Recent trends in the internationalisation of R&D in the enterprise sector

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Introduction

- For a long time, some experts thought that, faced with international competition, enterprises would tend to keep a close watch on R&D activities and keep them as close as possible to their base in the country of origin.

- Others, however, considered that R&D activities were also likely to be included in the economic globalisation process and, consequently, likely also to spread across all the major markets in which international firms were established.

- These divergent views were recently dissipated thanks to the new surveys organised by member countries and coordinated at international level by the OECD Secretariat, and by Eurostat at European level.
Evolution of the main driving forces of globalisation of goods and services in the OECD\(^1\) area (1995=100)

The results of these surveys showed that industrial R&D is in fact becoming increasingly internationalised, and that over the last ten years it has become the most dynamic activity of multinational companies, just behind mergers/acquisitions and international investment.

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1. Countries included: United States, Japan, United Kingdom, France, Germany, Canada, Netherlands, Sweden, Czech Republic, Finland, Hungary, Ireland and Poland.

1. Main forms of internationalisation of industrial R&D

   Establishment of R&D activities in the host country by foreign-controlled affiliates (inward investment)

   Setting up R&D laboratories abroad by investing countries (outward investment)

   Creation of joint ventures

   Co-operation agreements or technological alliances

   International R&D subcontracting
2. Trends of R&D activities by multinationals

Activity of foreign affiliates in home countries

R&D expenditure under foreign control in the business sector in selected OECD countries

1. Consists of the Czech Republic, Finland, Hungary, Ireland, Poland, the Netherlands and Sweden.

Source: OECD, AFA database, June 2006.
Activity of foreign affiliates in home countries (2)

- Between 1995 and 2003, the R&D expenditures of foreign-controlled affiliates constituted one of the most dynamic elements for assessing the process of globalisation.

- Between 1995 and 2003, the R&D expenditure of foreign-controlled firms in the OECD countries rose by 39 billion purchasing power parity dollars and by 36 billion current dollars.

- In absolute value, this rise can be seen in all the countries. However, at the end of the period under review, the shares of each country in aggregate OECD-area R&D expenditure by foreign affiliates had changed. The shares of Germany, Japan and the United Kingdom increased, while those of the United States, France and Canada declined.

- The United States continued to attract 41.9% of total R&D expenditure by foreign affiliates in the OECD area, although in terms of turnover, the share of the same affiliates was only 38.5%.

- This shows that, for foreign affiliates, the United States followed by Germany and the United Kingdom are more attractive countries for research than for production.
Growth in R&D expenditure by affiliates under foreign control between 1995 and 2003

Billions of PPP US dollars

- Total of selected countries: 38.4
- United States: 14.7
- Germany: 6.7
- United Kingdom: 5.6
- Other OECD (1): 4.8
- Japan: 2.9
- Sweden: 2.6
- France: 2.4
- Canada: 1.4
- Netherlands: 0.8
- Czech Republic: 0.5
- Ireland: 0.4
- Finland: 0.3
- Hungary: 0.3
- Poland: -0.0

1. Consists of the Czech Republic, Finland, Hungary, Ireland, Poland, the Netherlands and Sweden.

Source: OECD, AFA database, June 2006.
Growth in turnover of affiliates under foreign control between 1995 and 2003

Billions of US dollars

1. Consists of the Czech Republic, Finland, Hungary, Ireland, Poland, the Netherlands and Sweden.

Source: OECD, AFA database, June 2006.
3. The sectoral dimension

In the internationalisation of industrial R&D, some sectors are more important than others. However, before exploring aspects relating to the internationalisation of business R&D, one needs to take account of the relative size and trends in the main sectors of overall R&D in the OECD area.

Five sectors play a dominant role in business-sector R&D. Foremost among them is the manufacturing of information and communications technology, followed distantly by the automobile industry, pharmaceuticals, chemicals (excluding pharmaceuticals).
Industries in the field of information and communications technologies (ICTs) play a dominant role in OECD-area R&D expenditures, but they are less internationalised than the pharmaceutical or automobile industries (as measured by the ratio of R&D performed abroad to R&D performed within the country).

The extensive internationalisation of the pharmaceutical industry may stem from the fact that the industry is highly regulated in all countries, and that this demands a local laboratory presence so as to obtain authorisations to put new drugs on the market more quickly.

The automobile industry is highly regionalised, and R&D laboratories to some extent follow production units, which are scattered widely around the world.

The relatively lower percentage for information technology industries may stem from the fact that the denominator of the fraction (total R&D) measuring the sector’s internationalisation is far greater than those for other sectors.
Indeed, information technology industries in the broad sense account for a preponderant share of aggregate R&D spending in the OECD area.

European R&D spending in the pharmaceutical, automobile and chemical industries exceeds that of the United States and Japan.

In contrast, in information and communications technologies Europe lags considerably behind.
R&D expenditure in the ICT sector (2)

In 2003, the United States accounted for virtually half of the OECD area’s aggregate R&D investment in the ICT industries. The EU-15 nations invested a little over a quarter, whereas Japan’s investments accounted for roughly 18% of the OECD-area total.
Differences between countries in absolute amounts of R&D, at aggregate or industry levels, express primarily differences among countries in the industrial structure (and trade specialisation).
R&D intensity (R&D expenditure / turnover)

Worldwide R&D intensity of 12 top multinationals in Automobile, Pharmaceuticals and Semiconductors

The 13th observation is the sector’s average intensity
R&D intensity by sector, 2001

**Chemicals, except Pharmaceuticals**

- United States: 2%
- EU-15: 2%
- Japan: 4%

**Pharmaceutical products**

- United States: 12%
- EU-15: 8%
- Japan: 10%

**Motor vehicles**

- United States: 4%
- EU-15: 3%
- Japan: 4%
R&D intensity by sector, 2001 (2)

ICT manufacturing industries

United States | EU-15 | Japan
---|---|---
5 | 3 | 14%

Computers and office machinery

United States | EU-15 | Japan
---|---|---
15 | 4 | 16%

Radio, TV and telecommunications

United States | EU-15 | Japan
---|---|---
14 | 8 | 14%

Scientific instruments

United States | EU-15 | Japan
---|---|---
19 | 2 | 18%
The United Kingdom and France are among the large European countries in which foreign-controlled R&D is greater than or equal to 40%. The United Kingdom and to a lesser extent France are also probably among the large European countries in which foreign-controlled affiliates receive relatively substantial funding from their parent companies abroad to finance their research in information technologies.
R&D flows between the EU-15, the United States and Japan, 2002

Millions of PPP dollars

USA
Total business sector
193 868

EU
Total business sector
127 802

Japan
Total business sector
80 582

1 452

17 554
12 941
1 541

720
2 239
Conclusions

In a large number of countries, business-sector R&D expenditures have increased, thanks in large part to the R&D spending of affiliates under foreign control. Not enough information is available at this time to be able to assess the impact or the meaning of this acceleration. A first question is whether it involves new R&D laboratories being set up by multinationals in the countries where they do business, or whether existing facilities are simply changing hands, as is generally the case in the realm of production, owing to the spread of mergers and acquisitions.

A second question involves the type of research performed by foreign laboratories in their host countries. Is it limited to a number of development projects to tailor products to local market standards, or does it involve the formulation of new technologies for worldwide use?

Another question is “for whom” the research of foreign affiliates is performed. This report has shown that in some cases foreign affiliates conduct research on behalf of their parent companies abroad, which alone possess exclusive rights to exploit the results. In addition, firms under national control (i.e. controlled by residents) may contract with firms abroad to conduct research intended for other countries.

The impact of the fact that certain US and European R&D laboratories are being set up or relocated in Asia is still difficult to assess. Will this be beneficial for host countries and investing countries alike? How widespread will this trend become in the years ahead? This needs to be put in a broader context in which the United States and Europe, faced with international competition, can rely only on their capacity for technological innovation. From this perspective, the ground lost by the European Union in information technologies and biotechnologies demands major shifts in priorities and the allocation of appropriations for R&D.