

## 4. CONNECTING TO GLOBAL RESEARCH

### 4.3. International co-operation in science

Co-authorship of research publications provides a direct measure of collaboration in science. Research publications may have a single author or two or more co-authors. Co-authorship may involve researchers in the same institution, in the same country, or in two or more countries. These indicators help to understand how knowledge is created among researchers and how collaboration in science is changing.

Collaboration among researchers in a single institution was the major form of collaborative research until the end of the 1990s. However, the percentage of single-institution co-authorship has been decreasing over the last two decades.

Co-authorship, both domestic and international, has grown in importance over the past decade. Domestic co-authorship, i.e. collaboration by researchers of different institutions in the same country, has been increasing rapidly. It surpassed the share of single-institution co-authorship in 1998 and has since been the most common form of scientific collaboration.

International co-authorship has been growing as fast as domestic co-authorship. In 2007, 21.9% of scientific articles involved international co-authorship, a figure three times higher than in 1985. Increases in domestic and international co-authorship point to the crucial role of interaction among researchers as a way to diversify their sources of knowledge.

As a general trend, scientific knowledge production is shifting from individual to group, from single to multiple institutions, and from national to international. Researchers are increasingly networked across national and organisation borders.

The degree of international collaboration varies. Large countries tend to engage in less international collaboration. Large European countries (France, Germany and the United Kingdom) conduct more collaborative work than the United States and Asian countries.

#### **Measures of co-authorship**

Four types of authorship of scientific articles are analysed: single authorship, single-institution co-authorship, domestic co-authorship and international co-authorship. The analysis is based on the Science Citation Index on CD-ROM (1981-2007) provided by Thomson Scientific and analysed by the National Institute of Science and Technology Policy in Japan.

Single authorship measures scientific papers with a single author. Single-institution co-authorship measures scientific papers with two or more authors of the same institution. Domestic co-authorship measures scientific articles with two or more authors from different institutions in the same country. International co-authorship measures scientific articles with two or more authors from different countries. The boundary between single-institution co-authorship and domestic co-authorship is not always clear, as for example, when co-authors belong to different departments of same university. Here, the classification is based upon the number of addresses listed in each article.

Indicators of co-authorship draw attention to language barriers and geographical factors. However, these obstacles have diminished as English has become the language most commonly used internationally among researchers. Furthermore physical distance between researchers is likely to have some correlation with the ratio of co-authorship, although the effect of information and communication technology on knowledge flows has undoubtedly facilitated distance collaboration.

#### **Sources**

National Institute of Science and Technology Policy in Japan (2008), "Science and Technology Indicators", data updated in 2008 for the 5th edition, July.

OECD calculations, based on Scopus Custom Data, Elsevier, July 2009.

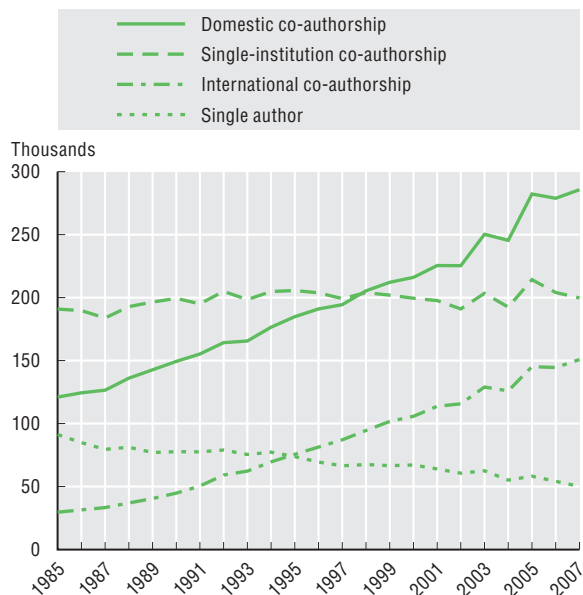
#### **Going further**

Igami, M. and A. Saka (2007), "Capturing the Evolving Nature of Science, the Development of New Scientific Indicators and the Mapping of Science", *OECD Science, Technology and Industry Working Papers 2007/1*, OECD, Paris, [www.oecd.org/sti/working-papers](http://www.oecd.org/sti/working-papers).

#### **Figure notes**

Data are based on research articles in natural and medical sciences and engineering.

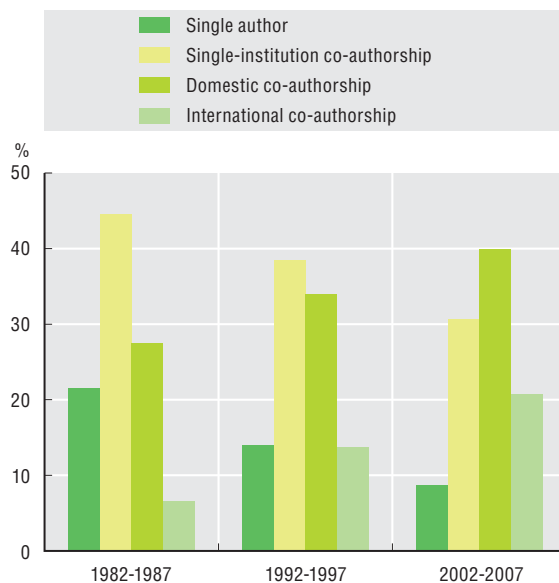
**Trends in the co-operation in science, 1985-2007**



StatLink <http://dx.doi.org/10.1787/745740774835>

**Share of co-authored scientific articles, 1982-87, 1992-97, 2002-07**

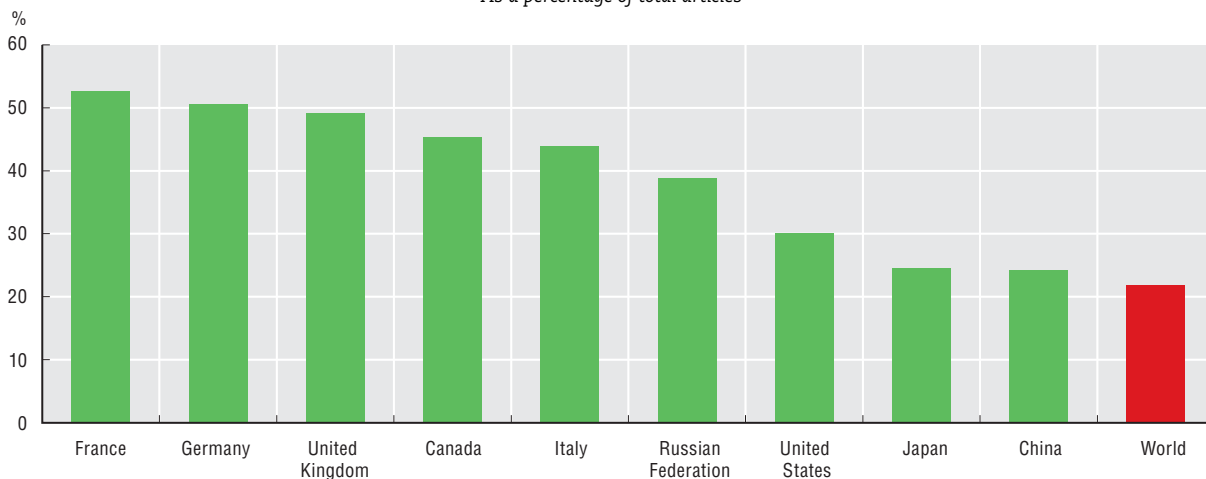
As a percentage of total



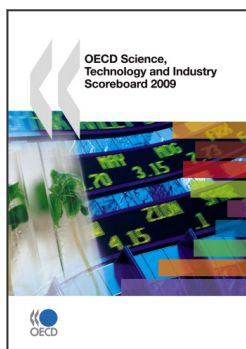
StatLink <http://dx.doi.org/10.1787/745744166773>

**Share of internationally co-authored scientific articles, 2007**

As a percentage of total articles



StatLink <http://dx.doi.org/10.1787/745766770745>



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