

1. Introduction

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THE TOPIC

In a seminal paper on research and development (R&D) in large multinational enterprises (MNEs), Pari Patel and Keith Pavitt concluded in 1991 that the production of technology remains 'far from globalized', but concentrated in the home countries of the enterprises (Patel and Pavitt 1991, p 17). In their words, research and development is 'an important case of non-globalisation'. Patel and Pavitt argued that the technological performance of large firms is inextricably connected with and strongly dependent on the scientific and technological capabilities of universities and other firms in the home country.

About 20 years later, a vast amount of evidence draws a different picture of R&D internationalisation: Enterprises not only produce and sell, but increasingly also develop goods and services outside their home countries, a development that became known as the internationalisation of business R&D in the literature (OECD 2008; Dunning and Lundan 2009; Hall 2010).

Today, it seems to be the rule, rather than the exception, that large European firms perform R&D activities at different locations inside and outside the Single Market. Alike, MNEs from the United States have considerably extended their R&D activities in the European Union, and new players from emerging economies are entering the scene: Brazil, the People's Republic of China (referred to as China in the book), India and other emerging economies have come into focus as host countries for R&D activities of US and European MNEs in recent years.

AIM AND APPROACH OF THIS BOOK

This book presents a comprehensive picture of the current state of the internationalisation of R&D in the business sector. Internationalisation of R&D at universities or public research centres as well as changes in the international mobility of students and researchers are left out. Moreover, there is no discussion of policy issues related to R&D internationalisation in this book. Excellent contributions on this topic are provided by Archibugi and Iam-

marino (1999), UNCTAD (2005), the CREST Working Group (2007), or De Backer and Hatem (2010). Recent surveys of policy initiatives in this field can be found in TAFTIE (2009), Verbeek et al. (2009), and Schwaag Serger and Wise (2010).

The various chapters describe the main patterns in R&D internationalisation across countries and sectors, examine the drivers of the process, and reveal impacts of R&D internationalisation on home and host countries applying both qualitative and quantitative analysis. Complementary case studies give further insights into the process of R&D internationalisation at country and sectoral level pointing towards heterogenous patterns and differences with respect to drivers and impacts.

The book is based on the results of the project ‘Internationalisation of business investments in R&D and analysis of their economic impact’ funded by the European Commission, DG Research and Innovation, over the period 2010-2012 (Contract No. RTD/DirC/C3/2010/SI2.561034). The aim of this project was to build a new and comprehensive database of bilateral data on trans-border R&D expenditure collected from EUROSTAT, the OECD, and national statistics and the analysis of this data. The European Commission has kindly agreed to the publication of the results of this project in this book.

OUTLINE OF THE BOOK

The book starts with a discussion of the motives of firms to locate R&D activities abroad by Bernhard Dachs in Chapter 2. These motives turn out to be diverse, determined by host and home country conditions, specific firm strategies as well as the complexity of many new technologies. Internationalisation is, on the one hand, driven by the aim of multinational firms to exploit their market potential with respect to technologies and products in foreign markets. R&D labs abroad help adapt these technologies and products to host country conditions. On the other hand, firms increasingly also perform more basic R&D abroad, harnessing more beneficial and conducive conditions for R&D in a particular location like the availability of R&D staff, or proximity to universities and firms with superior expertise in a particular field.

Despite the increasing importance of R&D internationalisation, data on the process is still incomplete, inconsistent and therefore sometimes difficult to interpret. In Chapter 3, Georg Zahradnik and Waltraut Urban discuss the most important issues concerning data availability, data quality and problems in international comparability. In a case study, the authors look at data on R&D activities of foreign-owned firms in China for which the data collection and analysis requires particularly careful interpretation.

The term ‘internationalisation’ suggests a trend that encompasses the whole world. However, despite this notion, R&D internationalisation still predominantly takes place between high-income countries and in high-technology sectors. Georg Zahradnik gives an overview of the current state

of R&D internationalisation in Chapter 4. Around half of total non-domestic R&D expenditure of European firms is located within Europe, mostly in neighbouring countries. In a global perspective, the United States and the European Union are the two most important regions in terms of R&D expenditure of foreign-owned firms by far.

However, there is also evidence that R&D internationalisation became more 'global' in recent years, as concentration in terms of locations has decreased and the number of countries and sectors involved in R&D internationalisation has increased. Small European countries and Asian countries benefited from this trend in particular. In Chapter 5, Sandra Leitner, Franziska Kampik and Georg Zahradnik provide supportive evidence for these trends for various countries. Trends at the sectoral level – such as the rising degree of R&D internationalisation in services – are investigated by Georg Zahradnik in Chapter 6. The specific role of the European Union and the United States in the internationalisation of R&D is investigated by Bernhard Dachs in Chapter 7. The internationalisation of R&D creates relationships between countries, which can be investigated with the tools of social network analysis. Thomas Scherngell provides such an analysis in Chapter 8.

Chapters 9 to 12 look at the drivers and impacts of R&D internationalisation. In the econometric analysis of Chapter 9, Sandra Leitner and Robert Stehrer identify country size, quality and size of the workforce and sector level variables such as foreign direct investment (FDI) and domestic R&D intensity as the main determinants of inward business enterprise R&D (BERD) at country level. In addition, case study evidence points to the existence of a number of drivers which seem to be specific to bilateral relations between countries, sectoral characteristics and even specific to individual firm strategies – such as foreign take-overs, long-term specialisation patterns of countries, or agglomeration effects. As an example, Bernhard Dachs and Doris Hanzl present evidence for such drivers from the automotive industry and knowledge-intensive business services in Chapter 10.

The internationalisation of R&D gained a lot of attention in economic policy discussions in recent years, fuelled by fears of the negative consequences of 'R&D offshoring' on domestic R&D efforts and capabilities. Sandra Leitner and Robert Stehrer investigate these and other potential impacts of R&D internationalisation on the home countries in Chapter 11, generally pointing towards mutually beneficial effects of R&D internationalisation. The empirical evidence suggests that policy makers need not be too worried: econometric evidence suggests that R&D expenditure and labour productivity of foreign affiliates is positively related to labour productivity of domestic firms which indicates spillovers between the two groups. Moreover, the results of Chapter 11 indicate that R&D activities of domestic firms abroad are not substituting similar activities at home.

With respect to impacts, Rajnish Tiwari presents the case of R&D activities of German firms in India and investigates how these activities are connected to R&D in Germany (Chapter 12). The second part of this contribution takes the opposite perspective and discusses R&D activities of Indian firms in Germany and their role in the R&D strategies of their parent companies.

In the final chapter of the book, Bernhard Dachs asks in which way the global financial crisis of 2008/09 has shaped the internationalisation of R&D. Though evidence is still scarce, it seems that the crisis has slowed down R&D internationalisation, but has not changed the main trends of the process.

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