Info Tech Design Mfg	Natl Inst Tech Arunachal Pradesh
Amity Univ	Indian Inst Info Tech Mgmt Gwalior;	Natl Inst Tech Meghalaya
Amrita Vishwa Vidyapeetham Univ	Indian Inst Informat Technol Allahabad	Natl Inst Tech Uttarakhand
Anand Agr Univ	Indian Inst Integrat Med	Natl Inst Technol Agartala
Andhra Pradesh Agr Univ	Indian Inst Management Ahmedabad	Natl Inst Technol Calicut
Andhra Univ	Indian Inst Petr	Natl Inst Technol Delhi
Anna Univ Chennai	Indian Inst Phys	Natl Inst Technol Durgapur
Anna Univ Technol Chennai	Indian Inst Sci Educ Res Kolkata	Natl Inst Technol Goa
Anna Univ Technol Coimbatore	Indian Inst Tech Mandi	Natl Inst Technol Hamirpur
Anna Univ Technol Madurai	Indian Inst Tech Patna	Natl Inst Technol Jamshedpur
Anna Univ Technol Tiruchirappalli	Indian Inst Tech Ropar	Natl Inst Technol Karnataka
Anna Univ Technol Tirunelveli	Indian Inst Trop Meteorol	Natl Inst Technol Kurukshetra
Annamalai Univ	Indian Natl Acad Engr	Natl Inst Technol Manipur
Aryabhatta Res Inst Observat Sci	Indian Natl Sci Acad	Natl Inst Technol Mizoram
Assam Agr Univ	Indian Oil Corp	Natl Inst Technol Nagaland
Avinashilingam Univ Women	Indian Sch Mines	Natl Inst Technol Patna
Banaras Hindu Univ	Indian Stat Inst	Natl Inst Technol Puducherry
Bangalore Univ	Indian Vet Res Inst	Natl Inst Technol Raipur
Bengal Engr Sci Univ	Indira Gandhi Ctr Atom Res	Natl Inst Technol Rourkela
Berhampur Univ	Inst Adv Study Sci & Technol	Natl Inst Technol Sikkim
Bhabha Atom Res Ctr	Inst Bioresources Sustainable Dev	Natl Inst Technol Silchar
Bhagalpur Univ	Inst Chem Tech Mumbai	Natl Inst Technol Srinagar
Bharathiar Univ	Inst Himalayan Bioresource Technol	Natl Inst Technol Tiruchirappalli
Bharathidasan Univ	Inst Life Sci	Natl Inst Technol Warangal
Bidhan Chandra Agr Univ	Inst Math Sci India	Natl Phys Lab – India
Bioprocressing Unit	Inst Microbial Technol	Natl Univ Educ Plan Admin India
Birbal Sahni Inst Paleobot	Inst Stem Cell Biol Regenerat Med Instem	Ne Hill Univ
Birla Inst Technol & Sci	Int Adv Res Ctr Powder Met New Mat	Niit Univ
Birsa Agr Univ	Int Inst Informat Technol Hyderabad	North Maharashtra Univ
Bose Inst	Inter Univ Accelerator Ctr	Oil And Nat Gas Corp
Br Ambedkar Natl Inst Tech Jalandhar	Inter Univ Ctr Astronomy Astrophysics	Op Jindal Global Univ
Bundelkhand Univ	Intl Crops Res Inst Semi Arid Trop	Orissa Univ Agr Technol
CCS Haryana Agr Univ	Islamia Degree Coll	Osmania Univ
Cent Plant Crops Res Inst	Iitm Univ	Panjab Agr Univ
Cent Univ Karnataka	Jadavpur Univ	Panjab Univ
Cent Univ Kerala	Jai Narain Vyas Univ Jodhpur	Panjabi Univ
Chandra Shekhar Azad Univ Agr Technol	Jamia Hamdard Univ	Pgimer Chandigarh
Chaudhary Charan Singh Univ	Jamia Millia Islamia	Phys Res Lab
Cmch Vellore	Jawaharal Nehru Agr Univ	Pondicherry Univ
Cochin Univ Sci & Technol	Jawaharlal Inst Postgrad Med Educ Res	Postgrad Inst Med Educ Res
Csir Reg Res Lab	Jawaharlal Neharu Technol Univ	Presidency Coll
Csk Himachal Pradesh Agr Univ	Jawaharlal Nehru Ctr Adv Sci Res	Rajasthan Agr Univ
Ctr Cellular & Mol Biol	Jawaharlal Nehru Univ	Rajiv Gandhi Ctr Biotechnol
Ctr Dna Fingerprinting Diagnost	Jiwaji Univ	Rajiv Gandhi Tech Univ

Ctr Elect Engr Res Inst	Kakatiya Univ	Raman Res Inst
Ctr Electrochem Res Inst	Kalyani Univ	Ravishankar Univ
Ctr Food Technol Res Inst	Kerala Agr Univ	Reg Engr Coll
Ctr Glass & Ceram Res Inst	Kiet Grp Inst	Reliance Ind
Ctr Inst Med & Aromat Plants	Kiet Sch Pharm	Saha Inst Nucl Phys
Ctr Inst Min & Fuel Res	Konkan Agr Univ	Sambalpur Univ
Ctr Leather Res Inst	Krishna Girls Engr Coll	Sanjay Gandhi Postgrad Inst Med Sci
Ctr Math Modeling & Comp Simulat	Krishna Inst Engr Technol	Sardar Patel Univ
Ctr Nano Soft Matter Sci	Krishna Inst Technol	Sardar Vallabhbhai Natl Inst Technol
Ctr Salt & Marine Chem Res Inst	Kumaun Univ	Sardar Vallabhbhai Patel Univ Agr Tech
Def Met Res Lab	Kurukshetra Univ	Saurashtra Univ
Desh Bhagat Univ	Kuvempu Univ	Shiv Nadar Univ
Devi Ahilya Univ	Lovely Professional Univ	Shivaji Univ
Dibrugarh Univ	Loyola Coll	Sn Bose Natl Ctr Basic Sci
Dr Babasaheb Ambedkar Marathwada Univ	Lucknow Univ	Sree Chitra Tirunal Inst Med Sci Technol
Dr D Y Patil Vidyapeeth Pune	Madurai Kamaraj Univ	Sri Venkateswara Univ
Dr K N Modi Univ	Maharaja Sayajirao Univ Baroda	St Stephens Coll
Dr Panjabrao Deshmukh Agr Univ	Maharshi Dayanand Univ	Struct Engineering Res Ctr
Dr Ys Parmar Uhf	Mahatma Gandhi Univ	Symbiosis Intl Univ
Gauhati Univ	Malaviya Natl Inst Tech Jaipur	Tamil Nadu Agr Univ
Geol Survey India	Mangalore Univ	Tamil Nadu Vet & Animal Sci Univ
Ggs Indraprastha Univ	Manipal Univ	Tata Inst Fund Res
Govind Ballabh Pant Univ Agr Technol	Manipur Univ	Tata Mem Hosp
Gujarat Univ	Marathwada Agr Univ	Tezpur Univ
Gulbarga Univ	Maulana Azad Med Coll	Thapar Univ
Haryana Agr Univ	Maulana Azad Natl Inst Tech Bhopal	Translat Hlth Sci Technol Inst
Homi Bhabha Natl Inst	Mother Teresa Womens Univ	Univ Agr Sci Bangalore
Iacs Jadavpur	Motilal Nehru Inst Technol	Univ Allahabad
Iisc Bangalore	N Bengal Univ	Univ Burdwan
Iiser Bhopal	Nagarjuna Univ	Univ Calcutta
Iiser Mohali	Nagpur Univ	Univ Calicut
Iiser Pune	Narendra Deva Univ Agr Technol	Univ Delhi
Iiser Thiruvananthapuram	Natl Aersp Labs	Univ Gorakhpur
Iit Bombay	Natl Agri Food Biotechnol Inst	Univ Hyderabad
Iit Delhi	Natl Bot Res Inst	Univ Jammu
Iit Gandhinagar	Natl Brain Res Ctr	Univ Kashmir
Iit Guwahati	Natl Chem Lab Pune	Univ Kerala
Iit Hyderabad	Natl Ctr Biological Sci - Ncbs	Univ Madras
Iit Indore	Natl Ctr Cell Sci	Univ Mumbai
Iit Jodhpur	Natl Dairy Res Inst India	Univ Mysore
Iit Kanpur	Natl Environm Engr Res Inst	Univ Patna
Iit Kharagpur	Natl Geophys Res Inst	Univ Pune
Iit Madras	Natl Inst Anim Biotechnol	Utkal Univ
Iit Roorkee	Natl Inst Biomed Genom	Vellore Inst Technol
Ind Toxicol Res Ctr	Natl Inst Cholera Enteric Dis	Vidyasagar Univ
Inderprastha Engr Coll	Natl Inst Immunol	Vikram Sarabhai Space Ctr
Indian Agr Res Inst	Natl Inst Interdisciplinary Sci & Technol	Visvesvaraya Natl Inst Tech Nagpur
Indian Council Med Res	Natl Inst Mental Hlth Neurosci	Wadia Inst Himalayan Geol

## ANNEX 4. INDIA'S TOP 10 MOST HIGHLY-CITED PAPERS IN EACH ESSENTIAL SCIENCE INDICATORS FIELDS

The top 10 most highly-cited papers are selected based upon the percentile ranking, which takes into account both subject fields and publication year. For some Essential Science Indicators fields, we have listed more than 10 papers, in order to include all papers which have the same percentile ranking as the tenth paper. The highly-cited papers are extracted where there is at-least one Indian institution listed in the author address affiliation. The list of top 10 highly-cited papers below mentions the first three author names in case of more than three authors.

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### A4.1 TOP 10 MOST HIGHLY-CITED PAPERS IN CHEMISTRY

1. **Babu, SS; Praveen, VK; Ajayaghosh, A;** et al. (2014), Functional pi-Gelators and Their Applications, CHEMICAL REVIEWS, 114: 1973-2129, doi: 10.1021/cr400195e
2. **Rao, CNR; Sood, AK; Subrahmanyam, KS;** et al. (2009), Graphene: The New Two-Dimensional Nanomaterial, ANGEWANDTE CHEMIE-INTERNATIONAL EDITION, 48: 7752-7777, doi: 10.1002/anie.200901678
3. **Chakrabarty, R; Mukherjee, PS;** Stang, PJ; et al. (2011), Supramolecular Coordination: Self-Assembly of Finite Two- and Three-Dimensional Ensembles, CHEMICAL REVIEWS, 111: 6810-6918, doi: 10.1021/cr200077m
4. **Chaudhuri, RG;** Paria, S (2012), Core/Shell Nanoparticles: Classes, Properties, Synthesis Mechanisms, Characterization, and Applications, CHEMICAL REVIEWS, 112: 2373-2433, doi: 10.1021/cr100449n
5. **Sangeetha, NM; Maitra, U** (2005), Supramolecular gels: Functions and uses, CHEMICAL SOCIETY REVIEWS, 34: 821-836, doi:
6. **Ghosh, SK; Pal, T** (2007), Interparticle coupling effect on the surface plasmon resonance of gold nanoparticles: From theory to applications, CHEMICAL REVIEWS, 107: 4797-4862, doi: 10.1021/cr0680282
7. **Desiraju, GR** (2013), Crystal Engineering: From Molecule to Crystal, JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, 135: 9952-9967, doi: 10.1021/ja403264c
8. **Desiraju, GR** (2007), Crystal engineering: A holistic view, ANGEWANDTE CHEMIE-INTERNATIONAL EDITION, 46: 8342-8356, doi: 10.1002/anie.200700534
9. **Punniyamurthy, T; Velusamy, S; Iqbal, J** (2005), Recent advances in transition metal catalyzed oxidation of organic substrates with molecular oxygen, CHEMICAL REVIEWS, 105: 2329-2363, doi:
10. **Cheetham, AK; Rao, CNR;** Feller, RK; et al. (2006), Structural diversity and chemical trends in hybrid inorganic-organic framework materials, CHEMICAL COMMUNICATIONS, : 4780-4795, doi: 10.1039/b610264f
11. **Nagarkar, SS;** Joarder, B; **Chaudhari, AK;** et al. (2013), Highly Selective Detection of Nitro Explosives by a Luminescent Metal-Organic Framework, ANGEWANDTE CHEMIE-INTERNATIONAL EDITION, 52: 2881-2885, doi: 10.1002/anie.201208885
12. **Mahadevi, AS; Sastry, GN** (2013), Cation-pi Interaction: Its Role and Relevance in Chemistry, Biology, and Material Science, CHEMICAL REVIEWS, 113: 2100-2138, doi: 10.1021/cr300222d

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### A4.2 TOP 10 MOST HIGHLY-CITED PAPERS IN PHYSICS

1. Yao, WM; Amsler, C; Asner, D; et al. (2006), Review of particle physics, JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS, 33: 1-+, doi: 10.1088/0954-3899/33/1/001
2. Amsler, C; Doser, M; Antonelli, M; et al. (2008), Review of particle physics, PHYSICS LETTERS B, 667: 1-+, doi: 10.1016/j.physletb.2008.07.018
3. Nakamura, K; Hagiwara, K; Hikasa, K; et al. (2010), REVIEW OF PARTICLE PHYSICS, JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS, 37: 1-1422, doi: 10.1088/0954-3899/37/7A/075021
4. **Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M.;** et al. (2012), Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC, PHYSICS LETTERS B, 716: 30-61, doi:
5. Adams, J; **Aggarwal, MM;** Ahammed, Z; et al. (2005), Experimental and theoretical challenges in the search for the quark-gluon plasma: The STAR Collaborations critical assessment of the evidence from RHIC collisions, NUCLEAR PHYSICS A, 757: 102-183, doi:
6. Aad, G.; **Abajyan, T.;** Abbott, B.; et al. (2013), Measurements of Higgs boson production and couplings in diboson final states with the ATLAS detector at the LHC, PHYSICS LETTERS B, 726: 88-119, doi:

7. Adcox, K; Adler, SS; Afanasiev, S; et al. (2005), Formation of dense partonic matter in relativistic nucleus-nucleus collisions at RHIC: Experimental evaluation by the PHENIX Collaboration, NUCLEAR PHYSICS A, 757: 184-283, doi:
8. Polkovnikov, A; **Sengupta, K; Silva, A;** et al. (2011), Colloquium: Nonequilibrium dynamics of closed interacting quantum systems, REVIEWS OF MODERN PHYSICS, 83: 863-883, doi: 10.1103/RevModPhys.83.863
9. **Chatrchyan, S; Khachatryan, V; Sirunyan, AM;** et al. (2012), Combined results of searches for the standard model Higgs boson in pp collisions at root s=7 TeV, PHYSICS LETTERS B, 710: 26-48, doi: 10.1016/j.physletb.2012.02.064
10. **Chatrchyan, S; Khachatryan, V; Sirunyan, AM;** et al. (2013), Study of the Mass and Spin-Parity of the Higgs Boson Candidate via Its Decays to Z Boson Pairs, PHYSICAL REVIEW LETTERS, 110: , doi: 10.1103/PhysRevLett.110.081803
11. Marchetti, MC; Joanny, JF; **Ramaswamy, S;** et al. (2013), Hydrodynamics of soft active matter, REVIEWS OF MODERN PHYSICS, 85: , doi: 10.1103/RevModPhys.85.1143

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#### A4.3 TOP 10 MOST HIGHLY-CITED PAPERS IN CLINICAL MEDICINE

1. Connolly, SJ; Ezekowitz, MD; **Yusuf, S;** et al. (2009), Dabigatran versus Warfarin in Patients with Atrial Fibrillation., NEW ENGLAND JOURNAL OF MEDICINE, 361: 1139-1151, doi: 10.1056/NEJMoa0905561
2. Cohen, MS; Chen, YQ; McCauley, M; et al. (2011), Prevention of HIV-1 Infection with Early Antiretroviral Therapy, NEW ENGLAND JOURNAL OF MEDICINE, 365: 493-505, doi: 10.1056/NEJMoa1105243
3. Granger, CB; Alexander, JH; McMurray, JJV; et al. (2011), Apixaban versus Warfarin in Patients with Atrial Fibrillation, NEW ENGLAND JOURNAL OF MEDICINE, 365: 981-992, doi: 10.1056/NEJMoa1107039
4. Lozano, R; **Naghavi, M;** Foreman, K; et al. (2012), Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010, LANCET, 380: 2095-2128, doi:
5. Murray, CJL; Vos, T; Lozano, R; et al. (2012), Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, LANCET, 380: 2197-2223, doi:
6. Lim, SS; Vos, T; Flaxman, AD; et al. (2012), A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, LANCET, 380: 2224-2260, doi:
7. Scagliotti, GV; **Parikh, P;** von Pawel, J; et al. (2008), Phase III study comparing cisplatin plus gemcitabine with cisplatin plus pemetrexed in chemotherapy-naive patients with advanced-stage non-small-cell lung cancer, JOURNAL OF CLINICAL ONCOLOGY, 26: 3543-3551, doi: 10.1200/JCO.2007.15.0375
8. Haynes, AB; Weiser, TG; Berry, WR; et al. (2009), A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population., NEW ENGLAND JOURNAL OF MEDICINE, 360: 491-499, doi: 10.1056/NEJMsa0810119
9. Connolly, SJ; Eikelboom, J; Joyner, C; et al. (2011), Apixaban in Patients with Atrial Fibrillation, NEW ENGLAND JOURNAL OF MEDICINE, 364: 806-817, doi: 10.1056/NEJMoa1007432
10. Vos, T; Flaxman, AD; **Naghavi, M;** et al. (2012), Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, LANCET, 380: 2163-2196, doi:
11. Fuchs, CS; Tomasek, J; Yong, CJ; et al. (2014), Ramucirumab monotherapy for previously treated advanced gastric or gastro-oesophageal junction adenocarcinoma (REGARD): an international, randomised, multicentre, placebo-controlled, phase 3 trial, LANCET, 383: 31-39, doi: 10.1016/S0140-6736(13)61719-5

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#### A4.4 TOP 10 MOST HIGHLY-CITED PAPERS IN ENGINEERING

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**ANNEX 5. INDIA'S TOP 50 PROLIFIC INSTITUTIONS DURING 2005-2014**

Institution	Number of Papers	Total Citations	Institution	Number of Papers	Total Citations
IISC Bangalore	13,685	240,608	Indian Stat Inst	2,789	24,736
Bhabha Atom Res Ctr	10,464	148,794	Univ Pune	2,779	39,674
IIT Kharagpur	10,261	164,977	Saha Inst Nucl Phys	2,776	39,255
Univ Delhi	8,497	130,331	Indira Gandhi Ctr Atom Res	2,703	25,476
Banaras Hindu Univ	7,854	114,269	Natl Phys Lab - India	2,687	41,676
IIT Delhi	7,769	104,437	Manipal Univ	2,511	23,524
IIT Madras	7,742	112,409	Jawaharlal Nehru Ctr Adv Sci Res	2,461	76,217
IIT Bombay	7,656	119,440	Jawaharlal Nehru Univ	2,449	31,375
IIT Kanpur	6,888	114,546	Univ Mysore	2,364	18,551
All India Inst Med Sci	6,624	112,248	Vellore Inst Technol	2,333	18,629
Jadavpur Univ	6,456	84,500	IISER	2,261	22,116
Tata Inst Fund Res	6,312	117,083	Indian Vet Res Inst	2,200	16,130
Panjab Univ	5,340	100,486	Guru Nanak Dev Univ	2,200	35,076
IIT Roorkee	5,334	93,999	Univ Allahabad	2,107	24,360
Indian Inst Chem Technol	5,148	124,299	IIT Guwahati	2,084	26,240
Anna Univ Chennai	4,580	56,807	Univ Rajasthan	2,065	28,485
Univ Calcutta	4,404	46,153	Jamia Millia Islamia	1,999	25,504
Aligarh Muslim Univ	4,392	55,500	CMCH Vellore	1,993	29,508
Pgimer Chandigarh	4,169	54,799	Bharathidasan Univ	1,993	24,233
Natl Chem Lab Pune	4,047	89,512	Cochin Univ Sci & Technol	1,906	22,024
IACS Jadavpur	4,014	85,329	Sri Venkateswara Univ	1,863	23,637
Annamalai Univ	3,772	53,847	Natl Inst Technol Tiruchirappalli	1,846	18,428
Univ Hyderabad	3,643	61,870	Osmania Univ	1,823	17,161
Univ Madras	3,235	46,599	Jamia Hamdard Univ	1,812	23,848
Indian Agr Res Inst	2,857	30,118	Bharathiar Univ	1,804	21,285



## ANNEX 6. NUMBER AND PROPORTION OF PAPERS PUBLISHED IN INDIA-ORIGINATED JOURNALS

The number and proportion of papers published in 163 India originated journals are calculated for each country between 2005 and 2014. The list of Indian journals is provided in ANNEX 7.

### A6.1 NUMBER OF PAPERS PUBLISHED IN INDIA-ORIGINATED JOURNALS

Number of papers published in India-originated journals										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	4,659	4,555	5,944	7,837	6,958	7,246	7,180	6,887	6,475	5,063
<b>Established research economies</b>										
<b>AUSTRALIA</b>	30	34	49	52	49	70	78	99	89	65
<b>CANADA</b>	35	33	32	59	56	51	43	67	77	67
<b>SWITZERLAND</b>	14	16	14	26	22	21	33	30	20	17
<b>GERMANY</b>	73	74	101	85	79	116	96	100	68	66
<b>ENGLAND</b>	59	47	94	115	126	119	138	133	117	83
<b>FRANCE</b>	48	47	74	63	61	57	70	78	63	50
<b>ITALY</b>	40	29	27	54	47	59	65	92	74	58
<b>JAPAN</b>	75	88	76	85	70	64	95	122	128	79
<b>NETHERLANDS</b>	14	7	22	17	16	19	29	20	29	19
<b>SWEDEN</b>	14	10	18	24	22	18	29	25	31	20
<b>USA</b>	225	205	270	322	316	309	437	393	407	353
<b>BRICS and other emerging research economies</b>										
<b>BRAZIL</b>	15	12	37	36	31	53	54	38	64	78
<b>CHINA</b>	222	219	285	339	449	719	1,014	1,584	2,969	1,674
<b>SPAIN</b>	20	27	31	25	34	38	43	57	59	43
<b>SOUTH KOREA</b>	54	33	57	97	80	110	174	210	351	276
<b>RUSSIA</b>	19	5	25	19	12	18	24	13	11	18
<b>TURKEY</b>	293	338	428	466	497	422	353	364	503	422
<b>TAIWAN</b>	17	34	34	31	43	42	63	76	103	78
<b>SOUTH AFRICA</b>	10	12	20	21	25	47	78	112	112	110

### A6.2 PROPORTION OF PAPERS PUBLISHED IN INDIA-ORIGINATED JOURNALS

Proportion of papers published in India-originated journals										
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>INDIA</b>	18.64%	16.15%	17.98%	20.74%	17.54%	16.90%	15.28%	13.99%	12.41%	9.67%
<b>Established research economies</b>										
<b>AUSTRALIA</b>	0.11%	0.11%	0.15%	0.15%	0.13%	0.17%	0.17%	0.20%	0.17%	0.12%
<b>CANADA</b>	0.08%	0.07%	0.07%	0.11%	0.10%	0.09%	0.07%	0.11%	0.12%	0.11%
<b>SWITZERLAND</b>	0.08%	0.09%	0.07%	0.13%	0.10%	0.09%	0.13%	0.11%	0.07%	0.07%
<b>GERMANY</b>	0.09%	0.09%	0.12%	0.10%	0.09%	0.13%	0.10%	0.10%	0.07%	0.07%
<b>ENGLAND</b>	0.09%	0.07%	0.13%	0.15%	0.16%	0.14%	0.16%	0.15%	0.12%	0.09%
<b>FRANCE</b>	0.09%	0.08%	0.13%	0.10%	0.09%	0.09%	0.10%	0.11%	0.09%	0.08%
<b>ITALY</b>	0.10%	0.07%	0.06%	0.11%	0.09%	0.11%	0.12%	0.16%	0.12%	0.10%
<b>JAPAN</b>	0.10%	0.11%	0.10%	0.11%	0.09%	0.08%	0.12%	0.16%	0.16%	0.11%
<b>NETHERLANDS</b>	0.06%	0.03%	0.08%	0.06%	0.05%	0.06%	0.09%	0.05%	0.08%	0.05%
<b>SWEDEN</b>	0.08%	0.06%	0.10%	0.13%	0.11%	0.09%	0.13%	0.11%	0.13%	0.09%
<b>USA</b>	0.07%	0.07%	0.08%	0.10%	0.09%	0.09%	0.12%	0.10%	0.11%	0.10%
<b>BRICS and other emerging research economies</b>										
<b>BRAZIL</b>	0.09%	0.06%	0.15%	0.12%	0.10%	0.16%	0.15%	0.10%	0.17%	0.22%
<b>CHINA</b>	0.31%	0.25%	0.30%	0.31%	0.36%	0.52%	0.62%	0.84%	1.35%	0.72%
<b>SPAIN</b>	0.06%	0.08%	0.08%	0.06%	0.08%	0.08%	0.08%	0.11%	0.11%	0.08%
<b>SOUTH KOREA</b>	0.20%	0.11%	0.19%	0.28%	0.21%	0.27%	0.38%	0.42%	0.68%	0.55%
<b>RUSSIA</b>	0.08%	0.02%	0.10%	0.07%	0.04%	0.07%	0.08%	0.05%	0.04%	0.07%
<b>TURKEY</b>	2.05%	2.22%	2.36%	2.38%	2.26%	1.83%	1.47%	1.42%	1.96%	1.78%
<b>TAIWAN</b>	0.11%	0.18%	0.17%	0.14%	0.18%	0.17%	0.23%	0.27%	0.37%	0.31%
<b>SOUTH AFRICA</b>	0.21%	0.22%	0.33%	0.30%	0.33%	0.58%	0.82%	1.09%	1.07%	1.06%

ANNEX 7. JOURNALS COPYRIGHTED IN INDIA<sup>13</sup>

ISSN	Full Source Title	Publication Year Range	
0972-2327	ANNALS OF INDIAN ACADEMY OF NEUROLOGY	2008	2014
0019-4646	INDIAN ECONOMIC AND SOCIAL HISTORY REVIEW	2005	2014
0974-0449	INDIAN JOURNAL OF HEMATOLOGY AND BLOOD TRANSFUSION	2009	2011
0970-4140	JOURNAL OF THE INDIAN INSTITUTE OF SCIENCE	2013	2014
2321-3558	JOURNAL OF VIBRATION ENGINEERING & TECHNOLOGIES	2014	2014
0972-0626	RESEARCH JOURNAL OF CHEMISTRY AND ENVIRONMENT	2007	2013
0367-8318	INDIAN JOURNAL OF ANIMAL SCIENCES	2005	2014
0250-474X	INDIAN JOURNAL OF PHARMACEUTICAL SCIENCES	2008	2014
0004-5772	JOURNAL OF ASSOCIATION OF PHYSICIANS OF INDIA	2005	2006
0974-3626	JOURNAL OF CHEMICAL SCIENCES	2005	2014
0970-9371	JOURNAL OF CYTOLOGY	2008	2014
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE VOL 9: HE 2	2005	2005
0972-4923	CONSERVATION & SOCIETY	2011	2014
0069-9667	CONTRIBUTIONS TO INDIAN SOCIOLOGY	2005	2014
0705-3797	EPISODES	2005	2013
0971-4588	INDIAN JOURNAL OF ENGINEERING AND MATERIALS SCIENCES	2005	2014
0973-1903	INTERNATIONAL JOURNAL OF AGRICULTURAL AND STATISTICAL SCIENCES	2007	2012
0253-4134	JOURNAL OF CHEMICAL SCIENCES	2005	2010
0972-060X	JOURNAL OF ESSENTIAL OIL BEARING PLANTS	2007	2011
0250-5371	LEGUME RESEARCH	2008	2014
0973-1296	PHARMACOGNOSY MAGAZINE	2008	2014
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE VOL 8: HE 1.5	2005	2005
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE, VOL 3: OG1	2005	2005
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE, VOL 6: HE 1.1, 1.2 & 1.3	2005	2005
NULL	PROCEEDINGS OF THE NATIONAL SEMINAR ON EVOLUTIONARY BIOLOGY AND BIOTECHNOLOGY	2007	2007
1319-3767	SAUDI JOURNAL OF GASTROENTEROLOGY	2011	2014
0971-4693	ALLELOPATHY JOURNAL	2005	2014
0972-0073	ANTHROPOLOGIST	2009	2014
0970-938X	BIOMEDICAL RESEARCH-INDIA	2008	2014
0304-9523	BULLETIN OF THE ASTRONOMICAL SOCIETY OF INDIA	2007	2014
0974-5963	CYTOJOURNAL	2008	2014
NULL	INCEMIC 2006: 9TH INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY, PROCEEDINGS	2006	2006
0019-5200	INDIAN JOURNAL OF GENETICS AND PLANT BREEDING	2008	2014
0973-6042	INTERNATIONAL JOURNAL OF SHOULDER SURGERY	2007	2014
0971-1600	JOURNAL OF SPACECRAFT TECHNOLOGY	2007	2011
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE, VOL 4: OG 2.1, 2.2 & 2.3	2005	2005
NULL	PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON CONTROL AUTOMATION, COMMUNICATION AND ENERGY CONSERVATION INCACEC 2009 VOLUME II	2009	2009
0972-5768	ADVANCES IN VIBRATION ENGINEERING	2008	2013
0019-5022	INDIAN JOURNAL OF AGRICULTURAL SCIENCES	2005	2014
0971-7811	JOURNAL OF PLANT BIOCHEMISTRY AND BIOTECHNOLOGY	2005	2014
0973-7510	JOURNAL OF PURE AND APPLIED MICROBIOLOGY	2009	2013
0973-1741	JOURNAL OF SOUTH ASIAN DEVELOPMENT	2009	2014
0972-5210	PLANT ARCHIVES	2007	2008
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE, VOL 5: OG 2.5, 2.6 & 2.7	2005	2005
0973-6263	RESEARCH JOURNAL OF BIOTECHNOLOGY	2007	2014
NULL	STRATEGIES AND INNOVATIONS FOR SUSTAINABLE ORGANIZATIONS	2011	2011
0972-2963	ANIMAL NUTRITION AND FEED TECHNOLOGY	2007	2014
0011-748X	DEFENCE SCIENCE JOURNAL	2005	2014
0972-5849	INDIAN JOURNAL OF BIOTECHNOLOGY	2008	2014
0972-8538	INDIAN JOURNAL OF HORTICULTURE	2007	2013
0019-5634	INDIAN JOURNAL OF SOCIAL WORK	2005	2011
0971-7544	JOURNAL OF INTELLECTUAL PROPERTY RIGHTS	2008	2012
0970-3950	MAPAN-JOURNAL OF METROLOGY SOCIETY OF INDIA	2007	2014

<sup>13</sup> ISSN is null when the sources are conference proceedings, and the publication year range is the time period for these sources being indexed by Web of Science.

NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE VOL 1: SH1 AND SH2	2005	2005
0371-750X	TRANSACTIONS OF THE INDIAN CERAMIC SOCIETY	2007	2014
1817-1737	ANNALS OF THORACIC MEDICINE	2008	2011
0379-5136	INDIAN JOURNAL OF GEO-MARINE SCIENCES	2011	2014
0253-7613	INDIAN JOURNAL OF PHARMACOLOGY	2007	2014
0019-6479	INDIAN VETERINARY JOURNAL	2005	2008
0971-2119	JOURNAL OF APPLIED ANIMAL RESEARCH	2005	2010
0253-4126	JOURNAL OF EARTH SYSTEM SCIENCE	2005	2014
NULL	JOURNAL OF INTELLECTUAL PROPERTY RIGHTS	2008	2009
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE VOL 7: HE 1.4	2005	2005
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE, VOL 2: SH3	2005	2005
0972-2815	TRANSACTIONS OF THE INDIAN INSTITUTE OF METALS	2005	2014
NULL	INCEMIC 2008: 10TH INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY, PROCEEDINGS	2008	2008
0301-1208	INDIAN JOURNAL OF BIOCHEMISTRY & BIOPHYSICS	2005	2014
0971-4502	INDIAN JOURNAL OF HEMATOLOGY AND BLOOD TRANSFUSION	2010	2014
0019-5413	INDIAN JOURNAL OF ORTHOPAEDICS	2008	2014
0972-2068	INDIAN JOURNAL OF SURGERY	2008	2014
0970-258X	NATIONAL MEDICAL JOURNAL OF INDIA	2005	2013
0369-8203	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES INDIA SECTION A- PHYSICAL SCIENCES	2007	2014
0971-7218	SCIENCE TECHNOLOGY AND SOCIETY	2009	2014
0973-4945	E-JOURNAL OF CHEMISTRY	2008	2010
0973-1458	INDIAN JOURNAL OF PHYSICS	2005	2014
0019-5588	INDIAN JOURNAL OF PURE & APPLIED MATHEMATICS	2005	2014
0973-3930	INTERNATIONAL JOURNAL OF DIABETES IN DEVELOPING COUNTRIES	2008	2014
0250-6335	JOURNAL OF ASTROPHYSICS AND ASTRONOMY	2005	2014
0973-1482	JOURNAL OF CANCER RESEARCH AND THERAPEUTICS	2008	2014
0003-2778	JOURNAL OF THE ANATOMICAL SOCIETY OF INDIA	2008	2012
0552-9360	JOURNAL OF THE PALAEOONTOLOGICAL SOCIETY OF INDIA	2011	2014
NULL	PROCEEDINGS OF THE INTERNATIONAL CAMEL CONFERENCE: RECENT TRENDS IN CAMELIDS RESEARCH AND FUTURE STRATEGIES FOR SAVING CAMELS	2008	2008
0019-493X	TRANSACTIONS OF THE INDIAN INSTITUTE OF METALS	2005	2009
0972-4036	VETERINARY PRACTITIONER	2007	2010
0974-9276	BIOSCOPE-SOUTH ASIAN SCREEN STUDIES	2010	2013
NULL	DNA STRUCTURE, CHROMATIN AND GENE EXPRESSION, 2006	2006	2006
0256-4602	IETE TECHNICAL REVIEW	2005	2013
0537-197X	INDIAN JOURNAL OF AGRONOMY	2005	2005
0376-4699	INDIAN JOURNAL OF CHEMISTRY SECTION B-ORGANIC CHEMISTRY INCLUDING MEDICINAL CHEMISTRY	2005	2014
0252-9416	MAUSAM	2007	2014
NULL	PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON CONTROL, AUTOMATION, COMMUNICATION AND ENERGY CONSERVATION INCACEC 2009 VOL 1	2009	2009
0972-1525	SUGAR TECH	2010	2014
0970-7077	ASIAN JOURNAL OF CHEMISTRY	2005	2014
0971-8966	HIMALAYAN GEOLOGY	2007	2012
0971-5215	INDIAN JOURNAL OF GENDER STUDIES	2005	2014
0019-5456	INDIAN JOURNAL OF PEDIATRICS	2007	2014
0973-8622	JOURNAL OF POLYMER MATERIALS	2005	2014
1119-3077	NIGERIAN JOURNAL OF CLINICAL PRACTICE	2008	2014
NULL	RHIZOSPHERE BIOTECHNOLOGY: PLANT GROWTH - RETROSPECT AND PROSPECT	2007	2007
0564-3295	TROPICAL ECOLOGY	2009	2014
NULL	GROUND IMPROVEMENT TECHNOLOGIES AND CASE HISTORIES	2010	2010
0367-6722	INDIAN JOURNAL OF ANIMAL RESEARCH	2008	2014
0973-1458	INDIAN JOURNAL OF PHYSICS AND PROCEEDINGS OF THE INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE	2005	2009
0970-2822	INDIAN JOURNAL OF VIROLOGY	2007	2013
0253-7222	JOURNAL OF DHARMA	2005	2013
0254-8704	JOURNAL OF ENVIRONMENTAL BIOLOGY	2005	2014
0022-1155	JOURNAL OF FOOD SCIENCE AND TECHNOLOGY-MYSORE	2005	2014
0022-3859	JOURNAL OF POSTGRADUATE MEDICINE	2006	2014
0025-1569	MAN IN INDIA	2005	2011
NULL	NEUROBIOLOGICAL STUDIES - FROM GENES TO BEHAVIOUR 2006	2006	2006
1463-1741	NOISE & HEALTH	2008	2014

NULL	PROCEEDINGS OF THE 7TH INTERNATIONAL SYMPOSIUM ON DISPLAY HOLOGRAPHY	2006	2006
0253-4142	PROCEEDINGS OF THE INDIAN ACADEMY OF SCIENCES-MATHEMATICAL SCIENCES	2005	2014
0971-2070	RANGE MANAGEMENT AND AGROFORESTRY	2008	2013
0019-509X	INDIAN JOURNAL OF CANCER	2010	2014
0971-457X	INDIAN JOURNAL OF CHEMICAL TECHNOLOGY	2005	2014
0970-6011	INDIAN JOURNAL OF FISHERIES	2009	2014
0971-1627	INDIAN JOURNAL OF HETEROCYCLIC CHEMISTRY	2005	2014
0971-5916	INDIAN JOURNAL OF MEDICAL RESEARCH	2005	2014
0972-5938	INDIAN JOURNAL OF TRADITIONAL KNOWLEDGE	2007	2014
0972-3757	INTERNATIONAL JOURNAL OF HUMAN GENETICS	2008	2014
0016-7622	JOURNAL OF THE GEOLOGICAL SOCIETY OF INDIA	2005	2014
0019-4522	JOURNAL OF THE INDIAN CHEMICAL SOCIETY	2005	2012
0304-4289	PRAMANA-JOURNAL OF PHYSICS	2005	2014
NULL	PROCEEDINGS OF THE 29TH INTERNATIONAL COSMIC RAY CONFERENCE, VOL 10	2005	2005
0971-7218	SCIENCE TECHNOLOGY AND SOCIETY	2010	2010
0250-4707	BULLETIN OF MATERIALS SCIENCE	2005	2014
0378-6323	INDIAN JOURNAL OF DERMATOLOGY VENEREOLOGY & LEPROLOGY	2007	2014
0019-5189	INDIAN JOURNAL OF EXPERIMENTAL BIOLOGY	2007	2014
0301-4738	INDIAN JOURNAL OF OPHTHALMOLOGY	2008	2014
0019-5464	INDIAN JOURNAL OF PHARMACEUTICAL EDUCATION AND RESEARCH	2007	2013
0019-5472	INDIAN JOURNAL OF PHARMACOLOGY	2009	2009
0019-6061	INDIAN PEDIATRICS	2005	2014
0971-6777	JOURNAL OF CAMEL PRACTICE AND RESEARCH	2005	2013
0972-6802	JOURNAL OF FUNCTION SPACES AND APPLICATIONS	2007	2011
0972-9941	JOURNAL OF MINIMAL ACCESS SURGERY	2011	2014
0022-4456	JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH	2005	2014
0970-1249	JOURNAL OF THE RAMANUJAN MATHEMATICAL SOCIETY	2011	2014
0255-660X	PHOTONIRVACHAK-JOURNAL OF THE INDIAN SOCIETY OF REMOTE SENSING	2005	2008
1008-682X	ASIAN JOURNAL OF ANDROLOGY	2005	2014
0256-1654	BULLETIN OF ELECTROCHEMISTRY	2005	2006
0011-3891	CURRENT SCIENCE	2005	2014
0974-262X	DISASTER ADVANCES	2008	2013
0376-4710	INDIAN JOURNAL OF CHEMISTRY SECTION A-INORGANIC BIO-INORGANIC PHYSICAL THEORETICAL & ANALYTICAL CHEMISTRY	2005	2014
0972-1665	JOURNAL OF AGROMETEOROLOGY	2007	2014
0250-5991	JOURNAL OF BIOSCIENCES	2005	2014
0256-2499	SADHANA-ACADEMY PROCEEDINGS IN ENGINEERING SCIENCES	2005	2014
0973-5070	STUDIES ON ETHNO-MEDICINE	2007	2014
0970-4078	VEGETOS	2007	2013
NULL	2ND NATIONAL WORKSHOP ON ADVANCED OPTOELECTRONIC MATERIALS AND DEVICES (AOMD-2008)	2008	2008
0377-2063	IETE JOURNAL OF RESEARCH	2005	2013
0971-0426	INDIAN JOURNAL OF FIBRE & TEXTILE RESEARCH	2005	2014
0379-5136	INDIAN JOURNAL OF MARINE SCIENCES	2005	2010
0255-0857	INDIAN JOURNAL OF MEDICAL MICROBIOLOGY	2008	2014
0377-4929	INDIAN JOURNAL OF PATHOLOGY AND MICROBIOLOGY	2008	2014
0019-5596	INDIAN JOURNAL OF PURE & APPLIED PHYSICS	2005	2014
NULL	INTEGRATED PLANT DISEASE MANAGEMENT	2005	2005
0022-1333	JOURNAL OF GENETICS	2005	2014
0972-9062	JOURNAL OF VECTOR BORNE DISEASES	2009	2014
0250-541X	NATIONAL ACADEMY SCIENCE LETTERS-INDIA	2005	2014
0028-3886	NEUROLOGY INDIA	2005	2014
0369-8211	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES INDIA SECTION B-BIOLOGICAL SCIENCES	2007	2013
0972-3226	RESEARCH ON CROPS	2008	2013

## ANNEX 8. DEFINITION OF ESSENTIAL SCIENCE INDICATORS CATEGORIES

Serial No.	Essential Science Indicators Category	Definition
1	Agricultural Sciences	Agricultural Sciences covers journals in general agriculture, agricultural chemistry and engineering, agronomy, dairy science, and animal science as it relates to agricultural needs, as well as food science and nutrition. Topics covered include tillage research and soil science; agroforestry; horticulture; crop protection and science; pest control and weed science; agrochemistry; phytochemistry; agricultural biochemistry; food chemistry; cereal chemistry; carbohydrate and lipid research; food composition, additives, and contaminants; food microbiology and technology; agricultural engineering and processing; meat and dairy science; animal breeding; animal genetics, nutrition, and production; poultry science; nutrition and metabolism; and nutritional biochemistry. Clinical nutrition also maps here. Agricultural economics maps to <i>Economics &amp; Business</i> .
2	Biology & Biochemistry	Biology & Biochemistry covers a broad range of general topics. These include structure and chemistry of biological molecules; molecular, cellular, and clinical studies of the endocrine system (but does not include clinical endocrinology); regulation of cell, organ, and system functions by hormones; experimental research in general biology and biological systems; anatomy; physiology; cytology; pathology; morphology; proteomics; histochemistry; biophysics; regulation of biological functions at the whole organism level; exploitation of living organisms or their components; industrial microbiology; pollution remediation; industrial chemicals and enzymes; biosensors; bioelectronics; pesticide development; food, flavor, and fragrance industry applications; and waste treatment. Computational biology and life-science-related microscopy journals also map here.
3	Chemistry	The Chemistry category covers a broad spectrum of topics within the chemical sciences, including analytical chemistry, inorganic and nuclear chemistry, organic chemistry, physical chemistry, crystallography, electrochemistry, chemical methods and structures, natural and laboratory syntheses, and isolation and analysis of clinically significant molecules. This category also covers instrumentation and spectroscopy journals. Miscellaneous and applied chemistry journals also map here. Polymer science journals not largely related to Materials Science map here; otherwise, they map to <i>Materials Science</i> . Chemical engineering journals also map here, provided they deal exclusively with chemical engineering—if they deal with multiple forms of engineering, they map to <i>Engineering</i> .
4	Clinical Medicine	The Clinical Medicine category covers journals dealing with a wide range of medical and biomedical topics. These include anesthesia and critical care medicine, cardiovascular medicine and cardiology, dentistry, dermatology, general and internal medicine, endocrinology, environmental medicine, gastroenterology, gynecology, hepatology, hematology, legal medicine, nephrology, nuclear medicine, nursing, obstetrics and reproductive medicine, oncology, ophthalmology, otolaryngology, pediatrics, radiology, respiratory medicine and pulmonology, rheumatology, surgery (including neurosurgery), and urology. Clinical pharmacology as it relates to clinical trials maps here; otherwise pharmacology topics map to <i>Pharmacology &amp; Toxicology</i> . All nutrition topics map to <i>Agricultural Sciences</i> . Ethics journals solely devoted to medical ethics map here. Journals dealing with the clinical aspects of substance abuse are classified here; those dealing with the social aspects map to <i>Social Sciences, General</i> .
5	Computer Science	Computer Science encompasses computer hardware and architecture, computer software, software engineering and design, computer graphics, programming languages, theoretical computing, computing methodologies, interdisciplinary computer applications, artificial intelligence theory, information systems and information technology, telecommunications, communications via various devices and systems, and acquisition, processing, storage, management, and dissemination of information. Bioinformatics journals also map here.
6	Economics & Business	The Economics & Business category includes journals which cover theoretical, political, agricultural, and developmental economics, as well as business, finance, management, organizational science, strategic planning and decision-making methods, and industrial relations and labor matters.
7	Engineering	Engineering includes publications covering a number of engineering disciplines, including aerospace engineering, mechanical engineering, electrical and electronics engineering, nuclear energy, civil engineering (which also encompasses water resources and supply and transportation and municipal engineering), the effects of humans on the environment and controls to minimize environmental degradation, applied artificial intelligence, robotics and automatic control, engineering mathematics (which

		encompasses mathematical modeling, optimization techniques, and statistical methods in engineering systems), energy and fuels, operations research, engineering management, construction and building technology, and the development, manufacture, and application of instruments. Chemical engineering journals also related to other areas of engineering map here; otherwise they map to <i>Chemistry</i> .
8	Environment/Ecology	Environment/Ecology covers interrelated disciplines on pure and applied ecology, ecological modeling and engineering, ecotoxicology, evolutionary ecology, environmental contamination and toxicology, environmental health, environmental monitoring and management, environmental technology, environmental geology, water resources research, climate change, limnology, and biodiversity conservation. Natural history journals are also covered here. Environmental <i>Studies</i> subjects map to <i>Social Sciences</i> .
9	Geosciences	The Geosciences category covers a broad range of journals related to physical studies of the Earth. These include geology, geochemistry, geophysics, geotechnics, economic geology, petrochemistry, mineralogy, meteorology and atmospheric sciences, hydrology, oceanography, petroleum geology, volcanology, seismology, climatology, paleontology, remote sensing, geodesy, and geological, petroleum, and mining engineering.
10	Immunology	The category of Immunology incorporates journals containing cellular and molecular studies in immunology; clinical research in immunopathology; infectious diseases; autoimmunity and allergy; host-pathogen interactions in infectious diseases; and experimental therapeutic applications of immunomodulating agents.
11	Materials Science	The Materials Science category deals with journals covering the admixtures of matter or the basic materials from which products are constructed. These include ceramics, paper and wood products, textiles, composites, coatings and films, biomaterials, metals and alloys, metallurgy, superconductors and semiconductors, ferroelectrics, dielectrics, and the application of chemistry to materials design and testing. Polymer journals largely related to Materials Science map here; otherwise they map to <i>Chemistry</i> .
12	Mathematics	The Mathematics category comprises journals dealing with pure and applied mathematics as well as statistics and probability.
13	Microbiology	The Microbiology category contains journals dealing with biology and biochemistry of protozoa and microorganisms (bacterial, viral, and parasitic), medical implications of the subsets of these organisms known to cause diseases, and the biotechnology applications of microorganisms for basic science or clinical use. Fungi journals are not mapped to this category, but rather to <i>Plant &amp; Animal Science</i> .
14	Molecular Biology & Genetics	Molecular Biology & Genetics covers all aspects of basic and applied genetics, as well as research that have specific emphasis on cellular functions in eukaryotic systems. These topics include biochemistry in eukaryotic systems; receptor biology; signal transduction; regulation of gene expression; morphogenesis; cell-environment interactions; molecular genetics; developmental genetics; developmental biology; biomedical engineering; mechanisms of mutagenesis; structure, function, and regulation of genetic material; clinical genetics; patterns of inheritance; genetics causes of diseases; and screening for and treatment of genetic diseases. General cell biology journals also map here.
15	Multidisciplinary	This category includes journals of a broad or general character in the sciences and covers the spectrum of major scientific disciplines. It also includes journals devoted to a multidisciplinary approach to the study of particular regions, ecosystems, or biological systems, as well as interdisciplinary journals designed to illuminate significant connections between fields.
16	Neuroscience & Behavior	Neuroscience & Behavior includes journals that cover cellular and molecular neuroscience, neuronal development, basic and clinical neurology, psychopharmacology, biobehavioral psychology, molecular psychology, and neuronal function underlying higher cognitive processes. Neurosurgery is not covered in this category, but rather in <i>Clinical Medicine</i> with other surgical journals.
17	Pharmacology & Toxicology	<i>Pharmacology</i> covers journals dealing with pharmacology; pharmaceuticals, cellular and molecular pharmacology; drug design and metabolism; mechanisms of drug action; drug delivery; natural products and traditional medicines; xenobiotics; medicinal chemistry; and mechanisms of action for clinical therapeutics. <i>Toxicology</i> covers journals dealing with molecular and cellular effects of harmful substances, environmental toxicology, occupational exposure, and clinical toxicology.
18	Physics	Physics includes journals covering articles from all areas of physics and the following subfields: mathematical physics, particle and nuclear physics, physics of fluids and plasmas, quantum physics, theoretical physics, chemical physics, applied physics, condensed matter physics, physics of materials, and optics and acoustics.
19	Plant & Animal Science	<i>Plant Science</i> covers general botany journals as well as non-agricultural plant research, including regional botany, mycology, bryology, plant physiology, forestry, plant pathology, economic botany, aquatic botany and toxicology, marine ecology, plant

		<p>nutrition, photosynthesis research, experimental botany, and cellular and molecular biology or physiology of plant cells and plant systems.</p> <p><i>Animal Science</i> covers non-agricultural animal science journals. Topics include animal behavior, health, and genetics; veterinary medicine; lab animal science; marine and freshwater biology; fisheries science; aquaculture; entomology; evolutionary biology; wildlife research; and zoology, encompassing primatology, mammalogy, ornithology, herpetology, nematology, and malacology.</p>
20	Psychiatry/Psychology	All areas of psychiatry and psychology are covered in this category, including applied, biological, clinical, developmental, educational, mathematical, organizational, personal, and social, as well as the diagnosis and treatment of psychiatric disorders.
21	Social Sciences, General	The Social Sciences category includes journals which cover communication, environmental studies, library and information sciences, political science, public health and administration, rehabilitation, social work and social policy, sociology, anthropology, law, education, linguistics, tourism and hospitality, and demography. Journals covering the history and philosophy of science also map to this category. Ethics journals are classified here, unless they deal strictly with medical ethics, then they map to <i>Clinical Medicine</i> . Journals dealing with the social aspects of substance abuse map here; any with clinical aspects map to <i>Clinical Medicine</i> .
22	Space Sciences	The Space Science category covers journals dealing with all areas of astronomy and astrophysics, celestial bodies, and observation and interpretation of radiation from the component parts of the universe.
23	Arts & Humanities	Arts & Humanities are not covered in <i>Essential Science Indicators</i> .

## ANNEX 9. BIBLIOMETRICS AND CITATION ANALYSIS

Bibliometrics are about publications and their citations. The academic field emerged from 'information science' and now usually refers to the methods used to study and index texts and information.

Publications cite other publications. These citation links grow into networks, and their numbers are likely to be related to the significance or impact of the publication. The meaning of the publication is determined from keywords and content. Citation analysis and content analysis have therefore become a common part of bibliometric methodology. Historically, bibliometric methods were used to trace relationships amongst academic journal citations. Now, bibliometrics are important in indexing research performance.

Bibliometric data have particular characteristics of which the user should be aware, and these are considered here.

Journal papers (publications, sources) report research work. Papers refer to or 'cite' earlier work relevant to the material being reported. New papers are cited in their turn. Papers that accumulate more citations are thought of as having greater 'impact', which is interpreted as significance or influence on their field. Citation counts are therefore recognised as a measure of impact, which can be used to index the excellence of the research from a particular group, institution or country.

The origins of citation analysis as a tool that could be applied to research performance can be traced to the mid-1950s, when Eugene Garfield proposed the concept of citation indexing and introduced the Science Citation Index, the Social Sciences Citation Index and the Arts & Humanities Citation Index, produced by the Institute of Scientific Information (currently the IP & Science business of Thomson Reuters).<sup>14</sup>

We can count citations, but they are only 'indicators' of impact or quality – not metrics. Most impact indicators use average citation counts from groups of papers, because some individual papers may have unusual or misleading citation profiles. These outliers are diluted in larger samples.

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### DATA SOURCE

The data we use come from the Thomson Reuters *Web of Science*<sup>TM</sup> databases which give access not only to journals but also to conference proceedings, books, patents, websites, and chemical structures, compounds and reactions. It has a unified structure that integrates all data and search terms together and therefore provides a level of comparability not found in other databases. It is widely acknowledged to be the world's leading source of citation and bibliometric data. The *Web of Science* focuses on research published in journals, conferences and books in science, medicine, arts, humanities and social sciences.

The *Web of Science* was originally created as an awareness and information retrieval tool but it has acquired an important primary use as a tool for research evaluation, using citation analysis and bibliometrics. Data coverage is both current and retrospective in the sciences, social sciences, arts and humanities, in some cases back to 1900. Within the research community this data source was previously referred to by the acronym 'ISI'.

Unlike other databases, the *Web of Science* and underlying databases are selective, that is: the journals abstracted are selected using rigorous editorial and quality criteria. The authoritative, multidisciplinary content covers over 12,000 of the highest impact journals worldwide, including Open Access journals, and over 150,000 conference proceedings. The abstracted journals encompass the majority of significant, frequently cited scientific reports and, more importantly, an even greater proportion of the scientific research output which is cited. This selective process ensures that the citation counts remain relatively stable in given research fields and do not fluctuate unduly from year to year, which increases the usability of such data for performance evaluation.

Thomson Reuters has extensive experience with databases on research inputs, activity and outputs and has developed innovative analytical approaches for benchmarking and interpreting international, national and institutional research impact.

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<sup>14</sup> Garfield, E (1955) Citation Indexes for Science – New dimension in documentation through association of ideas. *Science* **122**, 108-111.



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## DATABASE CATEGORIES

The source data can be grouped in various classification systems. Most of these are based on groups of journals that have a relatively high cross-citation linkage and naturally cluster together. Custom classifications use subject maps in third-party data such as the OECD categories set out in the Frascati manual.

Thomson Reuters frequently uses the broader field categories in the *Essential Science Indicators* system and the finer journal categories in the *Web of Science*. There are 22 fields in *Essential Science Indicators* and 254 fields in *Web of Science*. In either case, our bibliometric analyses draw on the full range of data available in the underlying database, so analyses in our reports will differ slightly from anything created 'on the fly' from data in the web interface.

The lists of journal categories in these systems are attached at the end of this document.

Most analyses start with an overall view across the data, then move to a view across broad categories and only then focus in at a finer level in the areas of greatest interest to policy, programme or organisational purpose.

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## ASSIGNING PAPERS TO ADDRESSES

A paper is assigned to each country and each organisation whose address appears at least once for any author on that paper. One paper counts once and only once for each assignment, however many address variants occur for the country or organisation. No weighting is applied.

For example, a paper has five authors, thus:

Author	Organisation	Country		
Gurney, KA	Univ Leeds	UK	Counts for Univ Leeds	Counts for UK
Adams, J	Univ Leeds	UK	No gain for Univ Leeds	No gain for UK
Kochalko, D	Univ C San Diego	USA	Counts for UCSD	Counts for USA
Munshi, S	Gujarat Univ	India	Counts for Gujarat Univ	Counts for India
Pendlebury, D	Univ Oregon	USA	Counts for Univ Oregon	No gain for USA

So this one paper with five authors would be included once in the tallies for each of four universities and once in the tallies for each of three countries.

Work carried out within Thomson Reuters, and research published elsewhere, indicates that fractional weighting based on the balance of authors by organisation and country makes little difference to the conclusions of an analysis at an aggregate level. Such fractional analysis can introduce unforeseen errors in the attempt to create a detailed but uncertain assignment. Partitioning credit would make a greater difference at a detailed, group level but the analysis can then be manually validated.

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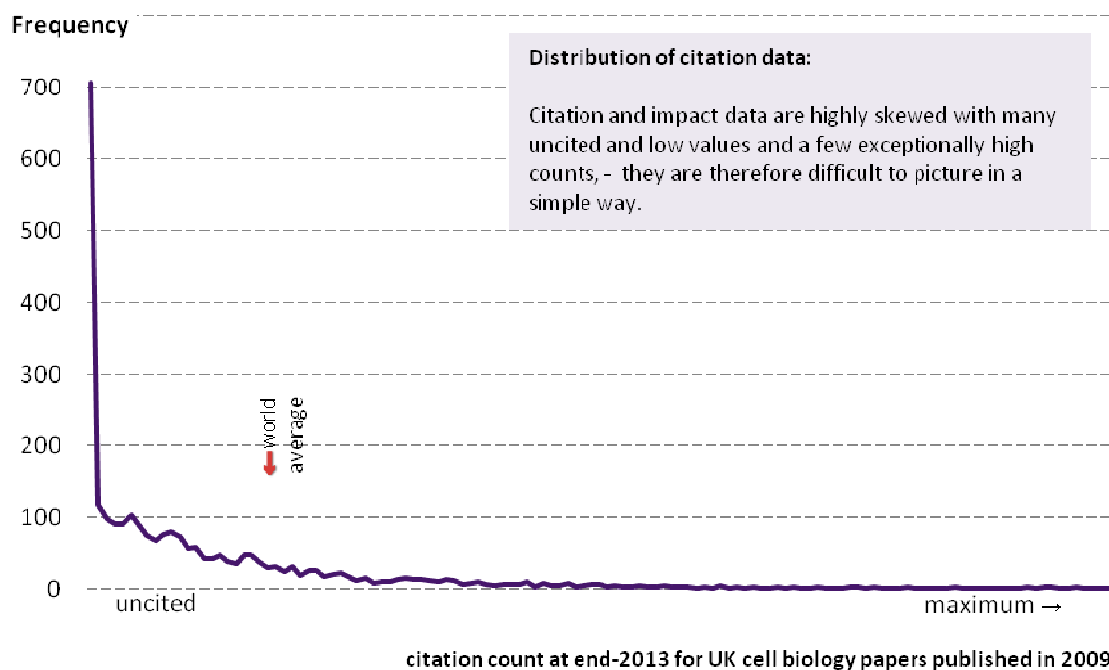
## CITATION COUNTS

A publication accumulates citation counts when it is referred to by more recent publications. Some papers get cited frequently and many get cited rarely or never, so the distribution of citations is highly skewed.

Why are many papers never cited? Certainly some papers remain uncited because their content is of little or no impact, but that is not the only reason. It might be because they have been published in a journal not read by researchers to whom the paper might be interesting. It might be that they represent important but 'negative' work reporting a blind alley to be avoided by others. The publication may be a commentary in an editorial, rather than a normal journal article and thus of general rather than research interest. Or it might be that the work is a 'sleeping beauty' that has yet to be recognised for its significance.

Other papers can be very highly cited: hundreds, even thousands of times. Again, there are multiple reasons for this. Most frequently cited work is being recognised for its innovative significance and impact on the research field of which it speaks. Impact here is a good reflection of quality: it is an indicator of excellence. But there are other papers which are frequently cited because their significance is slightly different: they describe key methodology; they are a thoughtful and wide-ranging review of a field; or they represent contentious views which others seek to refute.

Citation analysis cannot make value judgments about why an article is uncited nor about why it is highly cited. The analysis can only report the citation impact that the publication has achieved. We normally assume, based on many other studies linking bibliometric and peer judgments, that high citation counts correlate on average with the quality of the research.



The figure shows the skewed distribution of more or less frequently cited papers from a sample of UK authored publications in cell biology. The skew in the distribution varies from field to field. It is to compensate for such factors that actual citation counts must be normalised, or rebased, against a world baseline.

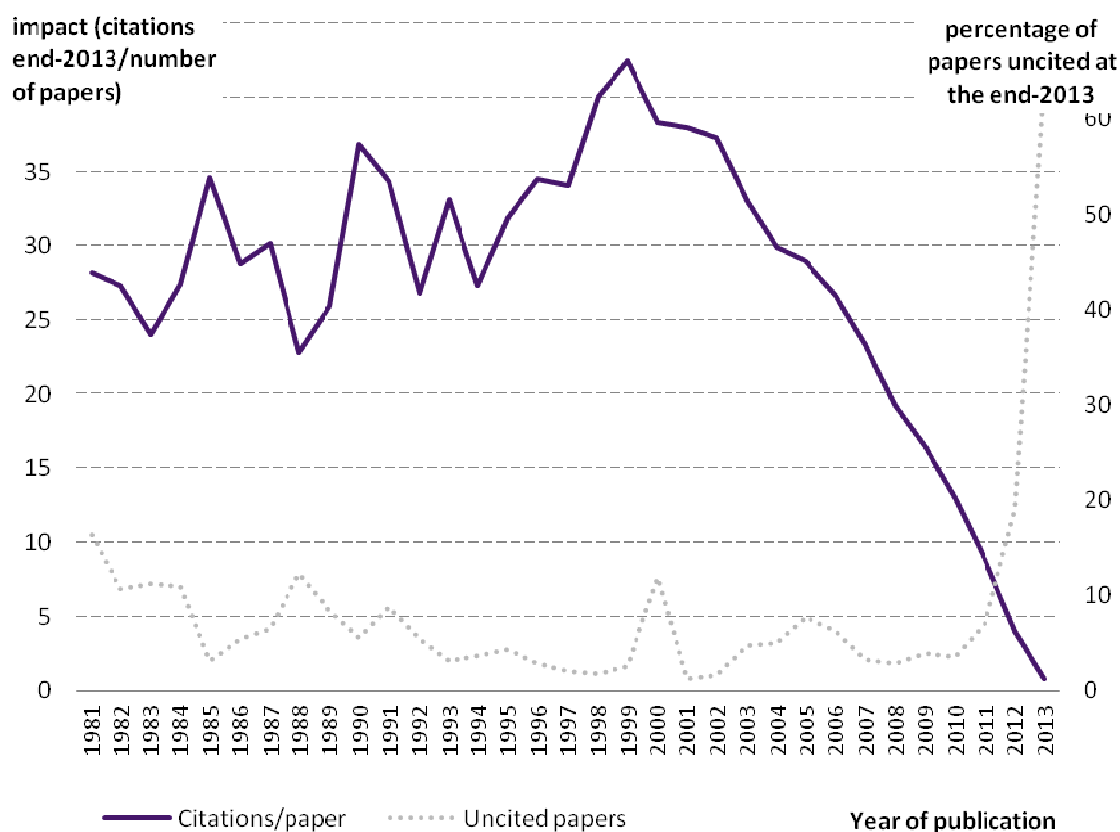
We do not seek to account separately for the effect of self-citation. If the citation count is significantly affected by self-citation then the paper is likely to have been infrequently cited. This is therefore only of consequence for low impact activity. Studies show that for large samples at national and organisational level the effect of self-citation has little or no effect on the analytical outcomes and would not alter interpretation of the results.

## TIME FACTORS

Citations accumulate over time. Older papers therefore have, on average, more citations than more recent work. The graph below shows the pattern of citation accumulation for a set of 33 journals in the journal category *Materials Science, Biomaterials*. Papers less than eight years old are, on average, still accumulating additional citations. The citation count goes on to reach a plateau for older sources.

The graph shows that the percentage of papers that have never been cited drops over about five years. Beyond five years, between 5% and 10% or more of papers remain uncited.

Account must be taken of these time factors in comparing current research with historical patterns. For these reasons, it is sometimes more appropriate to use a fixed five-year window of papers and citations to compare two periods than to look at the longer term profile of citations and of uncitedness for a recent year and an historical year.



## DISCIPLINE FACTORS

Citation rates vary between disciplines and fields. For the UK science base as a whole, ten years produces a general plateau beyond which few additional citations would be expected. On the whole, citations accumulate more rapidly and plateau at a higher level in biological sciences than physical sciences, and natural sciences generally cite at a higher rate than social sciences.

Papers are assigned to disciplines (journal categories or research fields) by Thomson Reuters, bringing cognate research areas together. The journal category classification scheme has been recently revised and updated. Before 2007, journals were assigned to the older, well established Current Contents categories which were informed by extensive work by Thomson and with the research community since the early 1960s. This scheme has been superseded by the 252 *Web of Science*<sup>®</sup> journal categories which allow for greater disaggregation for the growing volume of research which is published and abstracted.

Papers are allocated according to the journal in which the paper is published. Some journals may be considered to be part of the publication record for more than one research field. As the example below illustrates, the journal *Acta Biomaterialia* is assigned to two journal categories: **Materials Science, Biomaterials** and **Engineering, Biomedical**.

Very few papers are not assigned to any research field and as such will not be included in specific analyses using Normalised citation impact data. The journals included in the Thomson Reuters databases and how they are selected are detailed here <http://scientific.thomsonreuters.com/mjl/>.

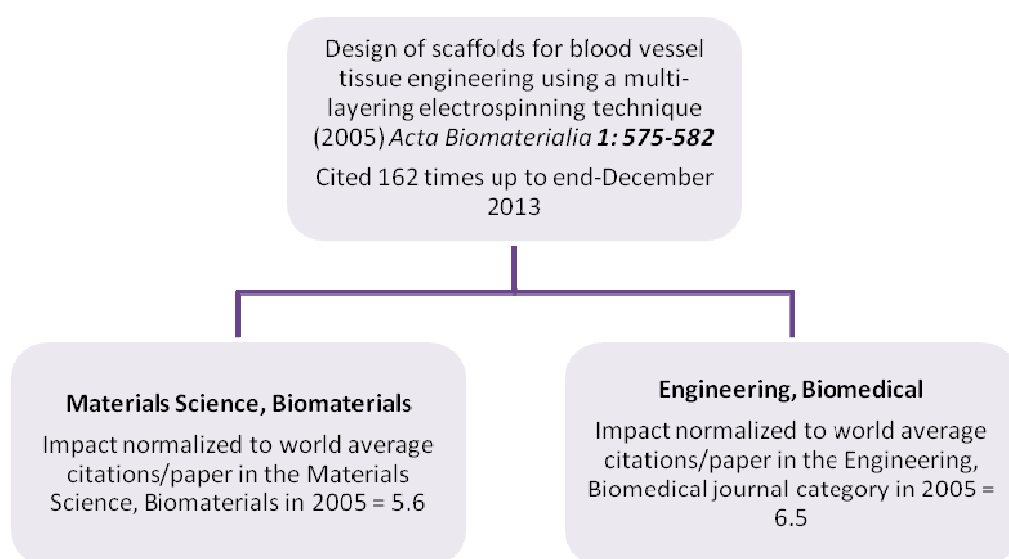
Some journals with a very diverse content, including the prestigious journals *Nature* and *Science* were classified as **Multidisciplinary** in databases created prior to 2007. The papers from these **Multidisciplinary** journals are now re-assigned to more specific research fields using an algorithm based on the research area(s) of the references cited by the article.

## NORMALISED CITATION IMPACT

Because citations accumulate over time at a rate that is dependent upon the field of research, all analyses must take both field and year into account. In other words, because the absolute citation count for a specific article is influenced by its field and by the year it was published, we can only make comparisons of indexed data after normalising with reference to these two variables.

We only use citation counts for reviews and articles in calculations of impact, because document type influences the citation count. For example, a review will often be cited more frequently than an article in the same field, but editorials and meeting abstracts are rarely cited and citation rates for conference proceedings are extremely variable. The most common normalisation factors are the average citations per paper for (1) the year and (2) either the field or the journal in which the paper was published. This normalisation is also referred to as 'rebasin' the citation count.

Impact is therefore most commonly analysed in terms of 'Normalised impact', or NCI. The following schematic illustrates how the Normalised citation impact is calculated at paper level and journal category level.



This article in the journal *Acta Biomaterialia* is assigned to two journal categories: **Materials Science, Biomaterials** and **Engineering, Biomedical**. The world average baselines for, as an example, **Materials science, Biomaterials** are calculated by summing the citations to all the articles and reviews published worldwide in the journal *Acta Biomaterialia* and the other 32 journals assigned to this category for each year, and dividing this by the total number of articles and reviews published in the journal category. This gives the category-specific Normalised citation impact (in the above example the category-specific NCI<sub>F</sub> for **Materials Science, Biomaterials** is 5.6 and the category-specific NCI<sub>F</sub> for **Engineering, Biomedical** is higher at 6.5). Most papers (nearly two-thirds) are assigned to a single journal category whilst a minority are assigned to more than 5.

Citation data provided by Thomson Reuters are assigned on an annual census date referred to as the Article Time Period. For the majority of publications the Article Time Period is the same as the year of publication, but for a few publications (especially those published at the end of the calendar year in less main-stream journals) the Article Time Period may vary from the actual year of publication.

World average impact data are sourced from the Thomson Reuters National Science Indicators baseline data for 2013.

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## MEAN NORMALISED CITATION IMPACT

Research performance has historically been indexed by using average citation impact, usually compared to a world average that accounts for time and discipline. As noted, however, the distribution of citations amongst papers is highly skewed because many papers are never cited while a few papers accumulate very large citation counts. That means that an average may be misleading if assumptions are made about the distribution of the underlying data.

In fact, almost all research activity metrics are skewed: for research income, PhD numbers and publications there are many low activity values and a few exceptionally high values. In reality, therefore, the skewed distribution means that average impact tends to be greater than and often significantly different from either the median or mode in the distribution. This should be borne in mind when reviewing analytical outcomes.

The average (Normalised) citation impact can be calculated at an individual paper level where it can be associated with more than one journal category. It can also be calculated for a set of papers at any level from a single country to an individual researcher's output. In the example above, the average citation impact of the *Acta Biomaterialia* paper can be expressed as  $((5.6 + 6.5)/2) = 6.1$ .

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## IMPACT PROFILES®

We have developed a bibliometric methodology<sup>15</sup> that shows the proportion of papers that are uncited and the proportion that lie in each of eight categories of relative citation rates, Normalised (rebased) to world average. An Impact Profile® enables an examination and analysis of the strengths and weaknesses of published outputs relative to world average and relative to a reference profile. This provides much more information about the basis and structure of research performance than conventionally reported averages in citation indices.

Papers which are "highly-cited" are often defined in our reports as those with an average citation impact (NCI<sub>F</sub>) greater than or equal to 4.0, i.e. those papers which have received greater than or equal to four times the world average number of citations for papers in that subject published in that year. This differs from Thomson Reuters database of global highly-cited papers, which are the top 1% most frequently cited for their field and year. The top percentile is a powerful indicator of leading performance but is too stringent a threshold for most management analyses.

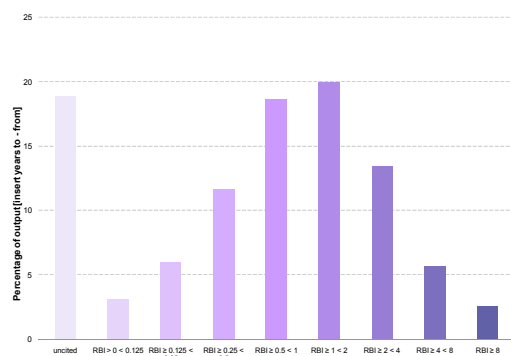
The proportion of uncited papers in a dataset can be compared to the benchmark for the UK, the USA or any other country. Overall, in a typical ten-year sample, around one-quarter of papers have not been cited within the 10-year period; the majority of these are, of course, those that are most recently published.

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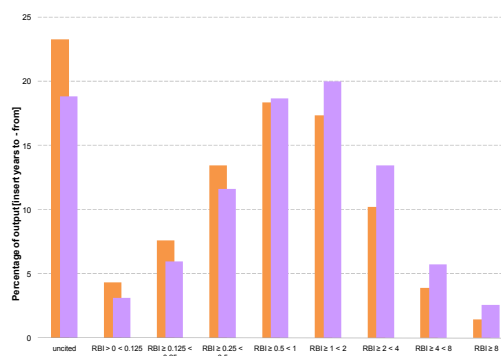
<sup>15</sup> Adams J, Gurney K & Marshall S (2007) Profiling citation impact: A new methodology. *Scientometrics* 72: 325-344.

The Impact Profile® histogram can be presented in a number of ways which are illustrated below.

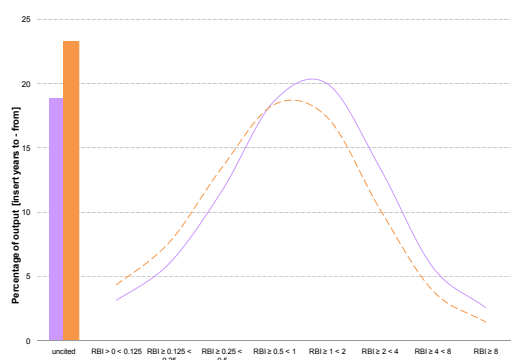
**A**



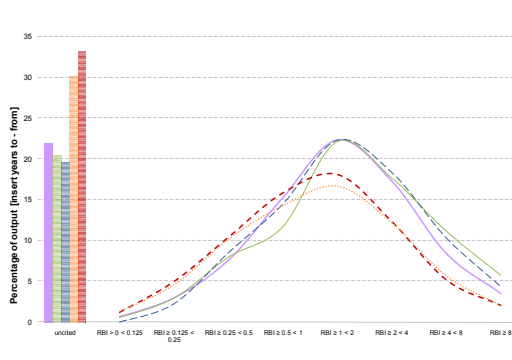
**B**



**C**



**D**



**A:** is used to represent the total output of an individual country, institution or researcher with no benchmark data. Visually it highlights the numbers of uncited papers (weaknesses) and highly cited papers (strengths).

**B & C:** are used to represent the total output of an individual country, institution or researcher (**client**) against an appropriate benchmark dataset (**benchmark**). The data are displayed as either histograms (B) or a combination of histogram and profile (C). Version C prevents the 'travel' which occurs in histograms where the eye is drawn to the data most offset to the right, but can be less easy to interpret as categorical data.

**D:** illustrates the complexity of data which can be displayed using an Impact Profile®. These data show research output in defined journal categories against appropriate benchmarks: **client, research field X**; **client, research field Y**; **client, research field Z**; **benchmark, research field X+Y**; **benchmark, research field, Z**.

Impact Profiles® enable an examination and analysis of the balance of published outputs relative to world average and relative to a reference profile. This provides much more information about the basis and structure of research performance than conventionally reported averages in citation indices.

An Impact Profile® shows what proportion of papers are uncited and what proportion are in each of eight categories of relative citation rates, Normalised to world average (which becomes 1.0 in this graph). Normalised citation rates above 1.0 indicate papers cited more often than world average for the field in which that journal is categorised and in their year of publication.

Attention should be paid to:

- The proportion of uncited papers on the left of the chart
- The proportion of cited papers either side of world average (1.0)
- The location of the most common (modal) group near the centre

- The proportion of papers in the most highly-cited categories to the right, ( $\geq 4 \times$  world,  $\geq 8 \times$  world).

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### WHAT ARE UNCITED PAPERS?

It may be a surprise that some journal papers are never subsequently cited after publication, even by their authors. This accounts for about half the total global output for a typical, recent 10-year period. We cannot tell why papers are not cited. It is likely that a significant proportion of papers remain uncited because they are reporting negative results which are an essential matter of record in their field but make the content less likely to be referenced in other papers. Inevitably, other papers are uncited because their content is trivial or marginal to the mainstream. However, it should not be assumed that this is the case for all such papers.

There is variation in non-citation between countries and between fields. For example, relatively more engineering papers tend to remain uncited than papers in other sciences, indicative of a disciplinary factor but not a quality factor. While there is also an obvious increase in the likelihood of citation over time, most papers that are going to be cited will be cited within a few years of publication.

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### WHAT IS THE THRESHOLD FOR 'HIGHLY CITED'?

Thomson Reuters has traditionally used the term 'Highly Cited Paper' to refer to the world's 1% of most frequently cited papers, taking into account year of publication and field. In rough terms, UK papers cited more than eight times as often as relevant world average would fall into the Thomson Highly Cited category. About 1-2% of papers (all papers, cited or uncited) typically pass this hurdle. Such a threshold certainly delimits exceptional papers for international comparisons but, in practice, is an onerous marker for more general management purposes.

After reviewing the outcomes of a number of analyses, we have chosen a more relaxed definition for our descriptive and analytical work. We deem papers that are in the world's top 10% of most frequently cited papers, taking into account year of publication and field, to be relatively highly-cited for national comparisons.

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**A4.11 WEB OF SCIENCE JOURNAL CATEGORIES**

Acoustics	Classics	Engineering, multidisciplinary
Agricultural economics & policy	Clinical neurology	Engineering, ocean
Agricultural engineering	Communication	Engineering, petroleum
Agriculture, dairy & animal science	Computer science, artificial intelligence	Entomology
Agriculture, multidisciplinary	Computer science, cybernetics	Environmental sciences
Agriculture, soil science	Computer science, hardware & architecture	Environmental studies
Agronomy	Computer science, information systems	Ergonomics
Allergy	Computer science, interdisciplinary applications	Ethics
Anatomy & morphology	Computer science, software engineering	Ethnic studies
Andrology	Computer science, theory & methods	Evolutionary biology
Anaesthesiology	Construction & building technology	Family studies
Anthropology	Criminology & penology	Film, radio, television
Applied linguistics	Critical care medicine	Fisheries
Archaeology	Crystallography	Folklore
Architecture	Dance	Food science & technology
Area studies	Demography	Forestry
Art	Dentistry, oral surgery & medicine	Gastroenterology & hepatology
Asian studies	Dermatology	Genetics & heredity
Astronomy & astrophysics	Developmental biology	Geochemistry & geophysics
Automation & control systems	Ecology	Geography
Behavioural sciences	Economics	Geography, physical
Biochemical research methods	Education & educational research	Geology
Biochemistry & molecular biology	Education, scientific disciplines	Geosciences, multidisciplinary
Biodiversity conservation	Education, special	Geriatrics & gerontology
Biology	Electrochemistry	Health care sciences & services
Biology, miscellaneous	Emergency medicine	Health policy & services
Biophysics	Endocrinology & metabolism	Haematology
Biotechnology & applied microbiology	Energy & fuels	History
Business	Engineering, aerospace	History & philosophy of science
Business, finance	Engineering, biomedical	History of social sciences
Cardiac & cardiovascular systems	Engineering, chemical	Horticulture
Cell biology	Engineering, civil	Humanities, multidisciplinary
Chemistry, analytical	Engineering, electrical & electronic	Imaging science & photographic technology
Chemistry, applied	Engineering, environmental	Immunology
Chemistry, inorganic & nuclear	Engineering, geological	Industrial relations & labour
Chemistry, medicinal	Engineering, industrial	Infectious diseases
Chemistry, multidisciplinary	Engineering, manufacturing	Information & library science
Chemistry, organic	Engineering, marine	Instruments & instrumentation
Chemistry, physical	Engineering, mechanical	Integrative & complementary medicine
International relations	Mining & mineral processing	Psychology
Language & linguistics	Multidisciplinary sciences	Psychology, applied
Language & linguistics theory	Music	Psychology, biological
Law	Mycology	Psychology, clinical
Limnology	Nanoscience & nanotechnology	Psychology, developmental



Linguistics	Neuroimaging	Psychology, educational
Literary reviews	Neurosciences	Psychology, experimental
Literary theory & criticism		Psychology, mathematical
Literature	Nuclear science & technology	Psychology, multidisciplinary
Literature, African, Australian, Canadian	Nursing	Psychology, psychoanalysis
Literature, American	Nutrition & dietetics	Psychology, social
Literature, British Isles	Obstetrics & gynaecology	Public administration
Literature, German, Dutch, Scandinavian	Oceanography	Public, environmental & occupational health
Literature, romance	Oncology	Radiology, nuclear medicine & medical imaging
Literature, Slavic	Operations research & management science	Rehabilitation
Management	Ophthalmology	Religion
Marine & freshwater biology	Optics	Remote sensing
Materials science, biomaterials	Ornithology	Reproductive biology
Materials science, ceramics	Orthopaedics	Respiratory system
Materials science, characterization & testing	Otorhinolaryngology	Rheumatology
Materials science, coatings & films	Palaeontology	Robotics
Materials science, composites	Parasitology	Social issues
Materials science, multidisciplinary	Pathology	Social sciences, biomedical
Materials science, paper & wood	Paediatrics	Social sciences, interdisciplinary
Materials science, textiles	Peripheral vascular disease	Social sciences, mathematical methods
Math & computational biology	Pharmacology & pharmacy	Social work
Mathematics	Philosophy	Sociology
Mathematics, applied	Physics, applied	Soil science
Mathematics, interdisciplinary applications	Physics, atomic, molecular & chemical	Spectroscopy
Mechanics	Physics, condensed matter	Sport sciences
Medical ethics	Physics, fluids & plasmas	Statistics & probability
Medical informatics	Physics, mathematical	Substance abuse
Medical laboratory technology	Physics, multidisciplinary	Surgery
Medicine, general & internal	Physics, nuclear	Telecommunications
Medicine, legal	Physics, particles & fields	Theatre
Medicine, research & experimental	Physiology	Thermodynamics
Medieval & renaissance studies	Planning & development	Toxicology
Metallurgy & metallurgical engineering	Plant sciences	Transplantation
Meteorology & atmospheric sci	Poetry	Transportation
Microbiology	Political science	Transportation science & technology
Microscopy	Polymer science	Tropical medicine
Mineralogy	Psychiatry	
Urban studies		
Urology & nephrology		
Veterinary		
Veterinary sciences		
Virology		
Water resources		
Women's studies		
Zoology		