

The Relationship between Technological Advantages of Nations and Overseas R&D Activities

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This paper purports to examine the relationship between comparative advantages in innovative activities and corporate technological knowledge sourcing via overseas R&D activities. By doing this, we try to have an idea on how firms can overcome the mismatch between technological resources at home and technological demand of firms. Technological advantages and disadvantages of nations are examined by an index of Revealed Technological Advantage (RTA) by using the 1963-2005 US patent grant data. Here, we give a particular focus on Japanese multinationals and their host countries, and see if their patenting activities can be enhanced by overseas R&D at locations with rich technological resources.

The technological resources possessed by a country are gradually developed following its national innovation system. Therefore, they have the nature of path dependency, thus cannot be changed within a short period of time. From this reason, the pattern of technological specialization of each country is unique, and by examining this, we can learn in which technological fields the country has a comparative advantage in innovative activities. Furthermore, technological capabilities of firms are also strongly affected by the innovation system and the pattern of technological specialization at home. However, in order to maintain its international competitiveness, firms are required to catch up the state-of-the-art technology developed by the global technology leader regardless the geographical location. If the technology a firm requires matches with the home technological resources, the firm can either develop it in-house by hiring domestic R&D resources or form an alliance with domestic partners. In other words, it can source the technological knowledge they require from domestic resources. However, in many cases, there exists a mismatch between what the home has and what the firm wants. This can become a serious problem, particularly in sectors where technological change is rapid.

In this paper, we firstly examine in which technological fields countries possess technological advantages and disadvantages. In order to see the pattern of technological specialization across technological fields at country level, we calculate an index of the Revealed Technological Advantages (RTA) for representative countries by using the US utility patent data from 1963 to 2005. This index is originally based on an index of Revealed Comparative Advantages for international trade (Balassa, 1965), then applied to comparative advantages in innovative activities by Soete (1980). In terms of Japanese firms, high RTA is observed for technological fields such as information storage, stock materials, precision instruments, electricity, superconductor tech, and nanotechnology. On the other hand, relatively low RTA is observed for life sciences and testing methods, and body treatment care.

Given the indices, we give a particular focus on innovative activities of Japanese firms and see if overseas R&D activities in host countries with rich technological resources can contribute to more active patenting.

