Pre-emptive Merger in a Composite Good Framework*

Manas Chaudhuri

Narasingha Dutta College, Howrah

and

Tarun Kabiraj

Indian Statistical Institute, Kolkata

(December 2008)

*This is a revised version of the paper presented at the World Congress of the International Economic Association held in Morocco.

Correspondence to: Tarun Kabiraj, Economic Research Unit, Indian Statistical Institute, 203 B. T. Road, Kolkata – 700 108, India. E-mail: tarunkabiraj@hotmail.com; Fax: 91 33 25778893.

Pre-emptive Merger in a Composite Good Framework

Abstract

We construct a model of partial merger when there are three goods and three firms and consumers need two goods to complete their consumption. Therefore these are composite goods which have both competitive and complementary feature. We study pre-emptive incentives of firms for merger, given a target firm. We show that vertical merger strictly dominates horizontal merger. Pre-emption decision is prompted more by the amount of loss if the rival goes for merger. The paper also provides a welfare analysis. While all firms merger maximizes social welfare, under vertical merger consumers are always better off. Industry profit also goes up if the goods are not so close substitutes.

Keywords: Composite goods, pre-emptive merger, vertical integration, horizontal integration.
JEL Classification: C7, D 4, L1, L4.

1. Introduction

In the competitive environment of modern business world we experience an increasing speed and volume of merger and acquisition (M&A) activities in all parts of the globe. In such an environment merger is often prompted by pre-emption interest. The competing rivals bid for merger or acquisition, and then the highest bidder merges with the target firm. This is the pre-emption motive of merger. It is important to note that mergers sometimes confer strong negative externalities on the firms outside the merger. Then the firm might find it better to be an `insider' than to be an `outsider' and hence may rationally merge to pre-empt its partner merging with a rival. The key feature of such mergers is that merger is prompted not so much by the surplus (or, private gain) a merger generates, but more by the amount of loss the merger inflicts on if the rival wins the bid. The larger the possible loss the firm suffers from being non-integrated, the larger will be the pre-emptive bid. In fact, "be an insider or perish" motive has come to be a guiding factor in many defensive merger actions in recent years. Fridolfsson and Stennek (2005) have cited several cases where pre-emption was the primary motive behind merger and acquisition of a rival firm. In particular they show that sometimes `strategic motives may be so strong as to induce firms to agree to unprofitable mergers'.[1]

The purpose of the present paper is to study the question of pre-emptive merger decision in a composite good framework. The distinctive feature of merger in such a framework is that mergers inflict strong negative externalities on the outside firms. Then given that there is a danger of substantial financial loss as an outsider to a merger process, firms would rather attempt to protect themselves through pre-emptive merger moves even if such a move is costly. In contrary, in a homogeneous good framework under (horizontal) merger the outsiders always gain due to positive externalities provided that such a merger does not create synergies sufficiently.[2] In such a situation even when merger is profitable,

[1] One recent example of pre-emptive merger is the case of Tata-Corus merger. Tata Steel, an Indian Giant company has acquired the Anglo-Dutch Company, Corus by paying a huge compensation against the bidding of a Brazilian steel maker CSN. See CMIE (2007) for the list of and information on acquisitions by Indian firms during January 2001 and December 2006.

[2] See Salant et al (1983), Perry and Porter (1985), and Farrel and Shapiro (1990) for a detailed analysis.

staying as an outsider can be more profitable to a firm. It may also happen that firms fail to merge into monopoly (Kabiraj and Lee (2003)).

The idea of composite goods is very pertinent as there are instances where consumers need to purchase several goods to complete consumption. For example, mutually compatible hardware and software constitute one composite good. Using a computer involves simultaneous purchase of a keyboard, a monitor, a CPU, a printer and some particular software. While purchasing a car we need to consider price of the fuel and insurance premium, price of the car apart. For the use of internet service the telephone service, communication service need to be jointly consumed. Examples are thousands. A detailed discussion on this can be found in Economides and Salop (1992) and Kim and Shin (2002), among others.

Clearly, at least two goods are necessary to form a composite good, and each of these goods may have a number of competing brands. Thus within a composite good, the individual goods are complements to each other whereas across composite goods, these are substitutes. Therefore, the composite good framework provides a production system comprising both substitute and complementary brands or components.

Then a partial merger or integration in such a framework may take either of the following two forms. Firms are said to be vertically integrated when cooperation takes place between two (or more) mutually compatible or complementary goods, and they are horizontally integrated when cooperating firms produce goods which are gross substitutes. Although the terms `vertical' and `horizontal' are more appropriate in an upstream-downstream structure where products are mutually related in an input-output design, we are constrained to use these terms in connection with composite goods too due to their popular status in the literature. Thus integration in our context is different from Colangelo (1995) which discusses the question of pre-emptive merger but in an upstream-downstream structure.[3]

[3] Pre-emption in R&D is also quite common. See, for instance, Gilbert and Newberry (1982).

Now given a composite good framework, clearly for these composite products the system prices rather than individual prices are more important. Then the basic motive of the Economides and Salop (1992) paper was to extend and generalize Cournot (1838) results to the case of multiple producers and differentiated brands of each component. In particular, the paper considers two differentiated brands of each of two goods, A and B, and therefore each composite good consists of two complementary components, and the composite products are themselves substitutes to each other. The paper compares prices under independent and joint ownership of component producers. It also analyses a number of other market structures including partial parallel vertical integration. In Cournot (1838) the price under integration of two complementary goods producing monopolists is lower than the sum of their independent (non-cooperative) prices. In contrast, in Economides and Salop (1992) prices under full integration can be higher than those under independent ownership if (and only if) the composite goods are close substitutes. Prices under joint ownership can also be higher than the prices under partial vertical integration.

Kim and Shin (2002), on the other hand, considers a framework where three goods are necessary to define a composite good and composite goods are substitutes to each other. Out of these three goods, one good has two competing brands (and hence again there are four products in the production network). The paper considers formation of possible coalitions and derive their overall welfare implications, contrast to only consumer welfare in Economides and Salop (1992). In Kim and Shin (2002), the system price is lower in the grand coalition compared to that in any other ownership structure, and industry profit is largest under grand coalition.

The motivation of the present paper is to extend Colangelo (1995) to the case where the goods have both complementary and substitute characteristics, since the issue of pre-

emption in the composite good framework is left unattended so far.[4] We consider a minimum structure needed to analyse pre-emption incentives for vertical and horizontal merger and hence construct a model of three goods only, say X, Y and Z, of which two goods, Y and Z, are competing brands. Therefore (X,Y) and (X,Z) are two composite goods which are themselves substitutes to each other. If Y producing firm is the target firm, then vertical merger will be the integration of X and Y producing firms, and horizontal merger will be the integration of Y and Z producing firms. We show that both the horizontal and vertical mergers are feasible and the outside firm under merger is always the loser. Then as in Colangelo (1995),[5] vertical merger strictly dominates horizontal merger irrespective of the degree of product differentiability.

We also provide a welfare analysis of our model. While social welfare is largest under all firms merger, horizontal merger reduces welfare. Consumers are however better off under vertical merger compared to no-integration, but industry profits go up if and only if the goods are not close substitutes. The reason is that vertical integration tends to reduce prices through internalisation of externalities, and horizontal integration tends to increase prices due to an increase in market concentration. Therefore in our model antitrust laws should be directed only against horizontal mergers.

The plan of this paper is the following. Section 2 presents the model and discusses pre-emptive incentives for both forms of merger. In section 3 we derive welfare implications of our results. Finally, section 4 concludes the paper.

2. Model and Results

Suppose that consumers need to buy two complementary goods (or components) for a composite good. Consider three firms, 1, 2, and 3, producing X, Y and Z, respectively.

[4] Fridolfsson and Stennek (2005) also deal with the question of pre-emptive merger but not in the composite good framework. It does not explain the possibilities of both vertical and horizontal mergers. Externalities in this model come from economies of scale and scope and from diseconomies due to information problems.

[5] Colelangelo (1995) also considers the problem of integrations in the scenario when there are two firms in both streams.

Let X and Y be complementary to each other. Similarly X and Z are complementary. So the consumers consume either (X, Y) or (X, Z) to complete consumption, that is, for them (X, Y) and (X, Z) are two composite goods which are substitutes to each other, because Y and Z are assumed to be two brands of the same product. We study pre-emptive incentives for horizontal and vertical merger. In our case, if firm 2 and firm 3 merge together, it is a case of horizontal integration, but if merger occurs either between firm 1 and firm 2 or between firm 1 and firm 3, it will be a vertical merger. Let firm 2 be the target firm. We then study the incentives of firm 1 and firm 3 to merge with firm 2. Figure 1 portrays these cases.

[FIGURE I GOES HERE]

We construct the following two-stage problem. In the first stage firms 1 and 3 simultaneously bid for firm 2. Whoever makes the higher bid integrates with firm 2. If there is no bid, no integration takes place. Then in the second stage, given the merger configuration as determined in the first stage, the firms compete on product prices.

Let P_X, P_Y and P_Z be the individual prices of X, Y and Z, respectively. Consumers are only interested in system prices, not in individual prices. We denote the composite products by

$$\alpha = (X, Y), \text{ and } \beta = (X, Z)$$

Hence, the composite good prices or system prices are γ_α and γ_β, for α and β, given by

$$\gamma_\alpha = P_X + P_Y \quad \text{and} \quad \gamma_\beta = P_X + P_Z$$

We assume that Y and Z, and hence α and β are gross substitutes. Let us further assume that the demand functions for α and β are linear and given by

$$D^\alpha = a - \gamma_\alpha + \lambda\gamma_\beta$$

$$D^\beta = a - \gamma_\beta + \lambda\gamma_\alpha$$

where $a > 0$ and the parameter $\lambda \in (0,1)$ denotes the degree of substitutability between the products. Obviously, $\lambda = 0$ indicates that the products are independent and $\lambda = 1$ indicates that the products are perfect substitutes.

Let D_r be the individual demand for product $r = X, Y, Z$. Then

$$D_Y = a - \gamma_\alpha + \lambda\gamma_\beta$$

$$D_Z = a - \gamma_\beta + \lambda\gamma_\alpha$$

and,

$$D_X = D_Y + D_Z = 2a - (1-\lambda)(\gamma_\alpha + \gamma_\beta)$$

We assume that goods are produced at zero cost, and there is no cost of integration. Hence the respective pay-off functions of the firms producing X, Y and Z are the following:

$$\pi_1 = P_X D_X = P_X[2a - (1-\lambda)(\gamma_\alpha + \lambda_\beta)] = P_X[2a - (1-\lambda)(2P_X + P_Y + P_Z)]$$

$$\pi_2 = P_Y D_Y = P_Y[a - \gamma_\alpha + \lambda\lambda_\beta] = P_Y[a - (1-\lambda)P_X - P_Y + \lambda P_Z]$$

$$\pi_3 = P_Z D_Z = P_Z[a - \gamma_\beta + \lambda\lambda_\alpha] = P_Z[a - (1-\lambda)P_X + \lambda P_Y - P_Z]$$

We use the notation Π^k, k = N, V, H to denote total industry profit under different configurations, viz., no integration, vertical integration and horizontal integration respectively; π_m^V denotes merged firm's profit when two firms are vertically integrated and π_m^H denotes merged firm's profit under horizontal integration. Similarly, π_o^V, denotes profit of the non-integrated (outside) firm when vertical integration takes place, and π_o^H, is the profit of the non-integrated firm when horizontal merger occurs. The notation P_r^k, $r = X, Y, Z$; $k = N, V, H$ denotes individual equilibrium price of product r under k ownership structure, and $\gamma_s^k, s = \alpha, \beta$ denotes the system price for the composite good s under k configuration.

A. No Integration

With no integration, each firm behaves non-cooperatively to maximize individual profits. That is, for the i*-th* firm, $i = 1,2,3$, the problem is

$$Max\ \pi_i \tag{1}$$

with respect to their respective prices.

Using the first order and second order conditions for profit maximization we obtain the following individual price solutions in equilibrium:

$$P_X^N = \frac{a}{(1-\lambda)(3-\lambda)},\quad P_Y^N = P_Z^N = \frac{a}{3-\lambda} \tag{2}$$

Therefore, under non-cooperative situation, the system prices are

$$\gamma_\alpha^N = \gamma_\beta^N = \frac{a(2-\lambda)}{(1-\lambda)(3-\lambda)} \equiv \gamma^N \tag{3}$$

The respective profits of the firms under this situation are:

$$\pi_1^N = \frac{2a^2}{(1-\lambda)(3-\lambda)^2},\quad \pi_2^N = \pi_3^N = \frac{a^2}{(3-\lambda)^2} \tag{4}$$

and the industry profit is

$$\Pi^N = \sum_{i=1}^{3} \pi_i^N = \frac{2a^2(2-\lambda)}{(1-\lambda)(3-\lambda)^2} \tag{5}$$

B. Vertical Integration

Given that firm 2 is the target firm, under vertical integration firm 1 merges with firm 2. Thus the problem of the merged firm is

$$\underset{P_X, P_Y}{Max}\ \ \pi_1 + \pi_2 \tag{6.1}$$

and that of the non-merged firm is

$$\underset{P_Z}{Max} = \pi_3 \tag{6.2}$$

These maximizing problems generate following individual prices ,

$$P_X^V = \frac{a(2+\lambda)}{6(1-\lambda)}, \quad P_Y^V = \frac{a}{6}, \quad P_Z^V = \frac{a}{3} \tag{7}$$

and the system prices are

$$\gamma_\alpha^V = \frac{a}{2(1-\lambda)}, \quad \gamma_\beta^V = \frac{a(4-\lambda)}{6(1-\lambda)} \tag{8}$$

The equilibrium profits of the merged firm and the non-integrated outsider are respectively

$$\pi_m^V = \frac{a^2(13+5\lambda)}{36(1-\lambda)}, \quad \pi_0^V = \frac{a^2}{9} \tag{9}$$

The industry profit under vertical integration is

$$\Pi^V = \pi_m^V + \pi_o^V = \frac{a^2(17+\lambda)}{36(1-\lambda)} \tag{10}$$

C. Horizontal Integration.

In case of horizontal integration firm 3 seeks merger with firm 2. After a horizontal integration, the horizontally integrated firm sets the final product prices by solving the following maximization problem

$$\underset{P_Y, P_Z}{Max} \ \pi_2 + \pi_3 \tag{11.1}$$

and the non-integrated firm's problem is

$$\underset{P_X}{Max} \quad \pi_1 \tag{11.2}$$

The resulting individual price solutions are :

$$P_X^H = P_Y^H = P_Z^H = \frac{a}{3(1-\lambda)} \tag{12}$$

and the system prices are

$$\gamma_\alpha^H = \gamma_\beta^H = \frac{2a}{3(1-\lambda)} \equiv \gamma^H \tag{13}$$

The equilibrium profit solutions are:

$$\pi_m^H = \frac{2a^2}{9(1-\lambda)}, \quad \pi_0^H = \frac{2a^2}{9(1-\lambda)} \tag{14}$$

and the industry profit is

$$\Pi^H = \pi_m^H + \pi_o^H = \frac{4a^2}{9(1-\lambda)} \tag{15}$$

We are now in a position to write the following propositions.

Proposition 1.

(a) Both bilateral integrations, vertical and horizontal, are feasible.

(b) The non-integrated firms are losers compared to no-integration situation.

Proof:

(a) Integration is feasible when the merged firm's profit is greater than the sum of non-cooperative profits of its constituent partners. We have

$$\sum_1^2 \pi_i^N = \frac{a^2}{(3-\lambda)\ (1-\lambda)} \quad \text{and} \quad \sum_2^3 \pi_i^N = \frac{2a^2}{(3-\lambda)^2} \tag{16}$$

Hence the surplus generated under vertical and horizontal mergers are

$$S_m^V = \pi_m^V - (\pi_1^N + \pi_2^N) = \frac{a^2(3+5\lambda)}{36(3-\lambda)} \tag{17.1}$$

$$S_m^H = \pi_m^H - (\pi_2^N + \pi_3^N) = \frac{2a^2\lambda(\lambda+3)}{9(1-\lambda)(3-\lambda)^2} \tag{17.2}$$

Clearly, $S_m^V > 0$ and $S_m^H > 0$.

(b) It can be easily checked that

$$\pi_o^V < \pi_3^N \text{ and } \pi_o^H < \pi_1^N \tag{18}$$

This proves the result. Q.E.D.

S_m^V and S_m^H denote respectively private incentives for vertical and horizontal merger. Private incentive of merger is the difference between post merger payoff and the sum of pre-merger payoffs of the insiders. Result (a) follows because in each case the merged firm internalises the respective externalities through integration. Since such a merger

inflicts a loss on the outsider, this in turn further benefits the insiders.[6] Result (b) can be explained as follows. Under vertical merger the merged firm raises price of X as much as possible but keeps the price of Y very low. Since consumers are concerned about the system prices, and Y and Z are substitutes, firm 3 is forced to lower the price of Z. The larger the degree of substitutability, the larger will be the loss of firm 3. Under horizontal merger the merged firm monopolizes the markets for Y and Z, and raises their prices. This forces firm 1 to reduce the price of X. Again, the loss of payoff so inflicted depends on the degree of substitutability.

Proposition 2 *Private incentives for horizontal merger are larger if and only if the composite products are close substitutes.*

Proof: Comparing S_m^V and S_m^H we shall get the following:

$$\exists\, \hat{\lambda} \mid S_m^H > S_m^V \Leftrightarrow \lambda > \hat{\lambda} \tag{19}$$

This proves the result. Q.E.D.

To understand the result, note that private incentive of merger is the surplus payoff of the merged firm over and above the sum of non-cooperative payoffs of its constituents. We can then write

$$S_m^V - S_m^H = [\pi_m^V - \pi_m^H] - [\pi_1^N - \pi_3^N] \tag{20}$$

But we have,

$$\pi_m^V - \pi_m^H > 0 \quad \text{and} \quad \pi_1^N - \pi_3^N > 0$$

that is, both post- and pre- merger profits of the vertically integrated firms are larger than those of the horizontally integrated firms.[7] Moreover, for low degree of product differentiation the first squire bracket term in (20) strictly dominates the second squire

[6] In a homogeneous good set up, as in Salant et al. (1983), a bilateral merger is never feasible if there is no efficiency gain of merger.

[7] Further note that $\frac{\partial(\pi_m^V - \pi_m^H)}{\partial\lambda} > 0$ and $\frac{\partial(\pi_1^N - \pi_3^N)}{\partial\lambda} > 0$

bracket term, and the opposite happens when the products are close substitutes. This explains the result of Proposition 2

Proposition 3 *Loss of profit to the non-integrated firm is higher under horizontal integration than that under vertical integration, that is,* $\pi_1^N - \pi_0^H > \pi_3^N - \pi_0^V$.

Proof:- We can easily check that

$$(\pi_1^N - \pi_0^H) - (\pi_3^N - \pi_0^V) = \frac{a^2\lambda(1+\lambda)(6-\lambda)}{9(1-\lambda)(3-\lambda)^2} > 0. \text{ Q.E.D.} \qquad (21)$$

We are harping on the point that pre-emption is guided more by the consideration of the potential loss the firm incurs if its rival wins the bidding race. We have already shown in Proposition 1 that both vertical and horizontal mergers are feasible, but a negative externality in each case reduces payoffs of the non-integrated firm. Then Proposition 3 tells that the potential loss of profits of firm 1 is larger compared to its bidding rival, firm 3. Now we can write the main result of our paper.

Proposition 4 *In the composite good framework of our paper, pre-emptive incentives for vertical merger are always larger than that of horizontal merger.*

Proof: Given that both integrations are feasible (Proposition 1), whoever makes the higher bid integrates with the target firm (here firm 2). The maximum that firm 1 can bid for vertical merger with firm 2 is $(\pi_m^V - \pi_0^H)$. And firm 3 will bid a maximum of $(\pi_m^H - \pi_0^V)$ for horizontal merger. We can now check that

$$[\pi_m^V - \pi_0^H] - [\pi_m^H - \pi_0^V] = \Pi^V - \Pi^H = \frac{a^2(1+\lambda)}{36(1-\lambda)} > 0 \qquad (22)$$

This proves the result. Q.E.D.

To explain the proposition, note that,

$$\Pi^V - \Pi^H = [S_m^V - S_m^H] + [(\pi_1^N - \pi_0^H) - (\pi_3^N - \pi_0^V)] \qquad (23)$$

By Proposition (3), the term in the second square bracket on the right hand side is always positive, but the term in the first square bracket is positive if and only if λ is below a critical level (see (19)). Thus although private incentives for horizontal merger is larger when the goods are close substitutes, but firm 1 finds that its cost (that is, the potential loss) for being non-integrated is larger if the rival merges with the target firm. This dominates private motives of merger of firm 3. Hence firm 1 will give a higher bid to acquire firm 2. This is the key feature of the pre-emptive game. Our paper clearly distinguishes between private incentives and pre-emptive incentives for merger.

Before we go to the next section, let us also solve the problem of all firms merger in this context.

D. All Firms Merger

This is the case of full integration where a single firm takes over control of producing all the three products X, Y and Z. Therefore the problem of the fully integrated firm is:

$$\underset{P_X, P_Y, P_Z}{Max} \ \pi_1 + \pi_2 + \pi_3 \tag{24}$$

As in Economides and Salop (1992), all first order conditions are not independent, hence we cannot solve for individual prices. Thus we only determine the prices of composite goods,

$$\gamma_\alpha^* = \lambda_\beta^* = \frac{a}{2(1-\lambda)} \equiv \lambda^* \tag{25}$$

The profit of the integrated firm will be

$$\Pi^* = \sum_1^3 \pi_i^* = \frac{a^2}{2(1-\lambda)} \tag{26}$$

It is quite natural that we shall get

$$\Pi^* > \max\{\Pi^N, \Pi^V, \Pi^H\} \tag{27}$$

that is, industry profit is largest under all firms merger.

3. Welfare Implications.

In this section we compare welfare for various configurations and find out which configuration leads to higher social welfare. Although pre-emption is strictly motivated by the private gain and loss, the welfare implications of such moves cannot be lost sight of because there is an antitrust authority to be satisfied for the entire process to get through.

In the previous section we have derived the system prices under different ownership structures. Comparing these we have, $\lambda^* = \gamma_\alpha^V < \gamma_\beta^V < \gamma^N < \gamma^H$. Clearly,

$$\lambda^* < \gamma^V < \gamma^N < \gamma^H \tag{28}$$

Thus prices are lowest under full integration. Compared to no-integration, however, prices are lower under vertical integration and higher under horizontal integration. This is similar result to Kim and Shin (2002). Since consumers welfare are ordered inversely with regard to the order of equilibrium prices, consumers' surplus (CS) is highest under all firms merger and lowest under horizontal merger, that is, .

$$CS^* > CS^V > CS^N > CS^H \tag{29}$$

Leaving aside the possibility of all firms merger, we can see that vertical merger is the most preferred option for the consumers, but horizontal merger reduces consumers' welfare. Externalities generated by the complements producing firms are internalized in case of vertical integration resulting in a lower price and higher consumer surplus. But consumers' surplus goes down in case of horizontal merger of firms producing substitutes because of an enhanced market power. Therefore to protect the interests of the consumers, antitrust laws should be discriminating against horizontal mergers.

We have already noted in (27) that industry profit is largest under full cooperation. Therefore social welfare is maximum under all firms merger. To compare welfare for other ownership structures, note the following. We have shown earlier that $\Pi^V > \Pi^H$

(see (22)). It is also easy to show that $\Pi^N > \Pi^H$. This means, vertical merger generates larger overall welfare than horizontal merger, but horizontal merger strictly reduces welfare.

Finally, we can show that

$$\Pi^V > \Pi^N \text{ if and only if } \lambda^2 + 12\lambda - 9 < 0$$

Hence,

$$\exists\, \tilde{\lambda} \mid \Pi_m^V > \Pi_m^N \Leftrightarrow \lambda < \tilde{\lambda} \qquad (30)$$

This states that industry profit under vertical merger will go up provided that the degree of product differentiability is sufficiently larger. We have already noted in the context of Proposition 3 that as the degree of substitutability goes up, the loss of payoff the merger inflicts on the outsiders also goes up. Therefore, when the products are close substitutes, industry profit under merger falls compared to the no-merger situation.

Immediately we have the following proposition

Proposition 5 *If $\lambda < \tilde{\lambda}$, that is, if the degree of product differentiation is relatively larger, both consumers' welfare and industry profit will go up in equilibrium.*

Note that $\lambda < \tilde{\lambda}$ is the sufficient condition for higher social welfare in case vertical merger occurs. We have already proved that in equilibrium vertical merger will occur. Thus in a composite good framework antitrust authority might be less concerned about the negative impact of merger activity because horizontal merger will not occur in equilibrium and hence consumers will never be worse off.

4. Conclusion

In this paper we have discussed the question of pre-emptive merger in a framework where consumers like to have many goods simultaneously to complete their consumption. These are composite goods. Therefore the components of a composite good are

complementary to each other but across composite goods they are substitutes. In this structure integration of firms producing complementary components is a vertical merger and those producing substitute goods form a horizontal merger. Then given a target firm, the rivals bid for the firm and the highest bidder acquires the target firm. This is pre-emptive merger. The distinctive feature of such mergers is that a firm's bid is mostly guided by the possible loss of profits the firm suffers from if it fails to merge but the rival merges.

Thus our paper distinguishes between private incentives and pre-emptive incentives for merger. Private incentives for merger are concerned about whether a merger is mutually profitable to its constituents, whereas pre-emption may occur even when mergers are not privately profitable. In our case both vertical and horizontal mergers are feasible because each internalizes the respective externalities, but in turn each such merger inflicts a loss on the non-integrated firm. Given these negative externalities we have shown that pre-emptive incentives for vertical merger are strictly larger. This happens even when the horizontal merger has larger private incentives. The reason is that the horizontal merger is more detrimental for the vertically related non-integrated firm. As a result vertically related acquirer can offer a higher bid to the target firm so as to minimize the financial loss due to possible horizontal integration.

In a sense this paper is a stylised exercise on a very complex activity. It has a limited objective of giving an insight into the process of merger in a highly competitive environment of modern business where mergers and acquisitions often take place more as a strategic response to a challenge of survival than of simple growth and expansion of the firms. We have extended our analysis to derive welfare implications. We have shown that compared to no-integration situation consumers unambiguously benefit under vertical merger; however, industry profits will go up if and only if product differentiation is above a critical level. We have also shown that given all possible ownership structures in this model, social welfare is largest under all firms merger --- not only the industry profit is maximized, consumers' welfare is also maximum. The result follows from the fact that

externalities arising from both substitute and complementary nature of composite products are internalised by the fully integrated firm. Then, should a grand merger be allowed by the antitrust body in view of its welfare implications, pre-emption merger looses much of its relevance.

It may be mentioned that in this paper we have restricted our analysis to the case of three goods (and three firms) only where a composite product involves exactly two goods. Not only this simplifies the bidding competition but defining a partial merger structure has become easy. Clearly, pre-emptive mergers may occur in markets with more than three firms; then additional complexities will have to be addressed. One straightforward extension of the present paper should be to investigate the problem in the frameworks of Economides and Salop (1992) and Kim and Shin (2005).

Finally, our paper raises an empirical question. Do we observe horizontal mergers to occur in an industry where goods are simultaneously substitutes and complements to each other? Given the possibility that horizontal integrations reduce welfare, antitrust laws cannot remain indifferent to the forms of merger.

References

CMIE (2007), *Mergers and Acquisitions*, January, Centre for Monitoring the Indian Economy, Mumbai

Colangelo, G. (1995), "Vertical vs horizontal integration: pre-emptive merging", *Journal of Industrial Economics*, XLIII, pp. 323 – 337.

Cournot, A. (1838), *Researches into Mathematical Principles of the Theory of Wealth*, English edition of *Researches sur les Principles Mathematiques del a Theoriedes Richerses*, New York, Macmillan.

Economides, N. and S.C. Salop (1992), Competition and integration among complements, and network market structure", *Journal of Industrial Economics*, XL, pp. 105-123.

Farrel, J. and C. Shapiro (1990), "Horizontal mergers: an equilibrium analysis", *American Economic Review* 80, pp. 219-227.

Fridolfsson, S. and J. Stennek (2005), " why mergers reduce profits and raise share prices – a theory of preemptive mergers" *Journal of the European Economic Association* 3, pp. 1083-1104.

Gilbert, R and O Newberry (1982), "Pre-emptive patenting and the persistence of monopoly". *American Economic Review*, 72, pp. 514 - 526.

Kabiraj, T. and C.C. Lee (2003), "Technological asymmetry, externality and merger: the case of a three-firm industry", *Seoul Journal of Economics* 16, pp. 1-22.

Kim, C. and H. Shin (2002), "Endogenous formation of coalitions with composite goods", *International Journal of Industrial Organization* 20, pp. 1491-1511.

Perry, M.K. and R.H. Porter (1985), "Oligopoly and the incentive for horizontal merger", *American Economic Review* 75, pp. 219-227.

Salant, S.W., S. Switzer and R.J. Reynolds (1983), "Losses from horizontal merger: the effects of an exogenous change in industry structure on Cournot-Nash equilibrium" *Quarterly Journal of Economics* 98, pp. 185-199.

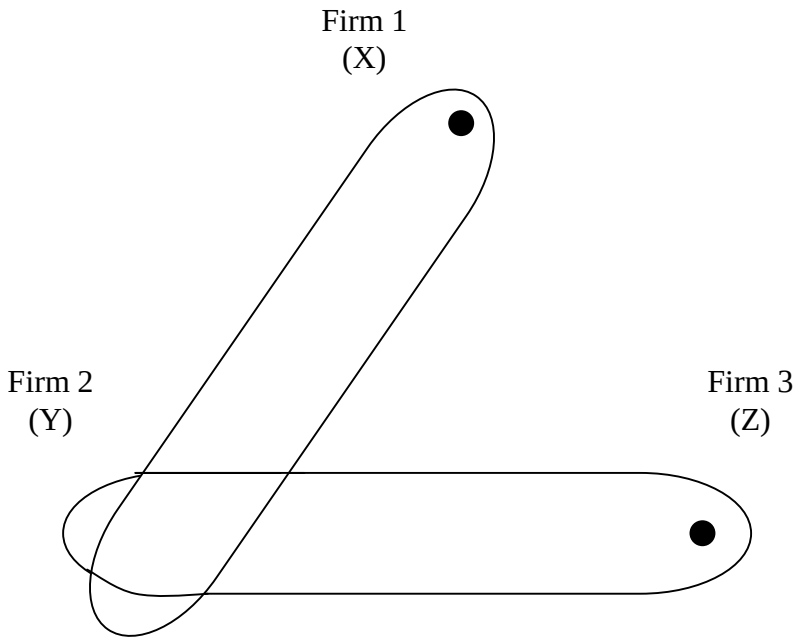

Figure 1: Possible merger configurations.