Journal of International Conference Proceedings (JICP) Vol.5 No.2, pp. 96-105, July, 2022
P-ISSN: 2622-0989/E-ISSN: 2621-993X
https://www.ejournal.aibpmjournals.com/index.php/JICP

Observable Versus Unobservable Contracts in Duopolistic Competition

Ayu Sasni Munte[1], Arie Kawulur[2]
Universitas Negeri Manado[1,2]
National Dong Hwa University[1]
Correspondence Email: ayusasni77@gmail.com
ORCID ID: https://orcid.org/0000-0002-7683-2749

ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Munte, A. S., Kumulur, A. (2022). Observable Versus Unobservable Contracts in Duopolistic Competition. *Journal of International Conference Proceedings*, *5*(2), 96-105.

DOI:
https://doi.org/10.32535/jicp.v5i2.1676

Received: 1 July 2022
Accepted: 15 July 2022
Published: 26 July 2022

ABSTRACT

One upstream and two downstream firms are involved in a vertically related industry. Under observable contracts, firms are aware of both their own and their rival's input prices. However, under an unobservable contract, firms only know their own input price and are unaware of their rival's input price. We demonstrate both vertical separation and vertical integration in the two contracts. We focus on two methods: linear tariffs and two-part tariffs. With linear tariffs and asymmetric costs under both observable contracts and unobservable contracts, vertical integration increases consumer surplus and social welfare. With separation linear tariffs and asymmetric costs, consumer surplus (social welfare) is lower (higher) under observable contracts than under unobservable contracts. With two-part tariffs, vertical integration does not affect (decreases) both consumer surplus and social welfare under observable contracts (under unobservable contracts). Under separation two-part tariffs, consumer surplus and social welfare are lower under observable two-part tariffs than under unobservable ones.

Keywords: Observable Contracts, Unobservable Contracts, Duopolistic Competition

INTRODUCTION

The observable contracts are the most well-known literature in industrial organization. An observable contract means that other players in the game can see the contract, which could give the first player advantages in the game. Contrary to observable contracts is the term "unobservable contracts." Unobservable contracts are the condition in which the contract is not visible to other players. It is somewhat less well understood, and as a result, this situation is an important one to investigate. For example, in an oligopoly market structure, a contract between an executive and his company may be mostly implicit and self-enforcing. It might be too expensive for the agent and the other players to write and enforce a contract that says there is no other agreement between the agent and his principal.

Vertical separation, where upstream and downstream firms separate vertically, under unobservable contracts, allows opportunism. However, vertical integration does not have opportunistic behaviour.

This study would like to observe linear tariffs and two-part tariffs to assess the outcome under observable and unobservable contracts. A linear tariff means the upstream firm charges the downstream specific royalty rate. On the other hand, two-part tariffs impose two different charges on the consumer: one that is a specific royalty rate, and another is a fixed fee. For example, for electricity, someone pays a fixed charge based on the size or rateable value of one's house plus a charge per unit of actual consumption.

LITERATURE REVIEW

Many papers analyse the observable contracts. The upstream firm discloses the information about the input price to the downstream firms. Therefore, both downstream firms can observe their input price and their rival's input price imposed by the upstream firm. Goering (2014) presents a bilateral monopoly model where an upstream firm sells output to a downstream firm. Using a two-part tariff, wholesale price and CSR, the upstream firm can fully control the downstream firms. Arya (2008) shows that a manufacturer with dual distribution can benefit from decentralized control and transfer prices that are higher than marginal cost. Bulow et al. (1985) show that strategic substitutes and strategic complements can influence output. Outputs are generally considered strategic substitutes, while prices are considered as the strategic complements. Vives (1984) analyses a duopoly model with uncertain linear demand and finds that in Bertrand's (Cournot) competition, sharing information is a dominant strategy for each firm if the goods are substitutes (not). According to Theilen (2007), consumer surplus expectations do not consistently decrease when ownership and management are separated. In addition, there are some other studies on observable contracts [for example, see Fershtman and Judd (1987), Schelling (1960), Sklivas (1987), and Vickers (1985)].

In reality, in many cases, the upstream firm hides the information from the downstream firms, especially about the input prices. When upstream firm determines the input price secretly, the downstream firms are only aware of their input price but not rival's input price. Therefore, the upstream firm can adjust the input price to the other after imposing on one firm. Upstream suppliers that use secret two-part tariffs are vulnerable to opportunistic behaviour, and prevent them from obtaining monopolies (Hart and Tirole, 1990). If a firm cannot observe its rival's input price, it must form expectations about the participation of the rival. In response to input price changes, firms do not adjust their expectations based on external information. Yet, passive expectations are fulfilled in equilibrium. There are many papers related [example, see McAfee and Schwartz (1994), Belleflamme and Peitz (2019), Gaudin (2019), Pinopoulos (2019, 2020a, 2020b)].

RESEARCH METHOD

In this study, we consider a vertically related industry with two downstream firms, firm 1 and firm 2. Each downstream firm purchases an input from upstream firm U, and transforms it into a homogeneous final good in *one-to-one* proportion and sells it to consumers. We assume the inverse demand is linear, $P = a - Q$, where P is the final-good price and $Q = q_1 + q_2$ is the total final-good quantity, with q_1, q_2 denoting the final-good quantity of firm 1 and firm 2, respectively.

We consider two methods: linear tariffs and two-part tariffs. The former means U charges an input price w_i only. The marginal costs of the two downstream firms are different. Downstream firm 1 is the less efficient firm, $c_1 > c_2$. For simplicity, we assume that $c_1 = c$ and $c_2 = 0$. The latter means U charges an input price w_i and a fixed fee f_i to the downstream firms.

The game setting is as follows: In the first stage, the upstream firm determines the input price, either w_i or (w_i, f_i). In the second stage, downstream firms compete in quantities with or without observing their own and rival's input price. The game is solved by backward induction.

RESULTS

1. Linear Tariffs and Asymmetric Costs
1.1 Observable Contracts

The input price information imposed by the upstream firm is observable by the two downstream firms. Therefore, both downstream firms know their input prices and their rival input prices.

a. Vertical Separation

We solve the second stage of the game. Firm 1 and firm 2 choose their quantity to maximize the following problems:

$$\max_{q_1} \pi_1 = (a - q_1 - q_2 - w_1 - c)q_1,$$
$$\max_{q_2} \pi_2 = (a - q_2 - q_1 - w_2)q_2.$$

The first order conditions (F.O.C) are given by

$$\frac{\partial \pi_1}{\partial q_1} = a - 2q_1 - q_2 - w_1 - c = 0,$$
$$\frac{\partial \pi_2}{\partial q_2} = a - 2q_2 - q_1 - w_2 = 0.$$

By solving the maximization problems, we are able to derive the equilibrium quantities q_1 and q_2 in the second stage as:

$$q_1 = \frac{a - 2w_1 + w_2 - 2c}{3}, \qquad q_2 = \frac{a - 2w_2 + w_1 + c}{3}. \tag{1}$$

From (1), due to the marginal cost difference, the effect of c on q_1 is negative, but on q_2 is positive.

Solving the first stage, U maximizes the following problem:

$$\max_{w_1, w_2} \pi_U = w_1 q_1(w_1, w_2) + w_2 q_2(w_1, w_2).$$

The F.O.Cs for the profit-maximization problems are given by

$$\frac{\partial \pi_U}{\partial w_1} = \frac{a - 4w_1 + 2w_2 - 2c}{3} = 0,$$
$$\frac{\partial \pi_U}{\partial w_2} = \frac{a - 4w_2 + 2w_1 + c}{3} = 0.$$

We solve w_1 and w_2 simultaneously to obtain the optimal input price and quantity, which are:

$$w_1^s = \frac{a-c}{2}, \qquad w_2^s = \frac{a}{2} \qquad q_1^s = \frac{a-2c}{6}, \qquad q_2^s = \frac{a+c}{6}, \tag{2}$$

where superscript s denotes equilibrium results under vertical separation. Note that we restrict $a > 2c$ for firm 1's positive output. The marginal cost c reduces the input price and firm 1's output, but increases firm 2's output.

Give that the profits, consumer surplus (CS), and social welfare (SW) in equilibrium are realized as:

$$\pi_1^s = (\frac{a-2c}{6})^2, \qquad \pi_2^s = (\frac{a+c}{6})^2, \quad \pi_U^s = \frac{a^2-ac+c^2}{6}, \qquad CS^s = \frac{Q^2}{2} = \frac{(2a-c)^2}{72},$$
$$SW^s = CS^s + \pi_1^s + \pi_2^s + \pi_U^s = \frac{20a^2-20ac+23c^2}{72}. \tag{3}$$

Equation (3) shows that both consumer and social welfare are decreasing in c.

b. Vertical Integration

Suppose now that U and one downstream firm 1 integrate vertically, say *I*; this could, for example, be the result of a vertical merger. The vertically integrated firm I does not want to foreclose the more efficient firm 2. Firm 2 has a lower marginal cost than the integrated firm *I does,* therefore firm 2 can survive in the market. Solving the second stage of the game, I and firm 2 choose their quantity to maximize profits:

$$\max_{q_1} \pi_I = w_2 q_2 + (P-c)q_1,$$
$$\max_{q_2} \pi_2 = (P-w_2)q_2.$$

Differentiating profits with respect to q_1 and q_2, we can derive the F.O.Cs are given by

$$\frac{\partial \pi_I}{\partial q_1} = a - 2q_1 - q_2 - c = 0,$$
$$\frac{\partial \pi_2}{\partial q_2} = a - 2q_2 - q_1 - w_2 = 0.$$

By solving the above optimization problems, we can derive the equilibrium quantities q_1 and q_2 in the second stage as:

$$q_1 = \frac{a-2c+w_2}{3}, \qquad q_2 = \frac{a+c-2w_2}{3}. \tag{4}$$

Equation (4) shows that an increase in w_2 (c) leads to an(a) increases (decreases) in q_1, but a (an) decreases (increases) in q_2.

In the first stage, I solves the profit- maximization problem as follows:

$$\max_{w_2} \pi_I = w_2 q_2 + (P-c)q_1.$$

The F.O.C for the optimization problem is given by

$$\frac{\partial \pi_I}{\partial w_2} = \frac{5a-c-10w_2}{9} = 0.$$

By routine calculations, we obtain the optimal input price and quantities as:

$$w_2^I = \frac{5a-c}{10}, \qquad q_1^I = \frac{5a-7c}{10}, \qquad q_2^I = \frac{2c}{5}, \tag{5}$$

where superscript I denotes the equilibrium results under vertical integration.
By using (5), we then can derive firm's profit, CS, and SW as:

$$\pi_2^I = \frac{8c^2}{50}, \quad \pi_I^I = \frac{5a^2-10ac+9c^2}{20}, \quad CS^I = \frac{Q^2}{2} = \frac{(5a-3c)^2}{200},$$
$$SW^I = CS^I + \pi_2^I + \pi_I^I = \frac{75a^2-130ac+131c^2}{200}. \tag{6}$$

By comparing CS and SW in (3) and (6), we come up with the following proposition:

Proposition 1. *With observable linear tariffs and asymmetric costs, vertical integration increases consumer surplus and social welfare.*

The proposition demonstrates that the findings are consistent with those obtained using the symmetric cost. It means that the results are the same whether the rival is foreclosed or not.

1.2 Unobservable Contracts

With an unobservability contracts, U faces a commitment problem. Once firm 1 has accepted a contract, U has an incentive to behave opportunistically and offer better terms of input price to firm 2 (Hart and Tirole 1990). Pinopoulos (2020b) mentions that when one of the downstream firms accepts the offer, upstream firm might be tempted to make an 'out-of-equilibrium' offer to another downstream firm in which the input price is lower. In this way, the latter firm would benefit from a competitive advantage over the former firm and upstream firm would benefit from higher profits.

a. Vertical Separation

Solving the second stage, firm 1 and firm 2 choose their quantity in order to maximize profits:

$$\max_{q_1} \pi_1 = (a - q_1 - q_2^e - w_1 - c)q_1,$$
$$\max_{q_2} \pi_2 = (a - q_2 - q_1^e - w_2)q_2,$$

where superscript e denotes the expectation. The F.O.Cs are given by

$$\frac{\partial \pi_1}{\partial q_1} = a - 2q_1 - q_2^e - w_1 - c = 0, \tag{7a}$$
$$\frac{\partial \pi_2}{\partial q_2} = a - 2q_2 - q_1^e - w_2 = 0. \tag{7b}$$

Under unobservable contracts, we cannot solve q_1 and q_2 simultaneously because the downstream firms do not know their rival's input prices. This also implies that the downstream firms do not know their rival's outputs. The best way to solve the game is to continue solving the first stage. From (7a) and (7b), we can derive the second-stage quantities as $q_1(q_2^e, w_1)$ and $q_1(q_2^e, w_2)$.

In the first stage, U maximizes the following problems:

$$\max_{w_1,w_2} \pi_U = w_1 q_1(w_1, q_2^e) + w_2 q_2(w_2, q_1^e).$$

The F.O.Cs are given by

$$\frac{\partial \pi_U}{\partial w_1} = \frac{a - q_2^e - 2w_1 - c}{2} = 0, \tag{8a}$$
$$\frac{\partial \pi_U}{\partial w_2} = \frac{a - q_1^e - 2w_2}{2} = 0. \tag{8b}$$

By solving (7) and (8) simultaneously and taking fulfilled expectations, i.e., $q_1^e = q_1$ and $q_2^e = q_2$, we are able to obtain the optimal input prices and quantities as:

$$w_1^{S*} = \frac{6a-8c}{15}, \qquad w_2^{S*} = \frac{6a+2c}{15}, \qquad q_1^{S*} = \frac{3a-4c}{15}, \qquad q_2^{S*} = \frac{3a+c}{15}, \tag{9}$$

where superscript $*$ represents the equilibrium results under unobservable contracts. Equation (9) shows that an increase in c reduces $w_1^{S*}$and q_1^{S*}, but increases $w_2^{S*}$and q_2^{S*}.

By routine calculations, we obtain for the profits, CS, and SW as:

$$\pi_1^{S*} = (\frac{3a-4c}{15})^2 \qquad \pi_2^{S*} = (\frac{3a+c}{15})^2, \qquad {\pi_U}^{S*} = \frac{36a^2-36ac+34c^2}{225},$$
$$CS^{S*} = \frac{Q^2}{2} = \frac{(2a-c)^2}{50}, \qquad SW^{S*} = CS^{S*} + {\pi_1}^{S*} + {\pi_2}^{S*} + {\pi_U}^{S*} = \frac{48a^2-48ac+37c^2}{225}. \tag{10}$$

b. Vertical integration

The calculations and results are the same as those under observable contracts. An integrated firm has no incentive to behave opportunistically because now there is only one downstream firm 2.

Journal of International Conference Proceedings (JICP) Vol.5 No.2, pp. 96-105, July, 2022
P-ISSN: 2622-0989/E-ISSN: 2621-993X
https://www.ejournal.aibpmjournals.com/index.php/JICP

By comparing CS and SW in (6) and (10), we come up with the following proposition*:*

Proposition 2. *With unobservable linear tariffs and asymmetric costs, vertical integration increases consumer surplus and social welfare.*

Integration eliminates the opportunism but prevents the upstream firm from engaging in foreclosure. The proposition demonstrates that the findings are consistent with those obtained by using the symmetric cost (Pinopoulos, 2019). It means that the results are the same whether the rival is foreclosed or not.

Comparing vertical separation under observable contracts and under un observable contracts, we built the following proposition:

Proposition 3. *With separation linear tariffs, consumer surplus (social welfare) is lower (higher) under observable contracts than unobservable contracts.*

Asymmetric cost reduces firm 1's input price to a lower level than firm 1's input price under symmetrical cost. It makes the results different from the previous literature. Pinopoulos (2019) finds that CS and SW are lower under observable contracts than in unobservable contracts.

2. Two-Part Tariffs
We assume that both downstream firms have zero marginal costs to simplify the analysis.

2.1. Observable Contracts
a. Vertical Separation
In solving the second stage, firm 1 and firm 2 choose their quantity to maximize profits:

$$\max_{q_i} \pi_i = (P - w_i)q_i - f_i.$$

The F.O.Cs are given by

$$\frac{\partial \pi_1}{\partial q_1} = a - 2q_1 - q_2 - w_1 = 0,$$
$$\frac{\partial \pi_2}{\partial q_2} = a - 2q_2 - q_1 - w_2 = 0.$$

Solving the profit-maximization problems yields:

$$q_1 = \frac{a - 2w_1 + w_2}{3}, \qquad q_2 = \frac{a - 2w_2 + w_1}{3}. \tag{13}$$

Solving the first stage, U maximizes

$$\max_{w_i, f_i} \pi_U = w_1 q_1(w_1, q_2) + w_2 q_2(w_2, q_1) + f_1 + f_2, \text{ subject to } \pi_i \geq 0.$$

Suppose the constraints are binding, $\pi_i = 0$, then we have:

$$f_1 = (P - w_1)q_1(w_1, w_2),$$
$$f_2 = (P - w_2)q_2(w_1, w_2).$$

In first stage, U maximizes

$$\max_{w_i} \pi_U = w_1 q_1(w_1, w_2) + w_2 q_2(w_1, w_2) + f_1 + f_2.$$

The F.O.Cs are given by

$$\frac{\partial \pi_U}{\partial w_1} = \frac{a - 2w_2 - 2w_1}{9} = 0,$$
$$\frac{\partial \pi_U}{\partial w_2} = \frac{a - 2w_2 - 2w_1}{9} = 0.$$

By routine calculations, we obtain:

$$w_1^s + w_2^s = \frac{a}{2}, \qquad q_1^s + q_2^s = \frac{a}{2}. \tag{14}$$

Journal of International Conference Proceedings (JICP) Vol.5 No.2, pp. 96-105, July, 2022
P-ISSN: 2622-0989/E-ISSN: 2621-993X
https://www.ejournal.aibpmjournals.com/index.php/JICP

Then, the upstream firm's profit, CS, and SW are realized as:

$$\pi_U{}^s = \frac{a^2}{4}, \quad CS^s = \frac{Q^2}{2} = \frac{a^2}{8}, \quad SW^s = CS^s + \pi_1^s + \pi_2^s + \pi_U^s = \frac{3a^2}{8}. \qquad (15)$$

With zero marginal cost under observable in vertical separation, CS and SW are higher in two-part tariffs than linear tariffs. The upstream firm has more tools to extract from the downstream firm's profit. The upstream firm monopolizes the output. Therefore, all output goes to upstream firms but not in linear tariffs.

b. Vertical integration

We use the same assumption for vertical integration that U and the downstream firm 1, integrate vertically. However, I can best gain control of the downstream market by foreclosing its downstream rival firm 2 because both downstream firms have the same input price. The inverse demand function is given by

$$p = a - q_1.$$

It is obvious to derive the price as $p^I = q^I = \frac{a}{2}$. Then, CS and SW are given by

$$CS^I = \frac{Q^2}{2} = \frac{a^2}{8}, \qquad SW^I = CS^I + \pi_I^I + \pi_2^I = \frac{3a^2}{8}. \qquad (16)$$

By comparing CS and SW in (15) and (16), we obtain the following proposition:

Proposition 4: *With observable two-part tariffs, vertical integration does not make any changes to consumer surplus and social welfare.*

Foreclosing the rival will result in the exact profit maximization as under separation. These results differ from linear tariffs and symmetric costs, where CS and SW are lower under separation than integration.

2.2. Unobservable Contracts

a. Vertical Separation

Through passive belief, downstream firms anticipate their rivals will receive the equilibrium input price offer, so they put the equilibrium quantity on the market. Therefore, firm 1 and firm 2 choose their quantity to maximize profits:

$$\max_{q_i} \pi_i = \left(a - q_i - q_j^e - w_i\right)q_i - f_i.$$

The F.O.Cs are given by

$$\frac{\partial \pi_1}{\partial q_1} = a - 2q_1 - q_2^e - w_1 = 0,$$
$$\frac{\partial \pi_2}{\partial q_2} = a - 2q_2 - q_1^e - w_2 = 0.$$

In the first stage, U maximizes

$$\pi_U = w_1 q_1(w_1, q_2^e) + w_2 q_2(w_2, q_1^e) + f_1 + f_2, \ s.t. \pi_i \geq 0.$$

Suppose the constraints are binding, then we obtain:

$$f_1 = (P - w_1)q_1(w_1, q_2^e),$$
$$f_2 = (P - w_2)q_2(w_2, q_1^e).$$

Substituting f_1 and f_1 in the profit function, then the F.O.Cs are given by

$$\frac{\partial \pi_U}{\partial w_1} = -2w_1 = 0,$$
$$\frac{\partial \pi_U}{\partial w_2} = -2w_2 = 0.$$

Solving the above problems and taking fulfilled expectations, i.e.,$q_1^e = q_1$ and $q_2^e = q_2$, then the optimal input prices, quantities, and fixed fees are realized as:

$$w_1^{S*} = w_2^{S*} = w_i^{S*} = 0, \qquad q_1^{S*} = q_2^{S*} = q_i^{S*} = \frac{a}{3}, \qquad f_1^{S*} = f_2^{S*} = f_i^{S*} = \frac{a^2}{2}. \qquad (17)$$

The analysis above concludes that the optimal input price of the two-part tariffs under an unobservable contract is zero. This result is in line with the results obtained by (Hart and Tirole, 1990)
Given that we obtain the upstream firm's profit, CS, and SW as:

$$\pi_U{}^{S*} = \frac{2a^2}{9}, \qquad CS^{S*} = \frac{Q^2}{2} = \frac{2a^2}{9}, \qquad SW^{S*} = CS^{S*} + \pi_1^{S*} + \pi_2^{S*} + \pi_U^{S*} = \frac{4a^2}{9}. \tag{18}$$

b. Vertical integration
The calculations and results are identical to those under observable two-part tariffs.
By comparing CS and SW in (16) and (18), we obtain the following proposition:

Proposition 5: *With unobservable two-part tariffs, integration decreases the consumer surplus and social welfare.*

Through vertical integration, the upstream firm gets involved in foreclosure and negates its opportunism problem, which tends to reduce the social welfare.

Comparing vertical separation under observable contracts and under unobservable contracts, we obtain the following proposition:

Proposition 6: *With separation two-part tariffs, consumer surplus and social welfare are lower under observable contracts than under unobservable contracts.*

Under unobservable two-part tariffs, upstream firms sell inputs at marginal cost when downstream firms are passive (Hart and Tirole,1990). The absence of input price tends to increase CS and SW.

DISCUSSION

This analysis is against the literature that a vertically integrated firm could foreclose the rival from the market. By assuming the rival having a lower marginal cost, the vertically integrated firm has no incentive to foreclose the rival. With separation linear tariffs, consumer surplus (social welfare) is lower (higher) under observable contracts than unobservable contracts. With separation two-part tariffs, consumer surplus and social welfare are lower under observable contracts than unobservable contracts.

CONCLUSION

We consider a vertically related industry consisting of one upstream and two downstream firms. We consider the observable and unobservable contracts. By using observable contracts, both downstream firms know their input prices as well as their rivals' input prices. However, under an unobservable contract, the firms only know their own input prices but do not know their rivals' input price.

We find, under both observable and unobservable linear tariffs and asymmetric costs, vertical integration increases consumer surplus and social welfare. With a separation linear tariff, consumer surplus (social welfare) is lower (higher) under observable contracts than under unobservable contracts. Under two-part tariffs, we observe the following: With observable two-part tariffs, vertical integration does not affect consumer surplus or social welfare. Integration reduces consumer surplus and social welfare when two-part tariffs are unobservable. With separation two-part tariffs, consumer surplus and social welfare are lower under observable contracts than the unobservable contracts.

LIMITATION

Due to the undetermined value of the market share and the marginal cost, it is not easy to find the exact optimal value of each variable.

ACKNOWLEDGMENT

I am thankful to my advisor, professor Yan-Shu Lin who is patient and humble in leading me through all the math calculations and intuitions. I am so grateful to have the Elite Scholarship from National Dong Hwa University, which helps me to improve my skills and knowledge.

DECLARATION OF CONFLICTING INTERESTS

Regarding the authorship or the publication of this article, we declare that we have no conflicts of interest.

REFERENCES

Arya, A. (2008). Friction in related-party trade when rival is also a consumer. *Management Science*, 54, 1850-1860.
Belleflamme, P., and Peitz, M. (2019). Price disclosure by two-sided platforms. *International Journal of Industrial Organization*, 67, 102529.
Bulow, J. I., Geanakoplos, J. D., and Klemperer, P. D. (1985). Multimarket oligopoly: Strategic substitutes and complements. *Journal of Political Economy*, 93, 488–511.
Fershtman, C., and Judd, K. L. (1987). Equilibrium incentives in oligopoly. *The American Economic Review*, 77, 927–940.
Gatsios, K. (1990). Preferential tariffs and the 'Most Favored Nation' principle: A note. *Journal of International Economics*, 28, 365-373.
Gaudin, G. (2019). Vertical relations, opportunism, and welfare. *The RAND Journal of Economics*, 50, 342-358.
Goering, G.E. (2014). The profit-maximizing case for corporate social responsibility in a bilateral monopoly. *Managerial and Decision Economics*, 35, 493-499.
Hart, O., and Tirole, J. (1990). Vertical integration and market foreclosure. *In Brookings Papers Economic Activity. Microeconomics*, 205-286.
McAfee, R. P., and Schwartz, M. (1994). Opportunism in multilateral vertical contracting: Nondiscrimination, exclusivity, and uniformity. *The American Economic Review*, 84, 210- 230.
Pinopoulus, I. N. (2019). On the welfare effects of vertical integration: Opportunism vs double marginalization. *Economics Letters*, 174, 169-172.
Pinopoulus, I. N. (2020a). Input price discrimination and upstream R&D investments. *Review of Industrial Organization*, 57, 85-106.
Pinopoulus, I. N. (2020b). Upstream horizontal mergers involving a vertically integrated firm. *Journal of Economics*, 130, 67-83.
Schelling, T. C. (1960). *The strategy of conflict*. Cambridge, MA: Harvard University Press.
Sklivas, S. D. (1987). The strategic choice of managerial incentives. *Rand Journal of Economics*,18,452–458.
Spencer, B.J. and Brander, J.A. (1983). International R&D rivalry and industrial strategy. *Review of Economic Studies*, 50, 707-722.
Theilen, B. (2007). Delegation and information sharing in Cournot duopoly. *Journal of Economics*, 92, 21–50.
Vickers, J. (1985). Delegation and the Theory of the Firm. *The Economic Journal, Supplement*, 95, 138-47.

Vives, X. (1984). Duopoly information equilibrium: Cournot and Bertrand. *Journal of Economic Theory*, 34, 71–94.