R&D&I and firms' internationalization: Introduction to the special issue

by

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1. R&D&I and firms' internationalization

Over the last two decades, the offshoring of manufactures has taken a back seat to that of services. Reasons behind the rise of service offshoring are the liberalization of trade, economic and regulatory reforms, technological advances in communication and digitalization, and the new commercialization of certain goods. Nowadays, an important proportion of exchanges of knowledge-intensive services corresponds to the offshoring of research, development and innovation (R&D&I) activities, which are decisive for the economic growth and development of countries. In this respect, the March 2005 OECD Forum on the Internationalization of R&D already recognized the internationalization of R&D as a crucial feature of globalization with a major impact on economic development and public policy.

Globalization and the spread of information technologies have influenced the creation of innovation networks (Freeman 1991). For example, aerospace companies obtain some pieces from very specialized foreign providers; manufacturers of food and industrial ingredients buy research studies on dietary habits from external companies in order to meet the requirements of their overseas customers; cars integrate software from other companies to download maps, directions, or music (The Economist Intelligent Unit 2007). Technological sourcing and the delocalization of innovative activities is an important strategy for companies because it can offer the possibility to buy the best available technology (Baumol 2001; Grimpe and Kaiser 2010; Bertrand and Mol 2012).

From a firm's point of view, the internationalization of R&D activities implies substantial potential benefits: a more cost-efficient innovation process, better ability to learn about R&D conducted by other companies/institutions, a quicker road to commercialization, and a positive impact on the firm's own innovation capacity (OCDE 2008). In this analysis, large multinational enterprises (MNEs) are key actors because they benefit from knowledge generated in other countries by both domestic firms and foreign subsidiaries, which are in many instances worldwide centres of knowledge. In addition to MNEs, an important part of R&D offshoring is undertaken by independent-domestic firms with a very different decisional context.

The internationalization of R&D&I is also part of the broader process of firms' internationalization, which includes exporting activities or cooperative agreements with foreign suppliers, customers and even competitors. The recent economic crisis along with the intensified global competition has forced companies to accelerate the internationalization of R&D&I. As a consequence, from a public policy perspective, the globalization of R&D&I has led to the reformulation of national innovation and industrial policies, which have to coexist in global markets with policies developed by supra-national institutions.

The purpose of this special issue is to provide new empirical evidence on the increasing phenomenon of globalization of R&D&I. The special issue has collected articles on trends in the internationalization of firms' R&D&I strategies, as well as its implications on firms' performance. There is a special focus on the role of Multinationals (MNEs) due to their internationalized structure.

2. Outline of the Special Issue

This special issue contains six articles that are structured around two main topics: 1) the determinants and effects of internationalizing firms' innovation strategies; and 2) the technology sourcing of multinationals.

The first group of papers includes three empirical studies that have in common the use of firm-level data, but that differ in the technological strategy that constitutes the focus of the analysis.

Gavin Murphy and Iulia Siedschlag put the emphasis on the determinants of R&D offshoring relative to offshoring other business functions. For a sample of Irish companies, they find that large, productive firms and those with advanced information technology services (ICT) are more likely to offshore their R&D services. Their results also suggest that firms' exporting status and foreign ownership influence imports of R&D, probably because more internationalized and larger firms find R&D offshoring more profitable than smaller and domestic firms. In addition, comparing the estimates for determinants of offshoring other business functions, they obtain that, with the exception of foreign-ownership, determinants of R&D offshoring differ from those for offshoring of support business functions such as distribution, marketing, ICT and administration. In contrast, offshoring of R&D is found to be a similar strategic choice as offshoring core business and engineering activities, although offshoring of R&D is less likely than offshoring of core business activities, which would suggest the relatively more strategic importance of R&D activities.

The results of **Dolores Añón-Higón, Juan A. Máñez and Juan A. Sanchis-Llopis** also provide evidence on a positive association between internationalisation and R&D activities. These authors specifically investigate the complementarity or

substitutability between intramural and external R&D (including domestically contracted R&D and imports of technology). While most literature on the complementarity between innovation strategies focuses on innovation performance, this study analyses the impact of these strategies on total factor productivity (TFP). Using information from a sample of Spanish manufacturing firms, the authors take advantage of the panel structure of the data to obtain robust estimates of TFP through a GMM approach where the innovation strategies carried out by firms are accounted. In the analysis they also distinguish between firms with different level of internationalization engagement. Their results indicate that there are synergies between intramural and external R&D that depend on firm size and industry characteristics. Large firms and those in high-tech sectors find intramural and external R&D complements to increase total factor productivity. In contrast, for small firms, intramural and external R&D seem to undermine each other. In addition, regardless of the size of the firm, only exporters obtain a positive effect on TFP due to the engagement in R&D activities.

Following the above line of argumentation, namely the positive relationship between internationalization and technological activities, **Pilar Beneito, María Engracia Rochina-Barrachina and Amparo Sanchis** study firms' decision to patent in foreign patent offices as against the decision to patent domestically. Using data for Spanish patenting firms, they distinguish between market-driven and innovation-type determinants. They find that both types of factors are important to patent abroad. Specifically, their results suggest that international trade has an important influence on patenting abroad. International patenting seems more oriented towards market enlargement than to accessing new markets. Moreover, regarding innovation-type factors, they obtain that firms are more prone to patent abroad the higher the scope and

quality of the innovations they seek to protect. In particular, the skill-intensity of the R&D working force is found to be a key determinant for international patenting.

An important take-away from the three articles in this first group of papers is that policy makers and governmental agencies should simultaneously design internationalization and innovation policies and consider the interrelations between each other.

The second group of articles in this special issue devotes the attention to the technology sourcing of multinationals. Therefore, they have one characteristic in common: providing new empirical evidence on MNEs' technology transfers, although in different geographical environments (Italy, China, OECD countries, South East Asian and Latin American economies).

Among the different sources of knowledge, **Claudio Cozza, Giulio Perani and Antonello Zanfei** specifically focus on R&D cooperation. Using information of a novel dataset of Italian firms, these authors are able to compare the cooperative behaviour of firms belonging to foreign owned groups with the one of firms belonging to domestic owned multinational groups and non-MNEs. They find that the probability of cooperating domestically is higher for domestic MNEs than for foreign owned MNEs, while these latter have the same propensity to R&D cooperate with local companies than non-MNEs. This result suggests that the superior technology and economies of common governance of foreign MNEs are more than compensated by the extra-costs and risks of dealing with a relatively unfamiliar context. On the contrary, foreign MNEs show the highest propensity to collaborate abroad, while domestic owned MNEs exhibit a lower premium. From these results the authors conclude that it is not foreignness but the specific combination of advantages and disadvantages of multinationality that explain R&D cooperation with both local and international partners.

Si Zhang, Shasha Zhao, Ioannis Bournakis, Robert Pearce and Marina Papanastassiou investigate the link between market seeking, efficiency seeking and knowledge seeking subsidiary roles and their sources of technology in the host country for a sample of subsidiaries of MNEs operating in the emerging economy of China. They argue that, while foreign subsidiaries located in emerging economies were conventionally viewed as having market or efficiency seeking roles, they have started to evolve towards knowledge-seeking roles, and this situation is expected to be reflected in the relative importance that they assign to knowledge sources. To test their hypotheses they use a two stage instrumental variable approach that takes into account the potential existence of an endogeneity issue, as available technology sources can also affect the type of a subsidiary primary role. Their results provide evidence that MNEs' knowledge seeking in China increases the relevance of locally available sources of technology, including the R&D carried out in collaboration with local firms.

Focusing as well on MNEs, the article by **Giovanni Cerulli, Bianca Potí and Raffaele Spallone** contributes to the increasing literature assessing the impact of public support to business R&D. These authors study the effect of R&D tax incentives on inward R&D investments of MNEs (R&D investments by foreign owned firms). This contribution is especially interesting because the number of papers that use MNEs' R&D investments at sectoral and country level as dependent variable is very scarce, probably due to the low availability of this information in public databases. In this paper, the authors take advantage of a novel dataset collected in a recent European Commission project on R&D internationalization. Through the estimation of a dose-response function with continuous treatment, they find a relatively low sensitivity of Inward BERD to the specific R&D fiscal regime, except for the case of a high and costly incentive. Other drivers seem to be more appropriate to attract MNEs Inward

BERD: the corporate income tax regime and the knowledge resources available in a country. This last element is consistent with what one would expect in the case of resource-seeking investments.

Obviously, the articles in this issue also point out many challenges that still remain for future research:

As for the effect of firms' international R&D&I strategies, further studies should examine more in depth whether R&D offshoring and offshoring of other business activities are complementary or substitutes for innovation and productivity performance.

Regarding MNEs technology transfers, much more analysis is needed about the interaction between subsidiary roles and the different sources of knowledge at host countries, and about the relationship between subsidiary roles and the co-location of production and R&D in order to better understand the positioning of emerging economies in the global innovation map. New data on the institutional peculiarities of host countries and the sources of MNEs' heterogeneity would also allow qualifying the different technological spillovers of MNEs' FDI.

And, in the field of impact assessment of public aid for business R&D, future analysis should take into account the particular elements of R&D fiscal regimes and the cost-effectiveness of R&D fiscal schemes in mobilizing private resources. Additionally, there is still a scarcity of studies quantifying the long-term effects of R&D fiscal policies. This would help to understand the role of fiscal competition among countries to attract FDI.

3. A Tribute to Professor Robert Pearce

In this special issue we want to pay a tribute to Professor Robert Pearce, who passed away on 30 April 2018, and whose contribution in the area of innovation strategies by MNEs and their subsidiaries has been defining the last 50 years.

For this reason, we reproduce here an edited version of the obituary to honour him written by Mark Casson and Marina Papanastassiou (co-author of Robert Pearce's contribution in this special issue) published online at Henley's Business School site:

Robert Desmond Pearce (1947-2018), known as 'Bob' to his friends and colleagues, joined the University of Reading in 1963 as a student in the Faculty of Humanities and Social Sciences. In 1964 John Dunning was appointed Professor of Economics and Head of the Faculty's newly-established Department of Economics. Upon his graduation in 1966 Bob was appointed by John as Research Assistant to work on international business research projects. Bob was a master of data and their sources, and he co-authored with John a ground-breaking volume on the world's largest firms. Bob thought:" Why leave if you can do everything you want at Reading? And he never left.

Bob was one of the founding members of the Reading School of International Business. He helped to lay the foundations for a school of thought that has defined the discipline of international business and turned the University of Reading and the Henley Business School into a buzzing community of distinctive scholars.

Bob's contribution is mainly in the understanding of the evolution of the internationalization of R&D and innovation by MNEs and specifically through the subsidiaries and their roles. Seminal in this context is his 1989 book on the Internationalization of R&D by MNEs where he introduced concepts and empirics that became a much more mainstream area of analysis from the late 1990s onward. Crucial

in this analysis was the differentiating roles of foreign subsidiaries and how these had an impact on the scope of overseas R&D. Bob was thus among the first scholars that studied this phenomenon which dominates today the literature through the concepts of NIS, embeddedness, reverse technology transfer and innovation, among others.

His 1992 book on Globalising R&D with Satwinder Singh cements his innovative contribution to a very fresh and new (at that time) area of research. Many publications followed in all the leading IB and R&D/innovation journals with senior colleagues, junior faculty his PhD students and students of his PhD students.

His final (2017) book on the Development of International Business: A Narrative of theory and Practice embodies the wisdom of 52 years of research in the field.

Bob was a staunch supporter of John Dunning's 'eclectic theory', and after John's untimely death became its principal exponent. Ever since his undergraduate days Bob had been committed to promoting the economic development of poorer countries, and through his study of international business he realized the crucial role that multinationals played in transferring technology to these countries. The key to economic development, Bob maintained, was to give the local subsidiaries of these firms the autonomy to adapt the firm's technology to local conditions and turn the developing countries into export hubs, serving entire continents and even the whole world.

Bob's legacy as an advisor and mentor was among others to publish where is relevant and when is relevant, to be creative, and to own the work. Last but not least was to respect and credit colleagues that have an impact on our work. Bob himself achieved great distinction, although it has to be said that his modesty, and his propensity to share the credit with others, was at variance with the more competitive behaviour of many other academics.

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