

R&D Boundaries of the Firm and the Intellectual Property System

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Abstract

The boundaries of the firm are an important issue in relation not just with the make-or-buy decision in production but also with research and development (R&D). Firms may depend on universities to gain scientific knowledge. They may also outsource some of their R&D works from other firms, purchase patented technologies, commission research, and participate in joint R&D. In this paper, we discuss these various methods of technology acquisitions and technology alliances, and discuss two major theories to explain the determinants of boundaries on whether to conduct a certain R&D task inside or procure it from outside. They are the transaction-cost theory and the capability theory. Shortly speaking, the former suggests that the larger the transaction costs, the more of R&D will be conducted inside. One determinant of the transaction costs is the extent of appropriability by means of intellectual property rights (IPR), such as patents. The capability theory suggests that whether the firm conducts an R&D task inside or outside depends on relative capabilities between the firm and the partners.

The results of two empirical analyses are summarized. The first is an econometric analysis using the micro-level data of the Japanese manufacturing firms. It shows that more alliances are made in industries in which appropriability by patents is higher. The second is a survey study against biotechnology-related firms in Japan, which indicates that the firms make alliances primarily to take advantages of (non-patentable) technological capabilities of the partners. On the other hand, they tend to avoid making an alliance when its outcome, they fear, cannot be fully appropriated.