CAN MERGERS BE USEFUL TO FACE TRADE LIBERALISATION?: THE ROLE OF TECHNOLOGY

G. BADRI NARAYANAN[1]

Abstract

The objective of this study is to analyse the effects of trade liberalisation on firm-level profits with mergers and its dependence on the degree of Increasing Returns to Scale (IRS), under an oligopolistic competition framework involving two countries. Mergers, as considered in this paper, cause an increase in the firm-level profits. The extent to which they enhance the profits is inversely proportional to the number of firms in the country. With mergers, the effects of freer trade depends on the extent to which the fall in profit due to fall in price outweighs the gain in profit due to increased output. A firm in the high-IRS country can gain more from a merger than one in the low-IRS country, if the aggregate output is at sufficiently large scale.

Keywords: Mergers, output, profit, technology, trade liberalisation

JEL Classifications: F12, L19

1. Introduction

The current trend of trade liberalisation worldwide, bilaterally, plurilaterally and multilaterally, necessitates analysis of various policies for the countries, taking their technologies into consideration. Though there is vast literature on many such ones, the effect of mergers on firm profits in the exporting countries and the possibility of utilising this effect as a policy measure to take advantage of, or at least face, trade liberalisation, with an explicit consideration of the nature of technology, has been seldom dealt with. The uniqueness and importance of this study sprouts from the following observations. Firstly, the policy options for different countries in order to make the best out of the trade liberalisation, in terms of firm profits, would depend on the nature of technology of production. Secondly, mergers of firms are widely considered to enhance firm profits owing to the lower costs and prices offered by the economies of scale. Stemming from the two aforementioned points, is the interesting question as to what extent can mergers be a successful policy option to face trade liberalisation, while explicitly incorporating the fact that the technology of production is essential in analysing such effects. For example, in India, as a move towards reaping the benefits from the liberalisation in several sectors, the government removed the protective reservation of those sectors under the small scale segment, thereby encouraging the mergers of small-scale firms.

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[1]   Research Economist, Center for Global Trade Analysis, Purdue University West Lafayette, Indiana USA, Email: badri@purdue.edu; badrinarayanang@ gmail.com.

In general, technologies with higher degree of Increasing Returns to Scale (IRS) are suited for larger scales than low-IRS technologies, at least in the case of a homogenous good. Moreover, the reaction to trade restrictions or liberalisation would be different for countries with high-IRS and those with low-IRS technologies, under different conditions such as the level of restrained output. To predict the changes in profits of the exporting countries based on their technology and those in the welfare of the importing country, due to the change in the extent of trade liberalisation, an Oligopolistic competition model could be developed. For simplicity, still without losing much of reality, if the exporting countries act as cartels of identical firms with additive identical cost functions or equivalently, if the firms in each exporting country are assumed to share the oligopolistically determined out- put equally among themselves, the policy implications of mergers could be made for the countries with different technologies.

For an example to illustrate the significance and relevance to the 'real-world' scenario, let us consider the pluri-lateral agreements being negotiated across the world, such as the Trans-Pacific Partnership (TPP). TPP is of huge global importance, since it involves many important economies, such as USA, Japan, ASEAN (Association for South East Asian Nations) members, etc. Many of the original member countries of TPP, currently going through the negotiations have high-IRS technologies, while some of them (like Viet Nam and Brunei) have predominantly low-IRS technologies. Questions are being asked whether it is worthwhile for countries like India and China to join these negotiations (Narayanan and Sharma, 2014). Knowing that these negotiations may likely conclude by 2015, emerging economies like India and China are looking for strategies to face the challenges and utilise the opportunities of trade liberalisation in general with TPP members and other countries. In this scenario, these emerging economies that use low-IRS technologies to produce many goods would have different policy implications from other countries such as USA, Taiwan and Korea, which use high-IRS technologies.

In a world where tariffs are less important by the day, non-tariff barriers such as quantitative restrictions have gained a lot of significance. These trade restrictions are based on the oligopolistically determined free-trade levels of different countries in the past, chosen using rational expectations of the extent of restriction. The levels of country-wise restricted aggregate exports are then divided among the firms in the countries, based on their sales history, size, etc. This poses the question of the effect of mergers on the profits of firms in different countries and more importantly, the extent to which this would be useful in terms of enhancing the profit-effects of trade liberalisation.

In this study, two exporting countries, one of which is high-IRS and the another is low-IRS, knowing the extent of trade liberalisation in an importing country, choose their freer trade levels of a homogenous good by playing Cournot game. The importing country then poses the trade restrictions as expected by the exporting countries, based on their freer trade levels. Narayanan (2007) uses a similar framework, but with the very different objectives and propositions. While the objective of this paper is to examine the extent to which the type of technology facilitates the firms to face trade liberalisation using mergers, Narayanan (2007) aims at examining how trade liberalisation influences the price effects of mergers with a due consideration to technology.

Jans, Wall and Hariharan (1995) analyse the effects of Voluntary Export Restraints (VER) on the welfare of an importing country. This verifies the proposition that if each firm's post-VER output is positively related to its output under freer trade, a credible threat of VER will induce foreign firms to dump in the current period, thereby decreasing the domestic price. The authors conclude that there may exist an incentive for a welfare- maximising government of the importing country to maintain protectionist reputation by imposing a VER, despite preferring freer trade. Some features of this model, incorporated in Narayanan (2006, 2007), were useful in framing the model in this study.

Narayanan (2006), while considering the effects of trade liberalisation on firm profits and social welfare with an explicit treatment of technology in an international duopoly model with two exporting countries, shows that output is increasing in the degree of trade liberalisation and price falls with it. However, the effects of freer trade on profits of the exporting countries are ambiguous and depend on the net gains in profit from freer trade. Given same level of output for both countries, a sufficiently high output would bring more profits to the high-IRS country than to the low-IRS country. Welfare of the importing country, at least within this framework, is increasing in the degree of trade liberalisation, provided that the initial level of restrictions in trade are not too high.

Moore (1997) studies a list of determinants of competitiveness in the clothing production. The theoretical analysis of the trade restrictions showing the effect of quota on imports in this study concludes that the profit lost due to restricted quantity and the profit gained due to increased price determine the desirability of quotas to the exporting countries. This was one of the sources of motivation for the current study, since a detailed examination of the aforesaid conclusion under a standard framework would prove useful to put forward concise policy implications.

Ross (1988) examines the price effects of mergers in an economy moving towards a freer trade, using a domestic dominant oligopoly model and an international oligopoly model. In the former, freer trade can mitigate or enhance the price effects of domestic mergers, whereas in the latter, it can mitigate those of domestic mergers, while enhancing those of foreign mergers. Thus, freer trade may not, per se , be a good substitute for an active competition policy.

Long and Vousden (1995), while analysing the effects of tariff reductions on horizontal mergers in a Cournot oligopoly in a two-country world, shows that for domestic and cross- border mergers, unilateral tariff reduction encourages the mergers which concentrate market power at the expense of cost-reducing mergers and bilateral tariff reductions encourage cost-reducing mergers. In the current study, the effects of merger on the profits of firms are analysed, since prices cannot be influenced by the firms in this framework.

In this paper, the effects of mergers on profit directly as well as indirectly via the profit effects of freer trade for each identical firm in each exporting country have been analysed in section 2. In section 3, the conclusions and policy implications of this study are summarised.

2. The Model and Results

In the context of international trade, there have been several studies that focus on market imperfections and dynamics (Choi and Yu, 2013); however, our objective is to focus on trade

liberalistion, mergers and technology and therefore, we develop and employ a simple model. In some ways, this model is quite simplified and we acknowledge that this is a limitation of the paper; however, the focus on trade liberalisation and mergers is facilitated by this simple and tractable nature of the model. In other words, this is an extremely simplified model to illustrate that the heterogeneity of production structure matters for any discussion on trade liberalization and mergers. An international duopoly model developed in Narayanan (2006 and 2007) is the starting point for this study; we borrow entirely from this model; the unique contribution of this paper lies in the analysis of comparative statics of this model with reference to nergers and trade liberalisation. In the original model, in the first stage, a high-IRS exporting country[2] EC_1 and a low-IRS exporting country EC_2[3] play a Cournot game in a market of importing country M,[4] which is assumed to be entirely covered by EC_1 and EC_2. In the second stage, the Cournot output chosen by them is, however, restricted by M, by a fraction $\delta \in (0,1)$.[5] Thus, this is a two-stage game between, EC_1, EC_2 and M.

Stage: δ is known to EC_1, EC_2 and M. EC_1 and EC_2 determine the standard Cournot output levels x_i^* where i=1 and 2 represent EC_1 and EC_2 respectively. Stage 2: Taking x_i^* as given, the importing country M selects the restricted output, based on equation (1).

$$\overline{x}_i = x_i^* \delta \qquad \qquad \text{... (1)}$$

where $\overline{x}_i$ and x_i are restricted and unrestricted levels of output, respectively.

Let the cost functions of EC_1 EC_2 be $c_1(.)$ and $c_2(.)$, which are strictly increasing in the outputs and concave. To capture the different technologies of EC_1 EC_2, (2) is assumed; this comprises of inequalities a, b and c as well as identity a.

$c_1'(.) > c_2'(.)$ if $\overline{x}_1 < x_1$ (Inequality a)

$c_1'(.) = c_2'(.)$ if $\overline{x}_1 = x_1$ (Identity a)

$c_1'(.) < c_2'(.)$ if $\overline{x}_1 > x_1$ (Inequality b)

$|c_1''(.)| > |c_2''(.)|$ (Inequality c)

$$\text{... (2)}$$

where $c_1'(.)$ and $c_2'(.)$ are the marginal costs of EC_1 and EC_2, respectively, and x_I be a threshold level of output at which the marginal costs are same for EC1 and EC2.

This assumption implicit in equation (2) is that the EC_1 is so efficient beyond a threshold level of its that its marginal cost is lower than that of EC_2, irrespective of the output of EC_2 and

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[2]　By country, we mean representative firm in the corresponding country; therefore, all the decisions are made by firms and not countries, which do not have separate objective functions for this reason

[3]　We assume zero consumption of the good in the exporting countries, making them completely export-oriented. If we relax this assumption, their scale of output and hence marginal costs will depend on domestic demand as well.

[4]　We implicitly assume production in the importing country, which is the motivation for such protection therein. We do not explicitly model this production structure for the sake of simplicity.

[5]　It may make a difference if the trade restriction levels were set exogenously as a level of output rather than as a proportion of freer trade Cournot outputs. However, we choose to assume the latter, since this provides a simple way to assess the effects of trade liberalisation.

EC_1 can never produce output at a lower marginal cost than that of EC_2 below this threshold output. Moreover, the rate of fall in marginal cost is higher in the case of high-IRS country than in the case of low-IRS country.[6] This is quite reasonable since, in real world, high-IRS technology reduces marginal costs at a higher rate at large scales than at small scales. Let the demand be linear with an intercept A, as shown in (3); the inequality here is required to obtain interior solution for zero production.[7] Moreover, this would be true even for restricted outputs.

$$p = A - x_1 - x_2$$

$$A > c(0) \quad \text{(Inequality d)}$$

$$\qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad ... (3)$$

The profit maximisation problem of the country EC_2 is given in equation (4). In this equation, it should be noted that though the players are interested in choosing their optimal free-trade levels, they incorporate the fact that they would be restricted, by including restrained level output $\overline{x}_i$ and not free-trade level in their objective function.

$$\pi_i = (A - \overline{x}_1 - \overline{x}_2)\overline{x}_i - c_i(\overline{x}_i) \qquad \qquad \qquad ... (4)$$

$$x_i^* = (c_i'(.) - A + 2\delta[A - c_j'(.)])/(1 + 4\delta^2) \qquad \qquad ... (5)$$

$$\overline{x}_i = (c_i'(.) - A + 2\delta[A - c_j'(.)])\delta/(1 + 4\delta^2) \qquad \qquad ... (6)$$

$$\overline{p} = A - (2\delta^2 - \delta)[2A - c_1'(.) - c_2'(.)]/(1 + 4\delta^2)$$

Let each of the exporting country EC_i consist of N_i firms with the same cost function $c_i(.)$, which is possessed by the country EC_i, as a whole. In this framework, let the oligopolistically determined output and price shown in the equations (6) and (7) be interpreted as a result of a cartel between these N_i firms. For this to hold true, the cost functions are assumed to be additive, as shown in equation (8).

$$\sum_j c_i(x_{ij}) = c_i(x_i), \quad \text{where} \quad \sum_j (x_{ij}) = x_i \quad \text{and} \quad j = 1 \text{ to } N_i \qquad ... (8)$$

Since all these firms are identical, the output of each firm would be just the average of those of all firms, as shown in equation (10). Hence, the profit of each firm in the ith country can be expressed in terms of aggregate output level, price and the number of firms in that country, as shown in equation (11).

$$x_{ij} = x_i/N_i, \quad j = 1 \text{ to } N_i, \quad i = 1,2. \qquad \qquad ... (9)$$

$$\pi_{ij} = \overline{p}\overline{x}_i/N_i - c_i(\overline{x}_i/N_i), \quad j = 1 \text{ to } N_i, \quad i = 1,2 \qquad ... (10)$$

It should be noted that the analysis here focuses on the profit of an individual representative firm and not that of the entire country, because in this framework, the aggregate output, price and hence the aggregate profit of the country are all fixed based on the two-stage process discussed in the beginning of this section.

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[6]   Assumption of diminishing marginal costs in oligopoly, as we have done here, typically requires investigation of conditions for existence and stability of the Cournot equilibrium. However, these are beyond the scope of this paper. We acknowledge this as a limitation arising from the need for brevity

[7]   We also assume herein that the firms will use the entire quota of imports demanded.

One more simplification in this model, though not very reasonable, is the assumption that the firms resulting from mergers are exactly identical to all the other firms. However, as mentioned in Ross(1988), to get hold of some basic features of effects of mergers, this is inevitable. The mergers could, therefore, be expected to influence the profits of the firms just by changing their average output.

In this framework, the effect of mergers on profit can be captured by the partial derivative of the profits with respect to the number of firms. Equation (11) shows that this is negative, decreasing in the number of firms, increasing in the level of output and increasing in the 'marginal profit', i.e., difference between the price and marginal cost. Thus, it is shown that mergers have a positive effect on profit of the firms.

$$\partial \pi_{ij} / \partial N_i = -[\overline{p} - c_i'(\overline{x}_i / N_i)]\overline{x}_i / N_i^2 \qquad \qquad \text{.. (11)}$$

Proposition 1: The country with less number of firms gains more from a merger.

This means that a country with fewer firms gains more reducing its number of firms further. In general, high-IRS country, owing to large investment required to establish firms, could be expected to be comprising of fewer firms than the low-IRS countries. This might, in turn, imply that high-IRS countries could gain more by merger policies. However, this could turn out to be too strong a generalisation to be realistic, since if the size and structure of the firms in the two countries are such that high-IRS country has more firms than the low-IRS one, then the merger policy would be more profitable for the latter. For simplicity and to determine the influence of the parameters other than the number of firms on the profit effects of the merger, let the number of firms be the same for both countries, i.e. Ni = N.

Proposition 2: If $c_1'(.) < c_2'(.)$ and:

a) $\overline{x}_1 \geq \overline{x}_2$, then $\left|\partial \pi_{1j} / \partial N\right| > \left|\partial \pi_{2j} / \partial N\right|$

b) $\overline{x}_1 < \overline{x}_2$, then $\left|\partial \pi_{1j} / \partial N\right| > \left|\partial \pi_{2j} / \partial N\right|$ if $x_2 \leq \overline{x}_1[\overline{p} - c_1'(.)]/[\overline{p} - c_2'(.)]$ and

$\left|\partial \pi_{1j} / \partial N\right| < \left|\partial \pi_{2j} / \partial N\right|$ if $x_2 > \overline{x}_1[\overline{p} - c_1'(.)]/[\overline{p} - c_2'(.)]$

Proposition 2 follows from the interpretation of equation (11) and it shows that if high-IRS country gets an allocation above both the threshold level and that of the low-IRS country, then it can benefit better from a merger. This is one more confirmation of the fact that large scales are generally beneficial for high-IRS countries. However, even at sufficiently high scales, if the low-IRS country is allocated a sufficiently higher level of output than the high-IRS country, then the mergers are more profitable for firms in the former than those in the latter. For this to hold true, the low-IRS country should be allocated an output which is higher than the product of marginal profit ratio and the output of high-IRS country. This means that the output allocated to EC_2 should be high enough to outweigh its disadvantage caused due to a higher marginal cost than EC_1, so that it could be benefitted better by the mergers than the latter.

Proposition 3: If $c_1'(.) < c_2'(.)$ and:

a) $\overline{x}_1 \leq \overline{x}_2$, then $\left|\partial \pi_{1j} / \partial N\right| < \left|\partial \pi_{2j} / \partial N\right|$

b) $\overline{x}_1 > \overline{x}_2$, then $\left|\partial \pi_{1j} / \partial N\right| < \left|\partial \pi_{2j} / \partial N\right|$ if $x_2 \geq \overline{x}_1[\overline{p} - c_1'(.)]/[\overline{p} - c_2'(.)]$ and

$$\left| \partial \pi_{1j} / \partial N \right| > \left| \partial \pi_{2j} / \partial N \right| \text{ if } x_2 < \overline{x}_1 [\overline{p} - c_1'(.)] / [\overline{p} - c_2'(.)]$$

Proposition 3 stems from equation (11), showing that if high-IRS country gets an allocation below both the threshold level and that of the low-IRS country, then the latter can benefit better from a merger. However, even at sufficiently small scales, if the high-IRS country is allocated a sufficiently higher level of output than the low-IRS country so that the 'high-output-advantage' outweighs the 'high-marginal cost-disadvantage', then the mergers are more profitable for firms in the former than those in the latter. The last two propositions have shown that the extent to which a firm in an exporting country can gain from a merger depends on the allocation of output not only to itself, but also to the another country. Equation (12) is useful for analysing the effect of trade liberalisation on profit effect of mergers.

$$\frac{\partial^2 \pi_{ij}}{\partial \overline{\delta} \partial N_i} = - \frac{(\overline{x}_i \left[\dfrac{\partial \overline{p}}{\partial \overline{\delta}} \right] + [\overline{p} - c_i'(\overline{x}_i / N_i) - c_i''(.)](\dfrac{\partial \overline{x}_i}{\partial \overline{\delta}}))}{N_i^2} \qquad \text{... (12)}$$

Proposition 4: The effect of mergers on profit-effects of trade liberalisation depends on the extent to which the fall in profit due to fall in price outweighs the gain in profit due to increased output.

In the equation (12), the first term can be interpreted as the negative effect of merger on the price effect of trade liberalisation, explained in Narayanan (2005). The second term in equation (12) is the increase in the positive effect of merger on the output effect of freer trade. Hence, to the extent to which price effect dominates output effect of freer trade, the profit effect of trade liberalisation is likely to be increasing in mergers, as fall in number of firms would correspond to increased mergers.

Proposition 5: If $c_1'(.) < c_2'(.)$, then EC_1 can derive higher profit from merger under a freer trade than EC_2.

$\left| c_1''(.) > c_2''(.) \right|$, as assumed in equation (2). In addition to this, if $c_1'(.) < c_2'(.)$, then the second term is higher in EC_1 than in EC_2. Since the first term reduces the effect of mergers and the second term enhances it, the rise in the latter would mean that the effect of mergers of EC_1 would be higher than that in EC_2, under a freer trade at sufficiently large scales of EC_1 such that $c_1'(.) < c_2'(.)$. This proves the proposition 5.

Since, at sufficiently large scales of EC_1, the extent to which gain in output from freer trade increases the profit is larger than that to which a fall in price reduces the profit, the effect of mergers on profit-effects of freer trade is larger than that of EC_2. However, if $c_1'(.) > c_2'(.)$, the comparison of effects of merger on the profit effects of freer trade for the two countries is ambiguous and it depends on the sensitivity of marginal cost to the output, the level of output and sensitivity of output to the extent of freer trade. A higher sensitivity of marginal cost to the output, a lower marginal cost, higher sensitivity of the output to the extent of trade liberalisation and lower sensitivity of price to the extent of trade liberalisation would mean that the effect of mergers on the profit effects of freer trade is higher. This follows directly from the equation (12).

3. Conclusions

The objective of this study is to analyse the effects of trade liberalisation on the firm-level profit-enhancing effects of mergers, under an oligopolistic competition framework. Further, the dependence of this effect on whether the technology is labour intensive or high-IRS is also analysed. Mergers, as considered in this paper, cause an increase in the firm-level profits. The extent to which they enhance the profits is inversely proportional to the number of firms in the country. With mergers, the effects of freer trade depends on the extent to which the fall in profit due to fall in price outweighs the gain in profit due to increased output that results from trade liberalisation. A firm in a high-IRS country can gain more from a merger than one in a low-IRS country in the context of freer trade, if the aggregate output is at sufficiently large scale. Extensions of this model could be done in terms of modelling the mergers in a more sophisticated manner considering non-identical firms and defining the cost functions in different ways.

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