Chapter 4
Firm Performance and Research and Development

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ABSTRACT

The objective of this chapter is to analyze the impact of research and development activities on the profitability of oligopolistic firms. The analysis is conducted in a two-stage, game-theoretic model of duopolistic competition. In the first stage, firms decide about the size of R&D investments, and in the second stage, they decide about the supply of the final product. On the one hand, different levels of research externalities are considered. And, on the other hand, three types of firms’ behavior in the final-product market are analyzed: Cournot competition, Stackelberg competition, and cooperation within a cartel. The numerical analysis shows that the full cartelization of the industry generates the highest profits for both firms, independent of the size of technological spillovers. In the non-cartelized industry the performance of the Stackelberg leader is better in comparison to the Cournot firm, when the extent of research externalities is not too high.

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INTRODUCTION

Research and development activities of firms are significantly interrelated. Any technological or organizational improvements introduced by one firm usually create positive spillovers for the entire industry (see, e.g., Bloom et al., 2013, or Geroski, 1995). The extent of cost-reducing technological externalities may vary due to the type of knowledge, or due to the strategic decisions of companies (see, for example, Spence, 1984). On the one hand, some information about technological improvements is naturally spread out through the industry. On the other hand, the firms by establishing some channels of research cooperation may stimulate the extent of knowledge spillovers.

The extent of spillovers is maximized when the companies create a research joint venture, which allows for a complete mutual transfer of technological improvements. Research joint ventures may help eliminate duplication of R&D activities and allow for technological advancements at the lower investment costs. The formation of a research joint venture, or the existence of a less formal channels of transferring knowledge and experience does not determine the size of efficiency-enhancing investment spendings of individual firms. Companies may decide about the size of their expenditures in a noncoordinated way, or they could jointly set the level of research outlays by forming a cartel at the research and development stage.

The costs of research and development activities are often very high, therefore various forms of cooperation in this respect could be beneficial to the industry participants (compare, e.g., Camagni, 1993, or Kaiser, 2002). Research cooperation in the private sector could potentially improve overall economic welfare resulting from technological progress. Based on that presumption, the governments of many countries, including the U.S. and the EU members, have provided financial support for the R&D cooperation of companies (see, for example, Horvath, 2001).

In addition to the research and development activities, the firm performance in a given industry depends, also, on the type of competition in the market for the final product. Kamien et al. (1992) point out that firms may directly cooperate in the development of new products or technologies, even though they could later on compete in the final-product market. Especially in the oligopolistic market, the competing firms have an option to cooperate in the R&D investments, as well as in the supply of the final product. The degree of R&D coordination and the type of competition among firms affect the final performance of market participants.
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