



## On R&D information sharing and merger

Uday Bhanu Sinha\*

Department of Economics, Delhi School of Economics, University of Delhi, Delhi – 110 007, India

### ARTICLE INFO

#### Article history:

Accepted 15 February 2013

#### JEL classification:

L12  
L13  
L41  
O32

#### Keywords:

Information sharing  
Trade association  
Market size  
R&D  
Merger  
Welfare

### ABSTRACT

The paper deals with the interaction of sharing cost information and merger in a Cournot duopoly. We show that an innovating firm would share information about the cost realization with its rival provided the market size is relatively small or, the R&D technology is relatively more efficient in a medium market size. However, in a large market, or in a medium market size with less efficient R&D technology, the innovating firm does not share information with its rival. In equilibrium whether information sharing occurs or not, merger is always formed. We find that the social welfare may be higher under incomplete information regime. We also establish the role of trade association in facilitating merger through information exchange.

© 2013 Elsevier B.V. All rights reserved.

### 1. Introduction

This paper examines the incentives of an innovating firm to share cost information with its rival in a Cournot duopoly. We consider the following game. First, an innovator decides whether to commit to share information about the outcome of a future R&D project that only it can undertake. Second, the R&D project is undertaken and the outcome is observed by the innovator. Information is shared depending on the commitment made in the first stage of the game. Third, the rival firm makes an offer of merger. If the firms merge they constitute a monopoly; otherwise they compete in a Cournot duopoly. In this setup we ask whether the innovator shares the cost information with its rival and analyze the implications for merger, R&D investment and social welfare.

Sharing of private information in oligopoly is an interesting area of research in industrial organization theory (Gal-or, 1986, 1987; Li, 1985; Novshek and Sonnenschein, 1982; Shapiro, 1986; Vives, 1990 etc.). In particular, Gal-or (1986), Li (1985) and Shapiro (1986) concentrated on the Cournot competition characterized by private information about the cost parameters and they find that there exists expected gain associated with the regime of information sharing as compared to a situation of incomplete information. On the other hand, Jensen (1993) showed with an example that this standard result on sharing cost information would change when an uncertain innovation can be

drastic. The literature closest to our paper is by Stenbacka (1991) and Wong and Tse (1997). Stenbacka (1991) added another dimension to the information sharing literature by analyzing the issue of R&D when the innovating firm anticipates a merger. In Stenbacka's (1991) paper R&D outcome is private information of the innovating firm and it was established that for the innovating firm no information sharing is a better strategy. Wong and Tse (1997) clarified the Stenbacka's result and argue that though the innovating firm is better off by not sharing its private information the investment in cost reduction is not necessarily higher in no information sharing regime and it may be sensitive to the level of technological spillover from the innovating firm to its rival.

The main point of the paper is to show that the above result on information sharing is sensitive to the bargaining power at the merger stage. First, we show that the change in the bargaining power modifies the results by Stenbacka (1991) and Wong and Tse (1997). We also find that the innovating firm's decision to share information about the cost realization with its rival depends on the market size and the efficiency of R&D technology. The innovating firm ex-ante commits to share information about the outcome of its R&D with its rival provided the market size is relatively small and it does not share information at all if the market size is very large. However, for medium market size, the innovating firm likes to share information when the R&D technology is relatively efficient and it does not share information when the R&D technology is less efficient. There is underinvestment in R&D under both complete and incomplete information regimes as compared to the social optimum. The society is better off under information sharing than without it when the market size is small or when the R&D technology is more

\* Fax: +91 11 2766 7159.

E-mail address: [sinhaulday@yahoo.com](mailto:sinhaulday@yahoo.com).

efficient in a medium market size. Interestingly, the social welfare would be higher under incomplete information regime when the market size is very large or when the R&D technology is very inefficient in a medium market size.

Sharing information credibly is always a problem in the literature on information sharing, however, typically the trade associations act as the forum for information exchange between firms. There are anti-trust policy concerns due to the existence of trade association in different industries (see Kühn and Vives, 1995). Trade associations by sharing information might help the merger process. In both Stenbacka (1991) and Wong and Tse (1997) the innovating firm never likes to share information and merger takes place even without information sharing. Thus, in their papers trade association plays no role either in information exchange or in merger. On the contrary, in our model without information sharing merger may not occur in some situations. However, the existence of trade association by facilitating the information sharing may actually help to form the merger between two firms. This finding is significant from the perspective of the competition policy. There are concerns in many countries that trade associations coordinate some anti-competitive practices such as price fixing, mergers etc. The implication with respect to relative size of the market is important and thus, the anti-competitive concern is more pronounced for smaller countries. Thus, our paper provides some insight into the role of trade associations in information exchange which facilitates merger.

In the current era of globalization many foreign firms consider the option of merger or acquisition of a local firm as an important mode of entry into a new market.<sup>1</sup> Horn and Persson (2001) pointed out that more than half of the foreign firms' investment occurs in the form of mergers and acquisitions. The foreign firms are typically more R&D intensive, so they often develop a better technology before entering into a host country. The costs of the foreign firms are private information also. The actual process of acquisition is very complex given the rules and regulations of a host country and the policy towards foreign investment varies across countries and as well as across industries in any country. However, most of the theoretical models focusing on such acquisition process are developed in terms of a game structure where the bargaining power is bestowed with the foreign firm entering into a domestic market (Eicher and Kang, 2005; Mattoo et al., 2004 to name a few). However, some theoretical works have acknowledged the existence of partial bargaining power with the host firm as well and typically they have taken Nash bargaining outcome as the solution for their analysis (Markusen and Stähler, 2011; Mukherjee, 2004 etc.). There is an increasing trend that the bargaining power of the multinational foreign firms are weakening due to competition between them and also when the entry occurs for the domestic market rather than for export-oriented investment. It is also recognized in the literature that multinational firms entering through cross-border acquisitions might be involved in a bidding competition for a target which increases the acquisition price (Horn and Persson, 2001; Norbäck and Persson, 2004). Also Qiu and Wang (2011) considered how the government's FDI policy affects the profit obtained by the foreign acquirer. However, in reality it is being observed that the governments in developing and emerging economies try to strengthen the bargaining power of their host firms for transactions with their foreign partners. It is now well documented that China uses its advantage of large domestic market and cheap labor in dictating terms to

the multinational corporations. Our theoretical model has a special relevance for analyzing the mergers and acquisition process in situations where the host firm has bargaining power in dictating terms of the transactions.

The rest of the paper is organized according to the following scheme. Section 2 describes the basic framework of our analysis. Section 3 discusses the choice of information sharing regime and the associated R&D investment. Welfare comparison is done in Section 4. Section 5 concludes the paper.

## 2. The basic framework

We closely follow the model developed by Stenbacka (1991). Consider the following linear inverse demand function:  $P = a - Q$ , where  $P$  is the price of the good,  $a$  is a positive constant and  $Q$  is the industry output. There are two firms: call them firm 1 and firm 2. Both firms are risk neutral and to begin with they have a common constant marginal cost  $\bar{c}$ . Firm 1 has monopoly access to an R&D project, if undertaken this might reduce its marginal cost from  $\bar{c}$  to zero with probability  $p \in [0, 1]$ . Thus, firm 1 fails to innovate the technology with probability  $(1 - p)$ . The cost of R&D for the success probability  $p$  is  $Kp^2$ , where  $K$  is a positive constant. The parameter  $K$  represents the efficiency of R&D technology as higher  $K$  represents that for a given probability of success the innovator has to invest more on R&D. In order to have an interior probability value, we need to impose restriction on the value of  $K$ , which we would do later. When firm 1 undertakes R&D investment, it anticipates the merger possibility after the realization of the R&D outcome. The exact realization of the R&D outcome is private information of firm 1; however, firm 2 can observe the level of R&D expenditure  $Kp^2$ . We assume that  $a > 2\bar{c}$  in order to ensure that both firms can operate in the market in case firm 1 is successful in R&D and the merger does not take place.<sup>2</sup> Unlike Stenbacka (1991), we assume away any technological spillover from firm 1 to firm 2 in case of successful R&D outcome. To understand the impact of bargaining power on information sharing we change the game by assuming that the non-innovating firm offers to merge by asking a price for its firm.

Now we explicitly lay out the game.

- Stage 1 Firm 1 decides whether to commit to share the information about the R&D outcome with its rival or not.
- Stage 2 Firm 1 undertakes the R&D and the outcome is realized. The outcome of the innovation is revealed to its rival firm 2 in case firm 1 has committed in stage 1 to share the information. Otherwise, the R&D outcome is private information of firm 1.
- Stage 3 In this stage firm 2 offers to merge with firm 1. Firm 1 either accepts or rejects the offer. In case of rejection both firms compete *a la* Cournot. In case the merger offer is accepted firm 1 operates in the market under monopoly with the best available technology and firm 2 receives the price it asks in the merger offer.

A rough sketch of the game tree can be depicted in Fig. 1 on the next page.

When firm 1 chooses not to share information then firm 2 makes a merger offer under incomplete information after the nature's choice of the outcome of the R&D. This information set is represented by the dotted line. Having observed the outcome itself firm 1 makes decision about acceptance of the merger offer having the full knowledge of its R&D success or failure. The dotted lines at the end nodes represent that even after acceptance or rejection firm 2 may not know what was the R&D outcome earlier. Finally after rejection two firms compete as Cournot duopolist and after acceptance the market is served under monopoly. When firm 1 chooses to share information, firm 2 makes a

<sup>1</sup> In last few decades a substantial portion of foreign direct investment (FDI) took the form of mergers and acquisitions (M&As). It was also noted (UNCTAD, World Investment Report 2010) that "a preference for M&As over greenfield investments as the dominant mode of FDI has been observed over the past two decades or so, particularly in developed countries". Before the onset of recent financial crisis, in 2007 the value of mergers and acquisitions (M&As) "equalled or exceeded greenfield investment". There was a substantial drop in mergers and acquisitions during the peak of the financial crisis. However, lately there is some recovery in the M&As. In 2010 the cross-border M&As grew by 37% and in 2011 it grew by 53% (Source: UNCTAD, Global Investment Trends Monitor 17 January 2011, World Investment Report 2012).

<sup>2</sup> Thus, unlike Jensen (1993) we do not consider the possibility of drastic innovation here.

Download English Version:

<https://daneshyari.com/en/article/5054920>

Download Persian Version:

<https://daneshyari.com/article/5054920>

[Daneshyari.com](https://daneshyari.com)