BUYER POWER, EXCLUSIVE CONTRACTS, AND VERTICAL MERGERS IN COMPETING SUPPLY CHAINS: IMPLICATIONS FOR COMPETITION LAW AND POLICY

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ABSTRACT

This paper studies how the buyer power of downstream firms can affect the market outcomes in both upstream manufacturing and downstream retail markets. In a two-tier oligopoly, where upstream firms are locked in a pair-wise exclusive relationship with their downstream retailers, we study the choice of firms between vertical merger and Nash Bargaining with two-part tariff regimes. On working with three cases of no vertical merger, single chain vertical merger and double chain vertical merger we find that joint profits of upstream and downstream firms are lowest when both channels choose vertical integration as compared to Nash Bargaining regime. We also find that Vertical integration is welfare enhancing because retail price will be minimum as upstream and downstream firms behave as a single entity. Hence for both single and double chain mergers, elimination of double marginalization is pro-competitive. These results have implications for the enforcement of competition (antitrust) law.

ACKNOWLEDGMENT

More extended discussion can be found in my working paper (Bhattacharjea and Gupta 2022).

Aditya Bhattacharjea & Srishti Gupta, Alternative Forms of Buyer Power in a Vertical Duopoly: Implications for profits and consumer welfare (Centre for Development Economics Working Paper No. 326, 2022). http://www.cdedse.org/pdf/work326.pdf

1. INTRODUCTION

The law and economics approach to competition policy uses the tools of economics to show how the interactions between firms may result in outcomes that are harmful to society, and how competition (antitrust) law can prevent such outcomes. In the marketplace, upstream and downstream firms come together to produce and distribute products and services to consumers. However, when the interests of these agents are not aligned they indulge in anti-competitive

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practices like collusion or market foreclosure. Hence the Competition Act came into existence. The aim of Competition Act 2002 ["the Act"] is to increase competition in the market and to protect interests of the consumers in Indian markets against anti-competitive agreements, abuse of dominant position by firms, and any other restraint which affects social welfare. The Act focuses on four main segments:

1. Anti-competitive Agreement (Section 3)
2. Abuse of Dominance (Section 4)
3. Regulation of Combinations (Section 5 & 6)
4. Competition Advocacy and Reference (Section 49 & 21)

The first two segments aim at free and fair competition in the marketplace and impose penalties wherever there is a violation. Regulation of combinations focuses on screening of mergers and acquisitions and the last one creates awareness about the benefits of competition.

Section 3(4)(c) deals with exclusive distribution agreements where the supplier agrees to sell his product to only one distributor for resale in a particular territory. Section 3(4)(d) deals with refusal to deal which restricts by any method any person or firm to whom goods are sold. For instance, Case No. 03 of 2011 of Shamsher Kataria v Honda Siels and Ors[2] deals with a violation of these sections. In this case the automobile manufacturer entered into exclusive dealing agreement with his authorised dealers, hence not allowing the latter to procure the spare parts from anyone else. The case also deals with the manufacturers' restrictions on upstream Original Equipment Suppliers (OES). OESs were prevented from supplying spare parts to independent repairing workshops. So, this violated section 3(4)(c) and (d) of the Competition Act.

Section 5 of the Act explains the combination where any merger or amalgamation of firms as per regulations prescribed by the CCI is considered as combination while section 20(4) of the Competition Act discusses various factors on basis of which a merger or combination between agents can have positive or negative effect on market competition. These factors include degree of countervailing power, nature and extent of vertical integration in the market and finally cost-

[2] Shamsher Kataria v Honda Siel Cars India Limited and others, (2011) Case no:03/2011.CCI. 1, 58.

benefit analysis of merger. For instance, CCI favoured the acquisition of 55.39% of total equity share capital of Magma HDI General Insurance Company Limited by Sanoti Properties LLP. Such combination between these two parties involved vertical overlaps (Combination Registration No. C-2022/04/917).[3] Magma HDI General Insurance Company Limited is operating in upstream market of providing non-life insurance products or services in India while Sanoti Properties LLP operates in downstream market of distribution of these products or services. Another example of vertical overlap is acquisition by Worldone Private Limited of 96.42% equity shareholding in Jindal Power Limited where Jindal Power Limited functions in upstream market of power generation while acquirer performs in downstream market of distribution of same (Combination Registration No. C-2021/11/880).[4] Another vertical combination is between TRIL Urban Transport Private Limited, Valkyrie Investment Pte Limited and Solis Capital Pte Limited who acquires 19.75% , 14.81% and 9.88% stakes respectively in GMR Airports Limited (Combination Registration No. C-2019/07/676).[5] GMR is operating in the upstream market of operation and maintenance of airport while acquirers are performing in the downstream market of provision of air transport services (scheduled/ non-scheduled) and other retail services. In 2017 CCI received a notice of vertical combination between Bayer Aktiengesellschaft (the acquirer), Monsanto Company and KWA Investment Co, wholly owned subsidiary of Bayer (Combination Registration No. C-2017/08/523).[6] In all above cases both the parties were performing activities relating to supply, distribution and sale of products or services at different levels of supply chain.

Of the above four cases of vertical overlap, the first two cases are not leading to vertical foreclosure as the market shares of merging firms are small and there is adequate competition in the upstream and downstream markets. While for the latter two cases there is threat of foreclosure as for acquisition of GMR group by Tata Sons group may lead to conflict of interest where acquirer has an incentive to create entry barriers for competing airlines and GMR is

[3] Combination Registration No. C-2022/04/917, Order dated 17.05.2022. (2022). Competition Commission of India.

[4] Combination Registration No. C-2021/11/880, Order dated 29.12.2021. (2021). Competition Commission of India.

[5] Combination Registration No. C-2019/07/676, Order dated 01.10.2019. (2019). Competition Commission of India.

[6] Combination Registration No. C-2017/08/523, Order dated 14.06.2018. (2018). Competition Commission of India.

having control in the market for provision of access to facilities. For the Bayer and Monsanto case, Monsanto had 98-100% market share in the upstream market for the licensing of Bt. cotton traits in India and thus had the ability to foreclose access to the product in downstream market. The CCI approved these mergers subject to the parties accepting certain conditions which would lessen the anti-competitive harms.

In our study we are formulating a model to find out how the downstream firms subcontracting to upstream firms, using their buyer power exploits the latter ones. To study this, we compare consumer surplus, profits of firms and social welfare under two regimes, namely, two part tariff with Nash Bargaining and Vertical Integration. Two-part tariff is a non-linear pricing mechanism where manufacturer sets wholesale price for retailer and a franchise fixed fee. In Two-part tariff with Nash Bargaining, since downstream firm have more buyer power, the fixed fee can be negative in this case. This negative fixed fee is called Slotting allowance which indicates power of retailers with scarce shelf space.[7] Under vertical integration, firms integrate (merge) to form single entity. In our model we have shown that firms always prefer Nash Bargaining over Vertical Integration while consumers prefer vice-versa. We further study with one pair merged and the other pair unmerged whether consumers and integrated firms will benefit under this model, and whether there is an incentive for neither, one or both vertical pairs to merge. In each case, we examine the effect of bargaining power and degree of product substitutability on social welfare. Thus, while competition law usually assesses exclusive contracts and vertical mergers from the perspective of foreclosure of competition, in our model we can evaluate them independently.

2. LITERATURE REVIEW

Traditionally, in competition law and economics, heavy emphasis is given to horizontal market structure where the extent of competition between firms producing the same or similar goods, and their resulting market power, affects the prices, quality and variety of the goods they produce. However, in recent decades, the focus has shifted to vertical relations between firms and buyer power. Most products reach consumers after going through many stages in a vertical chain structure. In vertical relations, upstream firms (manufacturers) sell to downstream firms (retailers) which in turn sell their products to final consumers. The market power could be

[7] L.M. Marx & G. Shaffer, *Slotting Allowances and Scarce Shelf Space*, 19(3) J. ECON. & MGMT. STRATEGY 575, 603 (2010).

equally distributed between upstream and downstream firms or either of them could have more market power. The increasing dominance of downstream retailers such as Wal-Mart and Toys ‘‘R” Us is not only because of their market size but also because of their increased buyer power which allows them to get favourable trading terms from their upstream suppliers. When large retailers are dominating, there is change in structure of power in supply chain.[8] Even in India, online marketplaces like Flipkart, Amazon are expanding because of their quick services, and their ability to provide a lot of variety at one place which isn't possible in offline market places.

Theoretically, in upstream manufacturer-downstream retailer model, buyer power involves ability of retailers to obligate manufacturers to provide more favourable contractual terms. These include requiring manufacturers to make lump-sum payment to the buyer to initiate or continue trading, most-favoured customer clauses and exclusive supply arrangements. Anticompetitive buying conduct by powerful buyers leads to a decline in the price of inputs they buy from sellers which in turn helps them in attaining monopsony power in the input market or market power in output market or both. There are many of definitions of buyer power. One approach is inverting the marker power from seller side to buyer side and defining buyer power as ability of a buyer to maintain prices profitably below competitive levels. Buyer power can be defined as:

“"*[B]uyer power" refers to the circumstances in which the demand side of a market is sufficiently concentrated that buyers can exercise market power over sellers. A buyer has market power if the buyer can force sellers to reduce price below the level that would emerge in a competitive market. Thus, buyer power arises from monopsony (one buyer) or oligopsony (a few buyers), and is the mirror image of monopoly or oligopoly.”*[9]

Though this approach is similar to monopsony power, there exists other definitions of buyer power which includes the notion of bargaining power. In case of monopsony power, the quantity purchased by a buyer is depressed.[10]While in broader sense market power is also derived from various other actions by buyer. For example, mergers or price collusion of buyers,

[8] Yanfei Lan, Haikuan Yan, Da Ren & Rui Guo, *Merger Strategies in A Supply Chain with Asymmetric Capital-Constrained Retailers Upon Market Power Dependent Trade Credit*, 83(C) OMEGA ELSEVIER 299, 318 (2018).

[9] R. G. Noll, “*Buyer Power” and Economic Policy*, 72 ANTITRUST L. J. 589, 624 (2005).
[10] Zhiqi Chen, *Defining Buyer Power*, 53 ANTITRUST BULL. 241, 249 (2008).

contractual requirements,[11] credible threat to take all or none from suppliers.[12] Bargaining power can be defined as "the power to obtain a concession from another party by threatening to impose a cost, or withdraw a benefit, if the party does not grant the concession."[13] Hence bargaining power is different from monopsony power as the former deals with the threat to reduce the quantity buyers purchase while later is achieved by the act, not the threat, of reducing the quantity purchased. Some authors recognize both monopsony power and bargaining power as buyer power, Buyer power "includes both monopsony power and its kissing cousin, bargaining power."[14]

So, buyer power should include market power characteristics and should be interpreted as including both monopsony power and bargaining power[15]. Also, a firm's ability to bargain depends on its bargaining power relative to its rival buyers and relative to sellers in the upstream market.[16]

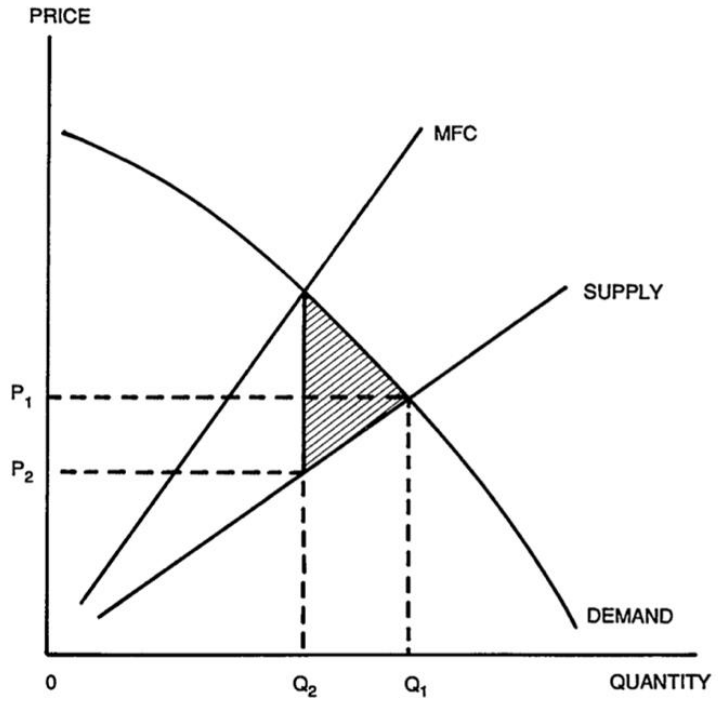
2.1.Classical Monopsony Case

In case of pure monopsony, there is a single buyer and sellers in the market have no market power. As a monopsony is mirror image of monopoly, monopsonist has buyer power in purchasing its requirements. However, monopsony is not beneficial for the economy as it leads to loss of efficiency and dead weight loss as shown in figure below. In the figure, if monopsonist acts as a perfectly competitive buyer and since seller doesn't have market power, the equilibrium in market is attained at the point where demand and supply curve intersect. Equilibrium price would be P1, Quantity would be Q1 and there is no dead weight loss to society. Under monopsony situation, the buyer will buy till that level of quantity where the marginal cost from purchasing one additional unit of input (MFC) intersects the market value of incremental output that input generates (Demand curve). Equilibrium outcome in this case

[11] 10 ROGER CLARKE, BUYER POWER & COMPETITION IN EUROPEAN FOOD RETAILING 9-21 (Edward Elgar Publishing 2002).
[12] J. B. Herndon, *Health Insurer Monopsony Power: The All-or-None Model*, 21(2) J. HEALTH ECON. 197, 206 (2002).
[13] J. B. Kirkwood, *Buyer Power and Exclusionary Conduct: Should Brooke Group Set The Standards for Buyer-Induced Price Discrimination And Predatory Bidding?*, 72 ANTITRUST L. J. 625, 668 (2005).

[14] Albert Foer, *Mr. Magoo Visits Wal-Mart: Finding the Right Lens for* Antitrust, 39 CONN. L. REV. 1307, 1331 (2006).
[15] Zhiqi Chen, *Buyer Power: Economic Theory and Antitrust Policy*, *22* RES. L. & ECON. 17, 40 (2007).
[16] Paul Dobson & Roman Inderst, *Differential Buyer Power and the Waterbed Effect: Do Strong Buyers Benefit or Harm Consumers?*, 28(7) EUR. COMPETITION L. REV. 393, 400 (2007).

is Q2 level of quantity and P2 level of price. The welfare loss to society is equal to the stripped triangular area in below figure[17]



Source: Blair and Harrison (1991)

Since monopsonist extracts lower prices from its suppliers it is believed that this drop in monopsonist's cost will be beneficial to consumers with lower prices in monopsonist's output market. However, this is not the case as monopsonist will not necessarily pass on these lower costs because marginal costs are relevant for pricing decisions.

The prevalence of subcontracting in the manufacturing sector is a field which may potentially come under this model. Subcontracting can be defined as when a firm may choose to undertake all activities in its manufacturing process to subcontract a part of the manufacturing process to an outside firm. Subcontracting benefits both, the parent firm and contracting firm. Parent firms provide the small firms with raw materials, technology, product designs and the like, enabling small firms to perform well in terms of greater output and higher efficiency, while the larger

[17] R.D. Blair & J.L. Harrison, *Antitrust Policy and Monopsony*, 76 CORNELL L. REV. 297, 338 (1991).

firms in return get the necessary end-product at a lower cost. But large firms could take advantage of small firms being big in size by delaying payments or affecting its efficiency.

In the literature, there is extensive discussion on how vertical separation is preferred over vertical integration by agents in the market. In a duopoly model at upstream and downstream level a vertically separated structure is preferred by a manufacturer because a vertically integrated firm will maximize profits with respect to its upstream marginal costs, whereas separation induces the upstream firm to set its wholesale price above marginal costs, and this makes it optimal for the downstream firms to set higher prices that enable them to exploit the strategic complementarity of prices under Bertrand competition in the final goods market[18]. In a model with two-part tariff where there are two manufacturers each supplying a single differentiated product and a downstream industry consisting of single or multiple retailers. Manufacturer's decision to vertically integrate or not depends on the degree of product differentiation[19]. When products are differentiated, then vertical integration is preferred by manufacturers while when products are close substitutes, vertical separation is preferred[20]. Within vertically separated structures, firms have a preference for exclusive trading over non-exclusive trading. Supplier exclusion can take place if slotting allowance is identical across suppliers where their model includes two upstream supplier and one downstream retailer[21].

Even though vertical separation is profitable for upstream and downstream firms depending on their bargaining power, a vertical merger between upstream and downstream firms leads to the elimination of double marginalization (EDM) which arises when an upstream firm adds its mark-up to marginal cost and the downstream firm adds mark-up to wholesale price. With a vertical merger, EDM allows reduction in retail prices to consumers and consumers get better off. However, the vertically merged firm is also likely to raise the price of the input to downstream rival firms as this will induce them to charge higher downstream prices which hence increases its own profits. This theory is called Raising Rival's Cost Theory (RRC). RRC and EDM are inseparable in equilibrium, and it is the size of EDM which determines the

[18] G. Bonanno & J. Vickers, *Vertical Separation*, 36(3) THE J. INDUS. ECON. 257, 265 (1988).
[19] Y. J. Lin, *Oligopoly and Vertical Integration: Note*, 78(1) AMERICAN ECON. REV. 251, 254 (1988).
[20] P. Cyrenne, *Vertical Integration Versus Vertical Separation: An Equilibrium Model*, 9(3) REV. INDUS. ORG. 311, 322 (1994).
[21] Y. Shen, *Platform Retailing with Slotting Allowance and Revenue Sharing*, J. OPERATIONAL RES. SOC'Y 1, 13 (2018).

magnitude of RRC[22]. Competition Commission of India (CCI 2021) studied the telecom sector of the country for the past five years and found the existence of vertical integration between telecom companies and OTT service providers, where telecom companies' revenue increased with increased data consumption because of OTT services and this led to more customers for OTT service providers and increased revenues for them. Even though such integration is welfare improving for consumers, these partnerships affect market competition by creating entry barriers for vertically separated firms both in telecom companies' market and among OTT service providers[23].

A study on 31 empirical studies on vertical integration and its effect on market outcomes gives mixed evidence, wherein some studies confirming the harmful effect of vertical integration on competition while others were supporting it[24]. Introduction of buyer power has some welfare implications. For example, downstream firms can influence the nature of competition in the supplier markets, reduce inter-brand competition between manufacturers and intra-brand competition between them, and reduce the quantity sold to final consumers. When downstream firms have scarce shelf space, two-part tariff with Nash bargaining regime involving slotting allowance can improve social welfare by efficient allocation of goods. Under asymmetric upstream firms, fringe rivals could be overpowered by a dominant firm and this could lead to inefficient allocation. However, they could be beneficial as they could promote supplier innovation in terms of quality and investment in goods; different promotional strategy in different markets, and economies of scale in distribution[25]. Powerful buying firms can actually keep prices low for final consumers by exerting 'countervailing power' against powerful producers[26]. However, critics point out that they may also use their power to increase the price to the final consumer.

[22] G. Das Varma & M. De Stefano, *Equilibrium Analysis of Vertical Mergers*, 65(3) ANTITRUST BULL. 445, 458 (2020).

[23] Competition Commission of India, *Market Study on the Telecom Sector in India*, (2021).
[24] Marissa Beck & Scott Morton, *Evaluating the Evidence on Vertical Mergers*, 59(2) REV. INDUS. ORG. 273, 302 (2021).
[25] Greg Shaffer, *Slotting Allowances and Optimal Product Variety*, 5(1) B.E J. ECON ANALYSIS & POL'Y 1, 28 (2005).
[26] J.K. GALBRAITH, AMERICAN CAPITALISM: THE CONCEPT OF COUNTERVAILING POWER (Houghton Mifflin, New York 1952)

So, we relax this assumption of firms trading through a predetermined regime and extend the study by making firms choose between a two-part tariff with the Nash Bargaining regime in exclusive trading agreements, and vertical integration. By doing so, we aim at filling the research gap regarding the choice between vertical merger vs different degrees of buyer power. So, we incorporate downstream firm's buyer power and study its impact on retail prices and social welfare under different regimes. To keep the analysis simple, we rule out RRC effects and investments or sales promotion strategies.

3. MODEL

In our model, we are studying a vertical structure where each upstream firm exclusively trades with a downstream firm. We aim at finding out how more market power with downstream firm influences social welfare. Since downstream firms have more market power than upstream firms, we can say they have more buyer power. Hence, in our research, we are studying the impact of buyer power on the profits of upstream and downstream firms.

We begin with a vertical setup where two upstream firms supply goods to two downstream firm for selling to consumers. We denote (U_1, U_2) as upstream duopolies and (D_1, D_2) as downstream duopolies. Denote by q_i the output level of final good supplied by downstream duopolies i, i=1,2.

Consumer's demand for final good is linear[27] with slight change in notations denoted as:

$$q_i = a - bp_i + \gamma p_j \qquad i, j = 1,2 \quad ; a, b > 0$$

Here, q_i is the quantity of good i sold by downstream firm i at price p_i . p_j is the price of good sold by downstream firm j. The coefficient of p_i is negative confirming the inverse relationship between price of good i and quantity of good i. The coefficient for price of good j is positive suggesting that both goods are demand substitutes. If p_j increases, consumers will prefer to consume more of q_i as good i has become relatively cheaper. The product differentiation and inter-brand substitutability is captured by parameter γ/b in the direct demand function. We

[27] N. Singh & X. Vives, *Price and Quantity Competition in a Differentiated Duopoly*, 15 RAND J. ECON. 546, 554 (1984).

assume γ/b lies between 0 and 1. When γ/b approaches 1 it implies products are close to perfect substitutes. However, results are not defined for values of γ=1, therefore we are bounding γ strictly less than 1 in all our following derivations. When γ/b approaches to 0, the indirect demand function reduces to

$$p_1 = \alpha - \beta q_1$$

Which shows that products are demand-independent. Each manufacturer is assumed to have constant and identical marginal costs, denoted by c. Imposing the restriction c >0 prevents the price of the goods from falling to zero, which would absurdly give the same result as the case of demand independence in equation (1) if p_j =0. Each downstream firm uses one unit of output of an upstream firm to sell one unit to the final consumers. We set up a downstream firm's cost as cost of purchasing goods from manufacturer at wholesale price. Downstream firms do not provide any retailing services (for example after sale services or promotional services). This allows us to assume that costs incurred in retailing are zero. It also abstracts from the problem of horizontal and vertical externalities arising from retailers' sales efforts, allowing us to focus on comparing different kinds of relationships between upstream and downstream firms. Downstream firms compete by simultaneously setting prices, i.e. as a Bertrand duopoly in differentiated products.

We will be discussing three cases. In case 1, two upstream firms are selling products to two downstream firms exclusively under Nash Bargaining with two-part tariff regime. In case 2, each upstream firm vertically integrates with a downstream firm under Vertical Integration regime. In case 3, we have one channel of upstream and downstream firm vertically integrated while the other is following the Nash bargaining with two-part tariff regime. In all three cases, the contract terms between the upstream- downstream pair are observable to the rival pair.

3.1.Case I: Neither channel is integrated

Each downstream firm's shelf space is assumed to be scarce. Hence, each firm stocks goods of at most one of 2 manufacturers, either U_1 or U_2 but not both. Since shelf space is restricted with downstream firms, this gives downstream firm, buyer power to choose amongst manufacturers leading to exclusive trading. This setup provides one justification for an exclusive trading arrangement between each pair of upstream and downstream firms. No downstream firm who is selling the product of one upstream firm will want to switch to the other supplier, because then it will be competing against the other downstream firm for the same product, which will

result in the Bertrand Paradox with zero profits.

An alternative explanation of exclusivity is that each upstream firm produces a different specialized intermediate input which is further processed or assembled by a downstream firm that sells directly to consumers, for whom the two goods are imperfect substitutes. Downstream firms have to specialize their technology to process/assemble the product of a particular upstream supplier, so the upstream firm cannot switch to the other downstream firm, or any other potential downstream entrant. Similarly, each downstream firm cannot switch to a different supplier. Exclusive trading therefore involves exclusive supply agreement between a downstream firm and a manufacturer as shown in figure 1 below:

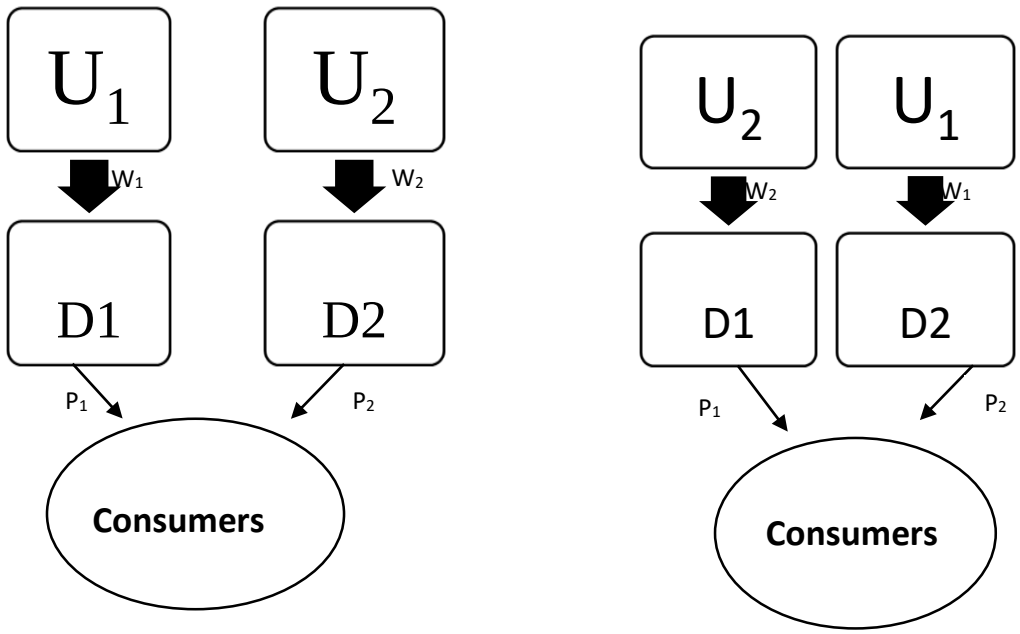


Figure 1. Possible assortment in Exclusive Trading contract

In Figure 1, w_i stands for the wholesale price which the downstream firm pays to upstream firms for goods purchased and p_i stands for the retail price which consumers pay to downstream firms for goods purchased. The configuration in the two left pairs is an alternative to those in the two right pairs. Such configurations are sometimes described in the literature as "supply chain or channel competition".

Following contractual sets are possible between upstream and downstream firms (U_1, D_1), (U_1, D_2), (U_2, D_1) & (U_2, D_2). We are assuming (U_1, D_1) & (U_2, D_2) sets hold true in all vertical regimes and profits of downstream firm 1 are more when he sells good from manufacturer 1

compared to manufacturer 2 ($\pi_{D1}(U_1) > \pi_{D1}(U_2)$). In fact, with either of the two alternative explanations of exclusivity discussed above, if downstream firm 1 sells a product from manufacturer 2 he will make zero profits i.e, $\pi_{D1}(U_2) = 0$.

Because of buyer power, slotting fee is also a possibility in our Nash Bargaining regime where each downstream firm imposes slotting fee contract of type (w, S) where w is wholesale price that downstream firm pays to manufacture for each unit of his product downstream firm buys from him and S is slotting allowance, a fixed amount independent of number of units bought from the manufacturer. It represents a slotting fee paid by the manufacturer to downstream firm, which can be regarded as the mirror image of a franchise fee paid by the downstream firm to the manufacturer. The set-up of the optimization problem for Nash bargaining regime is briefly outlined below, followed by the major findings.

3.1.1. Two-part tariff with Nash Bargaining

The equilibrium of bargaining between manufacturer and downstream firm is given with input price w_i and slotting allowance S by the following maximization problem:

$$\underset{w_i, S_i}{\operatorname{argmax}}\{(\pi_{Ui} - \pi_{U0})^{\mu}(\pi_{Di} - \pi_{D0})^{1-\mu}\}$$

For the upstream firm, i the disagreement payoff (π_{U0}) is obtained as the profit it gets by selling to downstream firm j and similarly for downstream firm the disagreement payoff (π_{D0}) is calculated as the amount of profit it receives when trading with upstream firm j. For simplicity, we have taken disagreement payoffs of both manufacturer and downstream firm equal to zero. In above expression, μ defines the bargaining power of upstream firm and $(1-\mu)$ is bargaining power of downstream firm. As long as μ lies between 0 and 0.5 downstream firms have more bargaining power than upstream firms. If μ lies between 0.5 and 1 then upstream firms have more bargaining power than downstream firms.

First order conditions on maximizing above problem for w_i and S give:

$$\frac{\partial \pi^{D}}{\partial w_i} + \frac{\partial \pi^{U}}{\partial w_i} = 0$$

$$S = (1 - \mu)\pi^{Ua} - \mu\pi^{Da}$$

Where, π^{Ua} is profit of manufacturer excluding slotting allowance and similary π^{Da} is downstream firm's profit excluding slotting allowance while $\pi^{Ua} - S$ gives us π_{Ui}, manufacturer's total profit and $\pi^{Da} + S$ equals to π_{Di}, which is downstream firm's total profit.

$$\pi^{Ua} = (w - c)q \;\; ; \;\; \pi^{Da} = (p\text{-}w)\, q$$

$$\pi_{Di} = (p_i - w_i)\, q_i + S \quad ; \quad \pi_{Ui} = (w_i - c)\, qi - S \qquad i=1,2$$

3.2.Case II: Both channels are integrated

3.2.1. Vertical Integration

In vertical integration, upstream and downstream firms integrate to form a single entity. In the figure below there is vertical merger between U_1 and D_1 & U_2 and D_2 We call this double-channel merger.

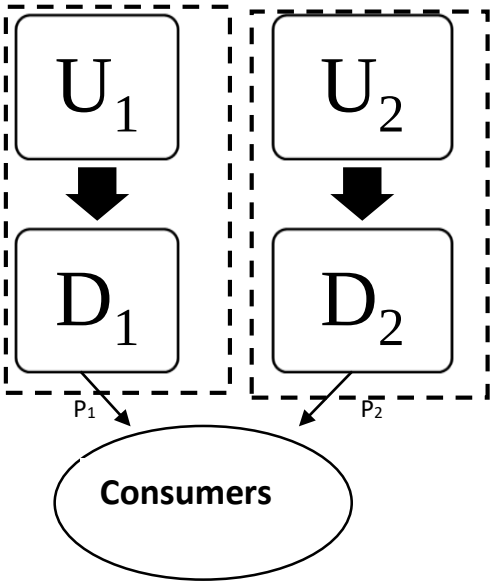


Figure 2. Vertical merger in an Exclusive Trading context

Integrated firm's profits are divided between shareholders of the erstwhile upstream and downstream firms according to their relative bargaining power. The profit function of vertically integrated firm is as below:

$\pi_1 = (p_1\text{-}c)\, q_1$

Each integrated firm chooses optimal price by differentiating its profit function with respect to its price. For firm 1,

$$\frac{\partial \pi_{VI1}}{\partial p_1} = (p_1 - c)\frac{\partial q_1}{\partial p_1} + q_1 = 0$$
$$= (p_1 - c)(-b) + a - bp_1 + \gamma p_2 = 0$$

On simplifying the above equation, we get,

$$\mathrm{p}_1 = \frac{a + bc + \gamma \mathrm{p}_2}{2b}$$

When we repeat same exercise for integrated firm 2, we get

$$\mathrm{p}_2 = \frac{a + bc + \gamma \mathrm{p}_1}{2b}$$

When we substitute p_2 in p_1 we get following optimal retail quantities and prices of each product.

$$p_1^* = \frac{\mathrm{a} + \mathrm{bc}}{(2\mathrm{b} - \gamma)} \; ; p_2^* = \frac{\mathrm{a} + \mathrm{bc}}{(2\mathrm{b} - \gamma)}$$

$q_1^* = \frac{\mathrm{b(a+c(-b+\gamma)}}{(2\mathrm{b}-\gamma)} \; ; q_2^* = \frac{\mathrm{b(a+c(-b+\gamma)}}{(2\mathrm{b}-\gamma)}$

3.3.Case III: One channel is integrated

We begin by focusing on how vertical merger of only one pair of upstream and downstream firms (as shown in the figure below) affects profits of integrated and unintegrated firms, pre and post-merger, and consumer surplus. In the figure below, there is a vertical merger between U_1 and D_1 while U_2 and D_2 remain in their premerger relationship, either Two-part tariff (Nash Bargaining). We call this a single-channel merger.

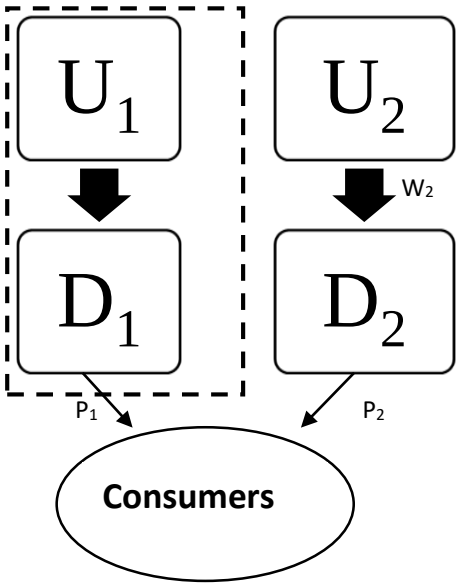


Figure 3. Vertical single-channel merger in an Exclusive Trading context

We use the relevant profit expressions to solve the following two-stage game. In Stage 1, both downstream firms simultaneously decide whether or not to vertically integrate with their upstream supplier. Then in Stage 2, the two supply channels compete in the final goods market. Order of moves within the second period will be the same as above for non-integrating firms U_2-D_2 while U_1-D_1 maximize the vertically integrated profits. By symmetry, integration of only U_2 and D_2, with U_1 and D_1 remaining unintegrated, will give exactly the same payoffs, with firm's subscripts interchanged. We derive the equilibrium prices of the final goods after the single-channel merger, and compare them to the prices in the respective regimes that were derived in the previous cases, to determine whether consumers benefit.

3.3.1 Two-Part Tariff with Nash Bargaining

We begin with structure where U_1-D_1 are vertically integrated and U_2-D_2 operate as separate firms with U_2 selling to D_2 under a two-part tariff determined by Nash Bargaining, but here U_1-D_1 maximize the integrated profits. The Nash equilibrium in this model arises in final goods market where integrated firm and downstream firm 2 interact. Integrated firm's profits are divided between shareholders of the erstwhile upstream and downstream firms according to their relative bargaining power.

The profit function of the vertically integrated firm is as below:

$$\pi_1 = (p_1 - c)\, q_1$$

Integrated firm's profits are divided between shareholders of the erstwhile upstream and downstream firms according to their relative bargaining power μ. The integrated firm chooses optimal price by differentiating integrated profit function with respect to price,

$$\frac{\partial \pi_1}{\partial p_1} = (p_1 - c)\frac{\partial q_1}{\partial p_1} + q_1 = 0$$
$$= (p_1 - c)(-b) + a - bp_1 + \gamma p_2 = 0$$

On simplifying the above equation, we get,

$$\mathrm{p}_1 = \frac{a + bc + \gamma \mathrm{p}_2}{2b}$$

The equilibrium of bargaining between manufacturer 2 and downstream firm 2 is given with input price w_2 and slotting allowance *S* by the following maximization problem:

$$\underset{w_2, S}{\text{argmax}} \{(\pi_{U2} - \pi_{U0})^{\mu} (\pi_{D2} - \pi_{D0})^{1-\mu}\}$$

For simplicity we have taken disagreement payoffs of both manufacturer (π_{M0}) and downstream firm (π_{D0}) equal to zero. First order conditions on maximizing gives:

$$\frac{\partial \pi_{D2}}{\partial w_2} + \frac{\partial \pi_{U2}}{\partial w_2} = 0$$
$$S = (1 - \mu)\pi_2^{Ua} - \mu\pi_2^{Da}$$

Where, π_2^{Ua} is profit of manufacturer excluding slotting allowance and similary π_2^{Da} is downstream firm's profit excluding slotting allowance while $\pi_2^{Ua} - S$ gives us π_{U2}, manufacturer's total profit and $\pi_2^{Da} + S$ equals to π_{D2}, which is downstream firm's total profit.

$$\pi_2^{Ua} = (w_2 - c)q_2 \;\; ; \;\; \pi_2^{Da} = (p_2 - w_2)\, q_2$$
$$\pi_{D2} = (p_2 - w_2)\, q_2 + S \quad ; \quad \pi_{U2} = (w_2 - c)\, q_2 - S \qquad i = 1,2$$

When we solve the above first order conditions for optimal price and quantity, we find

$$p_1^* = \frac{a(4b^2 + 2b\gamma - \gamma^2) + c(4b^3 + 2\gamma b^2 - b\gamma^2 - \gamma^3)}{(8b^3 - 4b\gamma^2)} ;$$

$$p_2^* = \frac{\mathrm{a}(2\mathrm{b}+\gamma) + c(\,2\mathrm{b}^2 - \gamma^2 + b\gamma)}{\left(4b^2 - 2\gamma^2\right)}$$

$$q_1^* = \frac{(4b^2 + 2b\gamma - \gamma^2)(\mathrm{a} - \mathrm{bc} + c\gamma)}{8b^2 - 4\gamma^2}$$

$$q_2^* = \frac{(2b+\gamma)(\mathrm{a} - \mathrm{bc} + c\gamma)}{(4b)}$$

$$S^* = \frac{(2\mathrm{b}+\gamma)^2(\mathrm{a} - \mathrm{c}(\mathrm{b}-\gamma))^2(\gamma^2 - 2b^2\mu)}{32b^5 - 16b^3\gamma^2}$$

4. FINDINGS

$\mathbf{w_{i,j,k}^*}$ gives optimal wholesale price for upstream firms, where U stands for upstream manufacturer. 'i' can be equal to 1 referring to number 1 firm or 2 referring to number 2 firm. 'j' defines regime type chosen by firm 1 , so j can be NB (Nash Bargaining) or VI (Vertical Integration regime). Similarly, 'k' defines regime type chosen by firm 2 , so k can be NB (Nash Bargaining) or VI (Vertical Integration regime). Similarly, $\mathbf{p_{i,j,k}^*}$ gives optimal retail price for downstream firm where D stands for downstream firm. Here we rank wholesale and retail prices, joint profits and consumer and social welfare. Joint profits of a firm are profits calculated by adding the profits of both the upstream and downstream firms when they are separated, and their consolidated profit when they are integrated.

In the appendix of this paper all the equilibrium expressions are tabulated. On comparing these efficient outcomes of case I (both channels choose Nash bargaining with two-part tariff) with outcomes of case II (each channel vertically integrates) & case III (one channel vertically integrates while other follows Nash Bargaining with two part tariff) we get following relationship. All the proofs in below comparison between wholesale prices, retail prices, joint profits when both firms choose vertical integration or Nash bargaining regime are to be found in working paper by Bhattacharjea and Gupta (2022)[28] while the ranking of outcomes for the single-channel merger can be provided upon request.

[28] Aditya Bhattacharjea & Srishti Gupta, *Alternative Forms of Buyer Power in a Vertical Duopoly: Implications for profits and consumer welfare* (Centre for Development Economics Working Paper No. 326, 2022). http://www.cdedse.org/pdf/work326.pdf

a. $w_{i,NB,NB}^* > w_{i,VI,VI}^* = w_{i,VI,NB}^* = c$

On comparing wholesale prices in these three types of regimes we find that wholesale price will be lowest for case II and case III as vertical integration of upstream and downstream firms maximize their integrated profit behaving as single entity, setting wholesale price equal to upstream firm's marginal cost.

b. $p_{i,VI,VI}^* < p_{i,VI,NB}^* < p_{i,NB,NB}^*$

On comparing retail prices in these three types of regimes we find that retail price will be lowest for case III as vertical integration of upstream and downstream firms maximize their integrated profit behaving as single entity.

With symmetric firms, prices are inversely proportional to consumer surplus and social welfare. Above relation confirms below inequality for consumer surplus and social welfare.

c. $CS_{VI,VI} > CS_{VI,NB} > CS_{NB,NB}$

On comparing consumer surplus in these three types of regimes we find that surplus will be lowest for Nash Bargaining regime.

d. $SW_{VI,VI} > SW_{VI,NB} > SW_{NB,NB}$

So, Vertical integration is welfare enhancing as retail price will be minimum in vertical integration as upstream and downstream firms behave as a single entity, eliminating double marginalization in the vertical structure of that channel.

From above consumer surpluses under different regimes, we find that consumer is getting maximum surplus when both downstream firms choose vertically integrated regime over other two regimes.

e. Comparison of Joint profits of channel 1 for all values of $\gamma \in (0, 1)$ and $c \in [0, 0.5)$: $(\pi^*_{1,NB}, \pi_{2,NB}) > (\pi^*_{1,VI}, \pi_{2,NB}) > (\pi^*_{1,VI}, \pi_{2,VI})$

In a nutshell, when the unintegrated channel follows two-part pricing with Nash Bargaining, vertical integration of the other channel benefits consumers but integrated firm is not in favour of merger as its joint profits are reducing post-merger. From above derivations, we can say that total profits of both the integrated and unintegrated firms have reduced post-merger

compared to pre-merger scenario while joint profits are least when both channels choose to vertically integrate.

4.1.Simultaneous and Sequential Game

In this section we find out the Nash equilibrium on the basis of actions chosen by the two chains when they move simultaneously and when they move sequentially. We begin with setting up the game,

Set of Players : 2 players $\{C_1, C_2\}$, where C_i is channel i

Set of possible strategies : $S = \{ s_1 , s_2\}$ = { VI (Vertical Integrate), No VI (Do not Vertical Integrate)}

Payoff function of player i : $u_i(s_1 , s_2)$ where $u_i : S \rightarrow R$

We will first discuss the simultaneous game where channel i and j choose VI or No VI at the same time. In below section the matrix representation of game is called as strategic game where the rows and columns depict the decisions of the channels and the entries in the matrix are their joint payoffs. We perform this exercise for both the regimes.

4.1.1. Two-Part Tariff with Nash Bargaining

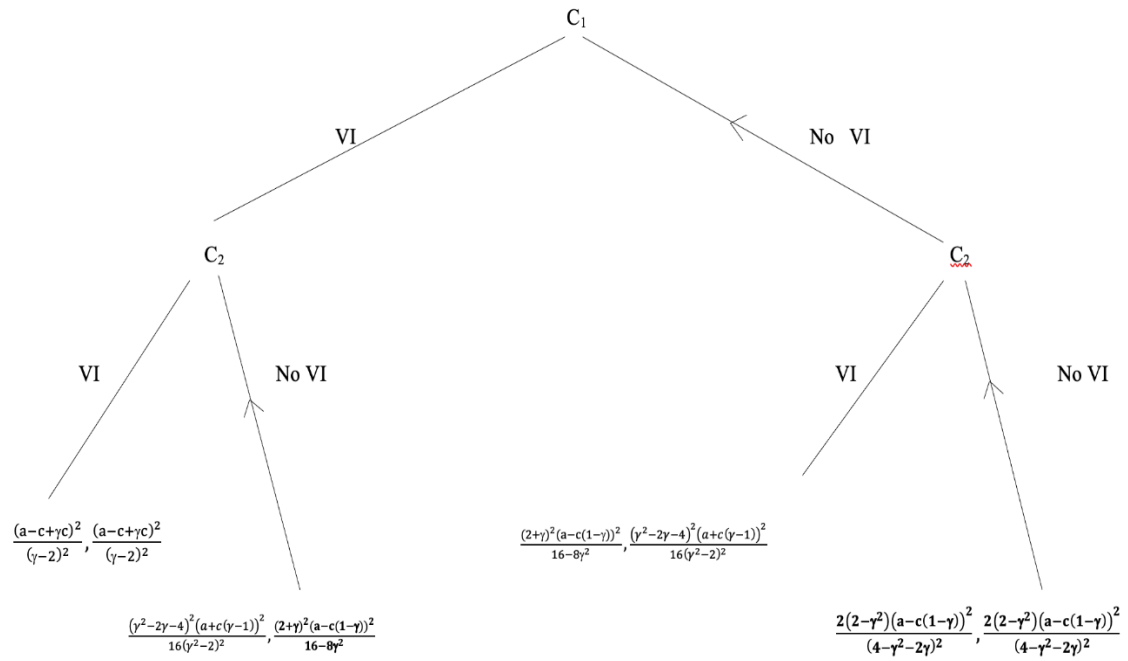
In this bimatrix form, channels simultaneously choose between two strategies, to vertically integrate or to not vertically integrate. They payoffs in each cell are derived from Cases I, II and III above, whichever is relevant. By comparison of payoffs which are profits of channels under pre-merger post-merger scenario, we find that *to not Vertically Integrate is the dominant strategy for both the channels, so the subgame perfect equilibrium is that neither channel integrates.*

		C2	
		Vertically Integrate	**Do Not Vertically Integrate**
C1	**Vertically Integrate**	$\frac{(\mathrm{a}-\mathrm{c}+\gamma\mathrm{c})^2}{(\gamma-2)^2}$, $\frac{(\mathrm{a}-\mathrm{c}+\gamma\mathrm{c})^2}{(\gamma-2)^2}$	$\frac{(\gamma^2-2\gamma-4)^2\left(a+c(\gamma-1)\right)^2}{16(\gamma^2-2)^2}$, $\frac{\boldsymbol{(2+\gamma)^2(\mathrm{a}-\mathrm{c}(1-\gamma))^2}}{\boldsymbol{16-8\gamma^2}}$
	Do Not Vertically Integrate	$\frac{\boldsymbol{(2+\gamma)^2(\mathrm{a}-\mathrm{c}(1-\gamma))^2}}{\boldsymbol{16-8\gamma^2}}$, $\frac{(\gamma^2-2\gamma-4)^2\left(a+c(\gamma-1)\right)^2}{16(\gamma^2-2)^2}$	$\frac{\boldsymbol{2(2-\gamma^2)\left(\mathrm{a}-\mathrm{c}(1-\gamma)\right)^2}}{\boldsymbol{(4-\gamma^2-2\gamma)^2}}$, $\frac{\boldsymbol{2(2-\gamma^2)\left(\mathrm{a}-\mathrm{c}(1-\gamma)\right)^2}}{\boldsymbol{(4-\gamma^2-2\gamma)^2}}$

We have worked out the extensive form below when players play a sequential game instead of simultaneous game. In this game also channels C_1 and C_2 choose between two actions, i.e. vertically integrate, Do not vertically integrate. We have worked out the case where C_1 moves first and then C_2 decides to {(VI,VI),(VI, No VI),(No VI,VI), (No VI, No VI)}on basis of his payoffs. We have perfect information in this sequential game where C_2 knows the strategy of C_1. Hence, we solve this game with backward induction where we begin at final node where C_2 do decision making on basis of his payoffs and then we move upward the tree to C_1 who does his decision making on basis of C_2 's actions.

On solving the game we found that in Nash Bargaining regime, it is dominant strategy for C_2 to not vertically integrate, hence, C_2 chooses strategy (No VI, No VI). As we move up the tree, C_1 prefers to not vertically integrate over vertical integration as his payoffs are more in former one. Therefore, (Do not Vertically Integrate, Do not Vertically Integrate) is the Nash Equilibrium.

Nash Equilibrium



5. CONCLUSION

Our contribution to existing literature is that so far, literature allocates full bargaining power to either upstream firms or downstream firms while in our study by allowing for two-part tariff regime with Nash Bargaining, we give some bargaining power to the downstream firm and rest to upstream firm in deciding the terms of the contract. From above study we have shown the 2x2 structure where we have two upstream firms each dealing exclusively with one of the two downstream firms, wholesale and retail prices are lower under Vertical Integration than under two-part tariff with Nash Bargaining regime. We can conclude that it is because of elimination of double marginalization, as discussed in the literature, under vertical integration regime that wholesale and retail prices are lower under it. In our model we do not have RRC problem as upstream firms are exclusively dealing with downstream firms.

Also, since competition policy evaluates firms' behaviour in terms of effects on consumer welfare, our model shows that vertical mergers are welfare improving but upstream and downstream firms will not like to implement them as their joint profits are relatively least in integrated structure than in a structure where one firm is integrating while other is separated. Joint profits are maximum when both firms function in a vertically separated structure choosing Nash bargaining regime. These results show that even without considering RRC and exclusionary effects, exclusive contracts may have adverse effects on welfare.

ISSN 2582-2667

APPENDIX: *Table: Comparison of Equilibrium outcomes Pre and Post Merger (b=1)*

	PRE-MERGER		**POST MERGER**	
	When both vertical chains follow:		When U_2 and D_2 follow:	
	VERTICAL INTEGRATION	**TWO-PART TARIFF WITH NASH BARGAINING**	**VERTICAL INTEGRATION**	**TWO-PART TARIFF WITH NASH BARGAINING**
w_1	c	$\frac{a\gamma^2 - c(\gamma^2-2)(2-\gamma)}{(4-2\gamma-\gamma^2)}$	c	c
w_2	c	$\frac{a\gamma^2 - c(\gamma^2-2)(2-\gamma)}{(4-2\gamma-\gamma^2)}$	c	$\frac{a\gamma^2(2+\gamma) + c(\gamma^3-(4-\gamma^2)(\gamma^2-2))}{(4(2-\gamma^2))}$
q_1	$\frac{(a+c(-1+\gamma)}{(2-\gamma)}$	$\frac{(2-\gamma^2)(a-c+c\gamma)}{(4-2\gamma-\gamma^2)}$	$\frac{(a+c(-1+\gamma)}{(2-\gamma)}$	$\frac{(4+2\gamma-\gamma^2)(a-c+c\gamma)}{8-4\gamma^2}$
q_2	$\frac{(a+c(-1+\gamma)}{(2-\gamma)}$	$\frac{(2-\gamma^2)(a-c+c\gamma)}{(4-2\gamma-\gamma^2)}$	$\frac{(a+c(-1+\gamma)}{(2-\gamma)}$	$\frac{(2+\gamma)(a-c+c\gamma)}{(4)}$
p_1	$\frac{a+c}{(2-\gamma)}$	$\frac{2a-c(\gamma^2-2)}{(4-2\gamma-\gamma^2)}$	$\frac{a+c}{(2-\gamma)}$	$\frac{a(4+2\gamma-\gamma^2)+c(4+2\gamma-\gamma^2-\gamma^3)}{(8-4\gamma^2)}$
p_2	$\frac{a+c}{(2-\gamma)}$	$\frac{2a-c(\gamma^2-2)}{(4-2\gamma-\gamma^2)}$	$\frac{a+c}{(2-\gamma)}$	$\frac{a(2+\gamma)+c(2-\gamma^2+\gamma)}{(4-2\gamma^2)}$
π_1	$\frac{(a-c+\gamma c)^2}{(-2+\gamma)^2}$	$\frac{2(2-\gamma^2)(a-c(1-\gamma))^2}{(4-\gamma^2-2\gamma)^2}$	$\frac{(a-c+\gamma c)^2}{(-2+\gamma)^2}$	$\frac{(\gamma^2-2\gamma-4)^2(a+c(\gamma-1))^2}{16(\gamma^2-2)^2}$
π_2	$\frac{(a-c+\gamma c)^2}{(-2+\gamma)^2}$	$\frac{2(2-\gamma^2)(a-c(1-\gamma))^2}{(4-\gamma^2-2\gamma)^2}$	$\frac{(a-c+\gamma c)^2}{(-2+\gamma)^2}$	$\frac{(\gamma+2)^2(a-c(1-\gamma))^2}{16-8\gamma^2}$
S*		$\frac{(\gamma^2-2\mu)(2-\gamma^2)(a-c(1-\gamma))^2}{(4-2\gamma-\gamma^2)^2}$		$\frac{(2+\gamma)^2(a-c(1-\gamma))^2(\gamma^2-2\mu)}{32-16\gamma^2}$

ISSN 2582-2667