A firm that invests in research and development has the opportunity to reap a reward using the innovation or licensing it. If the innovator is a research laboratory or a university, it recovers the investment by licensing the new technology to firms operating in the market. If the innovator is a private firm, it can decide to license its technology to its competitors by generating licensing revenues. Different types of licensing contracts are available: auction (if the innovation is licensed to a limited number of firms through a bid auction), fee licensing (offering a lump-sum licensing fee), royalty licensing (offering a royalty payment for every unit produced by the licensee) or two part tariff (a mix of a fixed amount and a variable part). The best model for the purpose of this analysis is the third one, (Royalty licensing), as it takes into account the wide objective of profit maximization. During the last couple of decades, economists began to take in consideration that the modern corporation is characterized by a separation of ownership and management: the new objective function begins to focus on managerial objectives. In this setting the owner-manager relationship is very important and it is a standard principal-agent problem where the manager’s objective function is linked to the structure of incentives designed by the owner to motivate him.

Managers are called to make decisions on the product market on the basis of a delegation chosen optimally by owners who pursue profit maximization objectives. The delegation gives each manager the ability to act on the market by maximizing sales (or another variable) of interest to the manager (rather than profits) in a certain measure.

MUDERI (1999).

It studies technology transfer of a cost-reducing innovation in a duopoly where the innovator is the leader in the market. In the first stage of the game the innovator decides to license its new technology to its competitor through fixed fee and in the second stage each firm decides whether to hire a manager or not. If owner assumes both the choice of the manager’s objective function (in the third stage), managers face Cournot competition and decide how much to produce in the fourth stage. It studies the probability of licensing with fixed fee for the different values of $\gamma$, assuming that this cost is the same for both firms:
- if the costs of hiring a manager are prohibitive, neither firm hires a manager.
- if the costs of delegation are negligible, the probability of technology transfer is minimal compared and less than in the no incentive delegation model:
- if $\gamma$ is significant, but not so costly that neither firm prefers to hire a manager (the equivalent in case of no-licensing is $[0,1]$), while $(0,0)$ is the equilibrium in case of no-licensing, the innovation is always profitable.

 Objectives:

We use a three stage game to study the influence of strategic delegation on the probability that a patent-holding (a competitor in the market or an outsider innovator) decides to license or not to license its new innovation to others firms. The analysis is carried out under the assumption that strategic delegation reduces the number of licensees to which the patent-holder would be zero in the case of non-licensing, royalty is equivalent to auction (also fixed fee because if the profit of the licensee would be zero in the case of non-licensing) and the non-licensing case of the fence licence.

We prove that royalty can dominate auction (also fixed fee because if the profit of the licensee would be zero in the case of non-licensing) and we show that royalty is more profitable than fixed fee if the number of potential licensees is small enough. In this way it shows that when the patentee likes with fixed fee, strategic delegation slows down the diffusion of the innovation. In this work, it is assumed that the cost of hiring a manager $c_i$ is zero

We consider different types of delegation: no delegation, mixed delegation and competitive delegation. We study the role of the manager on the product market

CASE 1: PRODUCT INNOVATION WITH AN INTERNAL PATENT-HOLDER

We analyze a duopoly with a differentiated product where one of the two firms has a product innovation that can decide to license it to the other, or to choose the role of a patent owner. We adopt a duopoly where the two firms have the same costs to decide to license or not to license in the first stage of the game. We carry out an analysis of case of Cournot and Bertrand competition.

We study the influence of strategic delegation in case of no drastic innovation in case of strategic delegation and in case of non-delegation (Wang-Yang, 1999), as follows:

- With strategic delegation
  $\gamma < 0.672$
- Without strategic delegation
  $\gamma < 0.611$

We analyze a model of duopoly in which one of the two firms invests in research and development and has a process innovation that allows it to reduce the cost of production of the final good: in this setting we work under the hypothesis of non-drastic innovation (the magnitude of the innovation is not so large that the firm reaps most of the benefits of the innovation) and we consider different types of delegation: no delegation, mixed delegation and competitive delegation. We study the role of the manager on the product market

CASE 2: PROCESS INNOVATION WITH AN INTERNAL PATENT-HOLDER

We analyze a model of duopoly in which one of the two firms invests in research and development and has a process innovation that allows it to reduce the cost of production of the final good: in this setting we work under the hypothesis of non-drastic innovation (the magnitude of the innovation is not so large that the firm reaps most of the benefits of the innovation) and we consider different types of delegation: no delegation, mixed delegation and competitive delegation. We study the role of the manager on the product market

CASE 3: PRODUCT INNOVATION WITH AN EXTERNAL PATENT-HOLDER

We consider the case of a firm that invests in research and develops a new product that can license to external licensees that adopt strategic delegation (where a company has the option to use its new technology and to license it to other firms). We study the licence fees of licensing with fixed fee, auction, and mixed fee.

In case of strategic delegation, the optimal choice of the number of firms to which the patent-holding licenses the innovation in case of strategic delegation and without delegation (Bagli, Mahyar, 2013).

We have shown that in the case of Bertrand competition strategic delegation increases the probability that licensing occurs, while in case of Cournot competition the delegation reduces the probability that licensing takes place. This is strongly related to the different behavior of owners in the two types of competition: if firm competes with Bertrand, the owners discourage managers to behave aggressively on the market through an overcompensation of profits, while in the case of Cournot competition managers are encouraged to be aggressive on the market.

We consider the simplest model of product innovation with a patentee that is a competitor on the market and licenses with fixed fee (case 1). In case of Cournot competition, hiring a manager ensures that firms in equilibrium have lower profits than in both case of non-delegation and case of optimal delegation, the marginal profit, of the managers is to maximize revenues) the total quantity produced on the market increases but the profits reduce. The owners incentive managers to be more aggressive through the parameters $\gamma_i$ and $\alpha$. Instead in case of Cournot competition if the innovator licenses with fixed fee, strategic delegation raises the probability of licensing its technology. In the case of Bertrand competition, the owners of the firms for the parameters knowing that in the next stage of the game the manager will compete with the price. They set $\gamma_i$ and $\alpha$ not making sure that the managers don’t behave in an aggressive way: they know that the growth in the price generates an increase in the price of the rival, they motivate managers to behave in a less aggressive way through an overcompensation of profits, this is equivalent to the number of firms to which the patentee licenses the innovation (in this setting, it is equal to market profit because in case of no licensing the rival isn’t on the market).

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