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Determinants of location of overseas R&D activity of multinational enterprises: the case of US and Japanese corporations [1]

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Abstract

This paper analyzes the determinants of location of overseas R&D activity of US and Japanese multinational enterprises (MNEs) in a three-dimensional setting. Large domestic market, the abundance of low cost R&D manpower, and the scale of national technological effort favour the location of overseas R&D in a country. Tests covering sectoral composition support the proposition that a significant proportion of MNEs' R&D activity follows that of leaders in their own fields. Lack of adequate patent protection or restrictive trade regime does not affect the attractiveness of a country otherwise well-suited for R&D activity. Internationalization of R&D activity of Japanese MNEs is confined to relatively low technology-intensive industries compared to US MNEs.

JEL classification: F23; O32
Keywords: Overseas R&D; Multinational enterprises (MNEs); US MNEs; Japanese MNEs

1. Introduction

Although R&D is the least internationalized of multinational enterprises' (MNEs') activities (Patel and Pavitt, 1991), affiliates of foreign MNEs have begun to account for a considerable proportion of domestic innovative activity in a number of countries. Dunning (1994) has noted that the share of MNE affiliates in national R&D expenditure exceeded 15% in Australia, Belgium, Canada, the UK, Germany, South Korea and Singapore in the 1980s. In the US, 16.4% of all R&D in industry was conducted by foreign affiliates in 1992, compared to 9.4% in 1982 (US OTA, 1994). In view of considerable spillovers of R&D activity, its internationalization is seen to be contributing to technological capability in host countries.

The overseas R&D expenditure of MNEs is, however, highly concentrated in a handful of technologically advanced countries. The inter-country pattern of location of R&D is expected to be uneven depending upon the availability of R&D infrastructure and resources and policy framework. This paper analyzes the factors that may be affecting the loca-

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tion of overseas innovative activity of US and Japanese MNEs across the countries in a three-dimensional setting with the help of an exclusive database viz., GLOB-TED Database.

The analysis is organized as follows. Section 2 briefly outlines the trends and patterns in the overseas R&D activity of MNEs particularly those from the US and Japan. Section 3 reviews literature on determinants of location of overseas R&D. Section 4 develops a framework for explaining the location of overseas R&D. Section 5 presents estimation results and draws the inferences. Section 6 concludes it with a recapitulation of major findings and their implications.

2. Internationalization of R&D activity of MNEs: trends and patterns

MNE decision making with respect to the location of R&D is determined by a balancing of factors: those that encourage concentration at headquarters, i.e., centripetal forces or others that favour location abroad in other words, centrifugal forces (Granstrand et al., 1992: p. 6). The economies of scale in innovative activities, agglomeration economies, a need to protect firm-specific technology, or to save on the costs of coordination of R&D units located in different countries — all tend to encourage a concentration of R&D in the home country. The internationalization of the R&D of firms may be motivated by one or more of the following three broad reasons. First and foremost, to support their foreign production by adaptations, some of these being best undertaken closer to the specific markets for which they are meant for, e.g., adaptations of consumer goods to the local cultural environment. The second motivation for overseas R&D could be to rationalize it according to cost considerations. Availability of abundant trained R&D personnel or other resources required for technological activities at relatively lower cost than in the home country may prompt MNEs to shift a part of their R&D activity to such locations to reduce their global R&D costs. It may also include rationalization of development of certain products and processes at an overseas R&D unit in view of economies of scope or scale. Finally, MNEs also locate R&D in other countries advanced in their own fields to benefit from the localized knowledge spillovers or simply to keep track of the activities of their competitors. The examples of this type of R&D include: investment in R&D or in high technology start up enterprises in biotechnologies and microelectronics in the US by European and Japanese enterprises; the US chemical enterprise investment in R&D in Germany; and European and US companies investing in semiconductor development in Japan.

Alternative terminologies are evolving for describing different motivations for overseas R&D. Granstrand et al. (1992) use the demand-oriented forces to capture the technical support laboratories set up abroad or those forced by host government regulations. Among the supply-oriented forces they cover the R&D units set up abroad to tap into scientific infrastructure of other countries, to save on costs because of availability of cheaper manpower, and to benefit from the R&D subsidies provided by the host governments. Kuemmerle (1996) uses 'home-base exploiting R&D (HBE)' to denote overseas R&D activity undertaken to adapt home-based innovations to host country markets, and 'home base augmenting (HBA)' to refer to overseas R&D activity that is motivated to tap the capabilities available in host countries.

Although the importance of overseas R&D as a proportion of the total R&D activity of corporations has grown over time, it continues to be the least globalized of MNEs' value adding activities even in the most internationalized industries. The surveys conducted by the US Department of Commerce and the Office of Technology Assessment confirm that the leading edge R&D in the core technologies of corporations is still performed in home countries while research towards customization and foreign production support is gradually conducted locally as affiliates become more deeply integrated into local markets (see Dalton and Serapio, 1995; and US OTA, 1994). Similarly, a survey conducted by Japanese Science and Technology Agency on private enterprises' R&D showed that a predominant proportion of the R&D located abroad was motivated to meet local needs or to help upgrade existing production facilities in the host country. However, over 40% of the Japanese firms setting up R&D in the US and Western Europe had been motivated by the