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Observable and Unobservable Investment Information in Multiple Markets

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ABSTRACT

This study considers the effects of disclosure conditions on firms' investment decisions when facing an identical competitor in multiple markets. Assuming that there are congestion costs between multiple investments to reduce marginal cost for each market, this study focuses on the cases where the disclosure conditions may differ by market. Like previous studies on single Cournot competition, these results show that firms invest more in the observable investment markets than in the unobservable markets under symmetric disclosure conditions. However, firms invest more in the unobservable market if there are asymmetric disclosure conditions.

KEYWORDS

Multimarket contact; cost-reducing investment; congestion cost; disclosure conditions

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1. Introduction

This study examines the effect of disclosure conditions on firms' investment decisions when they face competition from the same competitors in multiple markets. Many studies have addressed the impact of information disclosure on competitive markets and suggest that the disclosed information may be used by rival firms.[1] Therefore, a firm may adapt its management strategy depending on whether its private information can be observed by competitors.

Thus, we focus on cost-reducing investments aimed at realizing high productivity and examine how the disclosure of investment information affects firms' investment behaviors. Under Cournot competition, disclosing productivity improvement is considered to have a strategic effect and could cause the competitor's quantity decision to vary. Darrough (1993) shows that, for firms facing quantity competition, the disclosure of low-cost information increases their expected profits. Hughes and Williams (2008) analyze the strategic effects of commitment under quantity competition, which leads to a quantity increase. Studies on the impact of cost management in competitive markets demonstrate that cost-reducing investments have the strategic effect of changing the production quantity of competitors (e.g., Brander and Spencer 1983; d'Aspremont and Jacquemin 1988).

However, these studies are based on single market competition. When firms face competition in multiple markets, ``action taken by the firm in one market might affect the equilibrium in the other market'' (Darrough 1993, p.556), and the impact of disclosed information on firm behavior may differ from the strategic effect in a single market. Unlike the United Kingdom and the United States, European Union accounting rules do not explicitly require the disclosure of R&D expenses (see Hall and Oriani 2006). Thus, for multinational firms facing competition in different regions, the information on rival firms differs depending on the country or region in which a market exists. Therefore, these firms' investment strategies may change when they face multiple competitive markets with different degrees of business information disclosure.

In the situation where a firm faces competition in multiple markets, information disclosure does not necessarily increase the firm's productivity or investment. Bulow et al. (1985) show that the behavior of firms in their first market can change the strategy of competitors in the second market because the behavior affects their marginal costs in the second market. Bernheim and Whinston (1990) examine how contact with multiple markets affects firms' cooperation under repeated competition, noting that multimarket contact could weaken competition. This study analyzes a situation in which the observable information differs in multiple markets.

Our model is like those of the studies on cost allocation and decentralization among multiple products. For example, Gal-Or (1993) examines the allocation of overhead costs, which are common across multiple departments or products. Focusing on firms for which each product faces an oligopolistic and perfectly competitive market, she confirms the strategic effect of market competitiveness on cost allocation. Alles and Datar (1998) concentrate on the cost allocations between products facing price competition and analyze the strategic transfer pricing between decentralized departments. By contrast, this study observes the situation where the two products face Cournot competition and multimarket contacts allow each firm to predict the investment behavior of the other. In this context, the model of Hughes and Kao (1998), who focus on cost allocation in centralized/decentralized firms, is closest to this study. Their interests are decentralization and tacit coordination, and they observe a cooperative equilibrium if firms can coordinate with competitors; resultantly, they suggest that decentralization may provide a communication tool to firms. Empirical studies also suggest that multimarket contact can facilitate tacit collusion

[1] For example, Bolton and Scharfstein (1990) analyze the situation in which the disclosed information is not only used by investors to make investment decisions but also observed by competitors. Graham et al. (2005) notes that, while managers want to improve their reputation through transparent reporting, they are concerned that proprietary information, such as business investments representing a company's competitive advantage, may be used by competitors.

in certain industries, such as the airline and mobile telephone industries (e.g., Evans and Kessides 1994; Parker and Röller 1997; Ciliberto and Williams 2014). However, we focus on the effects on cost reduction investment by deriving a competitive equilibrium that results from firms competing with one another. We thus confirm whether disclosure requirements in multiple markets alter firms' investment decisions and, if so, how it affects their investment levels and profits under each disclosure environment.

Hall and Oriani (2007, p.972) state "how financial constraints on firms' R&D and capital investments are looser in continental European countries than in the UK and the US." Furthermore, Botosan et al. (2021) note that the Financial Accounting Standards Board (FASB) identified several segment reporting issues and deemed the list of items disclosed by segment to be insufficient. Our findings that the disclosure conditions for investment information affects firms' decisions have important implications for policymakers in disclosure regulation.

To analyze the impact of information disclosure, we assume that two firms competing in multiple quantity markets invest to reduce costs and consider an information environment under which the disclosure requirements differ depending on the market. We then verify how the information environment affects firms' investment levels, production quantities, and expected profits. This is closely related to the literature on strategic R&D investment. In a recent study, Baik and Kim (2020) compare the observable and unobservable investment models and show that firms invest more in the observable case than in the unobservable case. We find that, under the symmetric disclosure conditions, firms' investment behavior is consistent with their result in single Cournot market. However, under the asymmetric disclosure conditions, contrary to previous studies, firms invest more in the non-disclosure market rather than the disclosure market.

The remainder of this study is organized as follows. Section 2 presents the structure of firms' profits and multimarket competition. Section 3 derives the equilibrium for each case: the symmetric observable/unobservable case, and the asymmetric case. Section 4 compares the results of all the cases and evaluates the effects of disclosure conditions on firms' behaviors in multiple markets. Concluding remarks are presented in Section 5.

2. Model

Consider two independent markets, A and B, with two firms, i and j $(i, j \in 1,2, i \neq j)$. In each of the markets with homogenous products, firms compete in quantities with the same rival. The inverse demand function for firm i is $p_A = a - q_{Ai} - q_{Aj}$ $(p_B = a - q_{Bi} - q_{Bj})$ with a (b) as the demand intercept for the products, q_{Ai} and q_{Aj} (q_{Bi} and q_{Bj}) as the outputs of firms i and j, in market A (B). The marginal costs of firm i are $C_{Ai} = c_{Ai} - e_{Ai}$ and $C_{Bi} = c_{Bi} - e_{Bi}$ in each market. Firm i can reduce its constant marginal costs with investments, e_{Ai} and e_{Bi}. For simplicity, we assume that $c_{Ai} = c_{Aj} = c_{Bi} = c_{Bj} = c$ and $c < a, b$. Therefore, firm i's profit is:

$$\pi_i = \left[a - q_{Ai} - q_{Aj} - [c - e_{Ai}]\right] q_{Ai} + \left[b - q_{Bi} - q_{Bj} - [c - e_{Bi}]\right] q_{Bi} - \phi_i(e_{Ai}, e_{Bi}), \tag{1}$$

where $\phi_i(e_{Ai}, e_{Bi}) = .5(e_{Ai}^2 + e_{Bi}^2 + 2\theta_i e_{Ai} e_{Bi})$ is the investment costs with $\theta_i > 0$ as the congestion level between multiple investments for each of two markets. The investment costs consist of two exclusive cost terms for each market and one ``congestion cost'' term.[2] We assume that the investment resources are limited, and the congestion cost is sufficiently high, that is $\theta_i = \theta_j = \theta = 1$: a high investment level in the first market A (B) increases an investment cost in the second market B (A). In some cases, the selection and concentration of investment may be required.

To focus on investment information disclosure, we assume that all other components are common knowledge

[2] For example, see Gal-Or (1993) and Hughes and Kao (1998) who suggest that there are diseconomies of scope due to congestion effects that usually arise when utilizing common resources.

except the rival firm's investment levels, which can be observed only in the market that requires disclosure. We assume that at the beginning of the game, disclosure rule for each market is determined and firms are required to disclose or not their investment information on each market.[3] Thus, we consider three types of disclosure conditions for multiple markets. First, in the symmetric observable markets, firms' investments for both markets are disclosed. Second, in the symmetric unobservable markets, firms' investments for both markets are undisclosed. Third, in the asymmetric observable markets, firms' investments for only one market are disclosed. Under the three types of markets, we propose a two-stage game. At Stage 1, firms simultaneously choose their investment levels for each of two markets. At Stage 2, firms choose their output levels for both markets.

3. Analysis

At Stage 2, firm i chooses the output level for each market to maximize its profit. Differentiating equation (1) with respect to q_{Ai} and q_{Bi}, the reaction functions are:

$$q_{Ai} = \frac{a - c + e_{Ai} - \hat{q}_{Aj}}{2}, q_{Bi} = \frac{b - c + e_{Bi} - \hat{q}_{Bj}}{2}, \tag{2}$$

where $\hat{q}_{Aj}$ and $\hat{q}_{Bj}$ denote firm i's conjectures regarding rival j's outputs. The conjectures will be consistent with the rival's outputs in the market where firms' investment levels (i.e., rival's new marginal costs) are observable; otherwise, each firm must guess its rival's outputs. We assume that firms' conjectures are formed rationally and will be sustained at equilibrium.[4]

3.1. Symmetric observable markets

We first study the symmetric observable case in which firms' investment levels for both of two markets are disclosed. In this case, firms know each other's investment levels for each market when choosing their output levels. Replacing $\hat{q}_{Aj}$ and $\hat{q}_{Bj}$ in the reaction functions with q_{Aj} and q_{Bj}, respectively, the equilibrium outputs are:

$$q_{Ai}(e_{Ai}, e_{Aj}) = \frac{a - c}{3} + \frac{2e_{Ai} - e_{Aj}}{3}, \tag{3}$$

$$q_{Bi}(e_{Bi}, e_{Bj}) = \frac{b - c}{3} + \frac{2e_{Bi} - e_{Bj}}{3}. \tag{4}$$

Firm i's investments increase its own outputs but decrease rival j's outputs.

At Stage 1, firm i chooses the investment level for each market to maximize its profit. Substituting equations (3) and (4) into firm i's profit and differentiating with respect to e_{Ai} and e_{Bi}, we can obtain Proposition 1.

Proposition 1. In the symmetric observable investment markets, the equilibrium investment and output levels, and the expected profits for firm i are, respectively:

$$e_{Ai}^{O} = \frac{9b - 5a - 4c}{14}, e_{Bi}^{O} = \frac{9a - 5b - 4c}{14}, q_{Ai}^{O} = q_{Bi}^{O} = \frac{3(a + b - 2c)}{14}, and\ \pi_i^{O} = \frac{5(a + b - 2c)^2}{98},$$

where superscript ``O'' denotes the symmetric observable case.

[3] Note that we do not consider the conditions that firms can disclose their information voluntarily.

[4] Rey and Vergė (2004) refer to this assumption as "passive beliefs," arguing that these beliefs present a natural restriction to the potential equilibria. For more examples, see Kopel and Putz (2021) and Lee and Oh (2022).

Proposition 1 shows that the equilibrium investment levels decrease with the demand of the relevant market and increase with the demand of the other market.[5] As market demand grows, in a single Cournot market, firms would invest more to increase their own output because firms' outputs are strategic substitutes and cost-reducing investments accelerate it. In multiple markets, firms are also likely to invest more to reduce the marginal cost of a more profitable market because the congestion cost will require the selection and concentration of firms' investments in one of multiple markets.[6] Interestingly, our results indicate that cost-reducing investments are inversely related to the profitability of the relevant market. This is because multimarket contact allows firms to predict a rival firm's investment behavior. Supposing that a is relatively large, firm i would believe that rival j chooses a high level of e_{Aj} for market *A*. This has two conflicting effects on firm i: (i) a decrease in e_{Ai} which has a negative effect on firm i in market *A* by decreasing q_{Ai}, and (ii) a reduction in the cost for e_{Bi} which has a positive effect on firm i in market *B* by allowing them to increase q_{Bi}. Consequently, firms will concentrate their investment on market *B* to avoid excessive competition in market *A*, because the positive effect is greater than the negative effect when the congestion level between the investments is sufficiently high.[7] This avoidance behavior will constitute a key to understanding firms' investment behavior under different disclosure conditions.

Since the avoidance behavior may generate excessive investment choices, the above equilibrium investment levels would not be maintained positive values; if the relevant market demand, a (b), is substantially larger or smaller than the other market demand, b (a). To focus on the positive investment levels, we assume that the difference between the demand intercepts is sufficiently close.

3.2. Symmetric unobservable markets

Next, we study the symmetric unobservable case in which firms' investment levels for both markets are undisclosed. In this case, firm i must guess rival j's outputs as follows:

$$\hat{q}_{Aj} = \frac{a - c + \hat{e}_{Aj} - \hat{q}_{Ai}}{2}, \hat{q}_{Bj} = \frac{b - c + \hat{e}_{Bj} - \hat{q}_{Bi}}{2}, \tag{5}$$

where $\hat{e}_{Aj}$ and $\hat{e}_{Bj}$ denote firm i's conjectures regarding rival j's investments. Again, firm i must guess rival j's conjectures $\hat{q}_{Ai}$ and $\hat{q}_{Bi}$ regarding i's own outputs as follows:

$$\hat{q}_{Ai} = \frac{a - c + \hat{e}_{Ai} - \hat{q}_{Aj}}{2}, \hat{q}_{Bi} = \frac{b - c + \hat{e}_{Bi} - \hat{q}_{Bj}}{2}. \tag{6}$$

Solving the simultaneous equations (2) for the reaction functions and the above conjectures, the equilibrium outputs at Stage 2 are:

$$q_{Ai}(e_{Ai}) = \frac{a - c}{3} + \frac{3e_{Ai} - 2\hat{e}_{Aj} + \hat{e}_{Ai}}{6}, \tag{7}$$

$$q_{Bi}(e_{Bi}) = \frac{b - c}{3} + \frac{3e_{Bi} - 2\hat{e}_{Bj} + \hat{e}_{Bi}}{6}. \tag{8}$$

Firm i's outputs respond to its own actual investments, but not to rival j's actual investment.[8]

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[5] It is straightforward that $e_{Ai}^{O}(e_{Bi}^{O})$ decreases with a (b), but increases with b (a).

[6] For example, Gal-Or (1993) shows that a multimarket firm allocates relatively lower costs to a more favorable market to permit it to extract market opportunities more successfully.

[7] If we consider the congestion level θ, the reaction functions of investments from first-order conditions at Stage 1 are $e_{Ai} = 4(a - c) - 4e_{Aj} - 9\theta e_{Bi}$ and $e_{Bi} = 4(b - c) - 4e_{Bj} - 9\theta e_{Ai}$.

[8] Bagwell (1995) shows that the strategic effects of commitment disappear if the rival firm observes imperfectly the first-mover's

At Stage 1, substituting equations (7) and (8) into firm i's profit and differentiating with respect to e_{Ai} and e_{Bi}, we can obtain Proposition 2.

Proposition 2. In the symmetric unobservable investment markets, the equilibrium investment and output levels, and the expected profits for firm i are, respectively:

$$e_{Ai}^{U} = \frac{3b-2a-c}{5}, e_{Bi}^{U} = \frac{3a-2b-c}{5}, q_{Ai}^{U} = q_{Bi}^{U} = \frac{a+b-2c}{5}, and\ \pi_i^{U} = \frac{3(a+b-2c)^2}{50},$$

where superscript ``U'' denotes the symmetric unobservable case.

As in Proposition 1, the equilibrium investment levels decrease with the demand of the relevant market but increase with the demand of the other market. This is because of the belief related to multimarket contact that the rival firm may invest more in the market with relatively large demand and invest less in the other market, even if firms' investment levels are unobservable. Firms will concentrate their investments on a less profitable market to avoid an excessive competition in a more profitable market.

3.3. Asymmetric observable market

Finally, we study the asymmetric observable case in which firms' investment levels are disclosed in only market A, but not market B. In this case, observable investment levels in market A allow firms to replace $\hat{q}_{Ai} = q_{Ai}$ and $\hat{q}_{Aj} = q_{Aj}$, whereas firm i must guess rival's output for market B (i.e., $\hat{q}_{Bi} \neq q_{Bi}$ and $\hat{q}_{Bj} \neq q_{Bj}$). Therefore, at Stage 2, the equilibrium outputs, q_{Ai} and q_{Bi}, are consistent with equation (3) in the symmetric observable case, and equation (8) in the symmetric unobservable case, respectively. This implies that there are strategic effects of investments on rival's output only in an observable market A. Firm i must consider the effects of its investment on rival j's output in market A, whereas they do not consider their investments on rival j's output in market B.

At Stage 1, substituting equations (3) and (8) into firm i's profit and differentiating with respect to e_{Ai} and e_{Bi}, we can obtain Proposition 3.

Proposition 3. In the asymmetric observable and unobservable investment markets, the equilibrium investment and output levels, and the expected profits for firm i are, respectively:

$$e_{Ai}^{AO} = \frac{9b-8a-c}{17}, e_{Bi}^{AU} = \frac{12a-5b-7c}{17}, q_{Ai}^{AO} = \frac{3(a+b-2c)}{17}, q_{Bi}^{AU} = \frac{4(a+b-2c)}{17}\ and\ \pi_i^{AO/AU} = \frac{(a+b-2c)^2}{17},$$

where superscript ``$AO$'' and ``AU'' denote the asymmetric observable and asymmetric unobservable cases, respectively.

Proposition 3 also shows that the equilibrium investment levels decrease with the demand of the relevant market but increase with the demand of the other market. This implies that multimarket contact provides firms with the beliefs about a rival's investment behavior regardless of disclosure conditions.

4. Results

Comparing the equilibrium investment and output levels, and the expected profits for each case, we evaluate the effects of disclosure conditions in multiple markets. If demand intercepts a and b are sufficiently close (i.e., $a = b$), we can obtain Corollary 1.

Corollary 1. In the multiple markets,

(i) the investment and output levels are:

selection in a standard Stackelberg game.

$$e_{Ai}^{AO}(e_{Bi}^{AO}) < e_{Ai}^{U}(e_{Bi}^{U}) < e_{Ai}^{O}(e_{Bi}^{O}) < e_{Ai}^{AU}(e_{Bi}^{AU}),$$

$$q_{Ai}^{AO}(q_{Bi}^{AO}) < q_{Ai}^{U}(q_{Bi}^{U}) < q_{Ai}^{O}(q_{Bi}^{O}) < q_{Ai}^{AU}(q_{Bi}^{AU}).$$

(ii) the expected profits are:

$$\pi_i^{O} < \pi_i^{AO/AU} < \pi_i^{U}.$$

Under the symmetric disclosure conditions, the investment levels in the observable case are higher than in the unobservable case (i.e., $e_{Ai}^{U} < e_{Ai}^{O}$ and $e_{Bi}^{U} < e_{Bi}^{O}$). This leads to an increase in the output levels (i.e., $q_{Ai}^{U} < q_{Ai}^{O}$ and $q_{Bi}^{U} < q_{Bi}^{O}$), but firms earn less profits (i.e., $\pi_i^{O} < \pi_i^{U}$). This leads to Proposition 4.

Proposition 4. In the symmetric observable investment markets, firms invest more and earn less profits than in the symmetric unobservable investment markets.

This is consistent with previous research on strategic investment in a single Cournot market. In multiple markets with symmetric disclosure conditions, competing firms would choose greater output levels as strategic substitutes and increase the observable investments with strategic effects to decrease the rival's outputs, as a single market.

Under the asymmetric disclosure conditions, however, we find that firms choose lower investment levels in the observable market than in the unobservable market (i.e., $e_{Ai}^{AO} < e_{Ai}^{U}$ or $e_{Bi}^{AO} < e_{Bi}^{U}$), whereas firms choose higher investment levels in the unobservable market than in the observable market (i.e., $e_{Ai}^{O} < e_{Ai}^{AU}$ or $e_{Bi}^{O} < e_{Bi}^{AU}$). This leads to Proposition 5.

Proposition 5. Under the asymmetric disclosure conditions, firms invest more in the unobservable market than in the observable market.

This results from the multimarket contact and the congestion cost between multiple investments. Under the asymmetric disclosure conditions, firm i predicts that rival j chooses a lower investment level in unobservable market B to invest more in observable market A with a strategic effect. In this case, firm i is likely to reduce its investments in market A and concentrate on market B (i.e., $e_{Ai}^{AO} < e_{Bi}^{AU}$), because more profits are expected in the less competitive market B with a belief that rival j may choose low investment levels. This leads to a decrease in the output in market A and an increase in the output in market B (i.e., $q_{Ai}^{AO} < q_{Bi}^{AU}$). Consequently, firms earn less profits than in the symmetric unobservable case but more profits than in the symmetric observable case. This is because more intensive competition in unobservable market B exacerbates the congestion cost while less intensive competition in observable market A diminishes its cost.

5. Concluding Remarks

This study considers the effect of disclosure conditions on firms' investment decisions when firms compete with an identical competitor in multiple markets. Three types of disclosure conditions for firms' investment information are discussed: the symmetric observable and unobservable markets, and the asymmetric observable market.

Under the symmetric disclosure conditions, we have shown that firms invest more in the observable case than in the unobservable case. Under the asymmetric disclosure conditions, however, our results indicated that firms invest more in the unobservable market than in the observable market. This stems from the multimarket contact and congestion cost between multiple investments. With a high level of congestion cost, firms would concentrate (avoid) their investments on a less (more) competitive market. Multimarket contact allows firms to predict a rival firm's investment behavior, whereby they may choose a more aggressive investment level in the observable market, even if this proves to be inaccurate eventually. Consequently, two firms concentrate their investments on a more competitive market. This is an inefficient choice for both firms because they could benefit from a less competitive market opportunity. If firms are aware of this situation, they may coordinate their investments with the rival. This would lead to asymmetric equilibria where each firm has a dominant investment position in one of two markets. However, such coordination can be achieved only if firms credibly communicate with each other at the beginning of the game.[9] In contrast with existing empirical evidence, our results provide some implications for empirical research in certain industries that disclosure cannot serve as credible communication device.

We conclude this study with a discussion of the limitations. For simplicity, we assumed that multiple investments are perfect substitutes: one unit of investment for first market requires exactly one unit of investment cost for second market. Although this assumption is useful to highlight selective behaviors of firms with limited resources, it also narrows the generalizability of our results. In addition, we assumed that the disclosure regime in each market is binary: full disclosure or not. This may exclude several issues related to information disclosure, such as voluntary disclosure. These concerns reveal several possible extensions of this study for future research.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflicts of interest.

Author contributions

Conceptualization and Formal analysis: Joonghwa Oh; Investigation and Methodology: Yoshikazu Ishinagi; Writing – original draft, Writing – review and editing: Joonghwa Oh, Yoshikazu Ishinagi.

References

Alles, M., and S. Datar. 1998. Strategic Transfer Pricing. *Management Science*, 44(4): 451-461. https://doi.org/10.1287/mnsc.44.4.451

Arya, A., H. Frimor, and B. Mittendorf. 2010. Discretionary Disclosure of Proprietary Information in a Multisegment Firm. *Management Science*, 56(4): 645-658. https://doi.org/10.1287/mnsc.1090.1126

d'Aspremont, C., and A. Jacquemin. 1988. Cooperative and Noncooperative R&D in Duopoly with Spillovers. *The American Economic Review*, 78(5): 1133-1137. https://www.jstor.org/stable/1807173

Bagwell, K. 1995. Commitment and Observability in Games. *Games and Economic Behavior*, 8(2): 271-280. https://doi.org/10.1016/S0899-8256(05)80001-6

Baik, K., and S. Kim, 2020. Observable versus Unobservable R&D Investment in Duopolies. *Journal of Economics*, 130(1): 37-66. https://doi.org/10.1007/S00712-019-00679-3

[9] For example, Hughes and Kao (1998) suggest that decentralization can provide a credible communication tool for strategic cost allocations when divisional managers' compensation is based on divisional profits and compensation arrangements are reported publicly. They show that decentralization with tacit coordination is possible in equilibrium, regardless of the public disclosure of allocation choices, if market profitabilities are similar and congestion costs are relatively high.

Bernheim, B., and M. Whinston. 1990. Multimarket Contact and Collusive Behavior. *RAND Journal of Economics*, 21(1): 1-26. https://doi.org/10.2307/2555490

Bolton, P., and D. Scharfstein. 1990. A Theory of Predation Based on Agency Problems in Financial Contracting. *The American Economic Review*, 80(1): 93-106. https://www.jstor.org/stable/2006736

Botosan, C., A. Huffman, and M. Stanford. 2021. The State of Segment Reporting by US Public Entities: 1976–2017. *Accounting Horizons*, 35(1):1–27. https://doi.org/10.2308/HORIZONS-19-104

Brander J., and B. Spencer. 1983. Strategic Commitment with R&D: The Symmetric Case. *The Bell Journal of Economics*, 14(1): 225-235. https://doi.org/10.2307/3003549

Bulow, J., J. Geanakoplos, and P. Klemperer. 1985. Multimarket Oligopoly: Strategic Substitutes and Complements. *Journal of Political Economy*, 93(3): 488-511. https://www.jstor.org/stable/1832005

Ciliberto, F., and J. Williams. 2014. Does Multimarket Contact Facilitate Tacit Collusion? Inference on Conduct Parameters in The Airline Industry. *RAND Journal of Economics*, 45(4): 764-791. https://doi.org/10.1111/1756-2171.120

Darrough, M. 1993. Disclosure Policy and Competition Cournot vs. Bertrand. *The Accounting Review*, 68(3): 534-561. https://www.jstor.org/stable/248200

Evans, W., and I. Kessides. 1994. Living by the ``Golden Rule'': Multimarket Contact in the U.S. Airline Industry. *The Quarterly Journal of Economics*, 109(2): 341-366. https://doi.org/10.2307/2118466

Gal-Or, E. 1993. Strategic Cost Allocation. *The Journal of Industrial Economics*, 41(4): 387-402. https://doi.org/10.2307/2950599

Graham, J., C. Harvey, and S. Rajgopal. 2005. The Economic Implications of Corporate Financial Reporting. *Journal of Accounting and Economics*, 40(1-3): 3-73. https://doi.org/10.1016/j.jacceco.2005.01.002

Hall, B., and R. Oriani. 2006. Does the market value R&D investment by European firms? Evidence from a panel of manufacturing firms in France, Germany, and Italy. *International Journal of Industrial Organization*, 24(5): 971-993. https://doi.org/10.1016/j.ijindorg.2005.12.001

Hughes, J., and J. Kao. 1998. Cross-Subsidization, Cost Allocation, and Tacit Coordination. *Review of Accounting Studies*, 2(3): 265-293. https://doi.org/10.1023/A:1018326914717

Hughes, J., and M. Williams. 2008. Commitments and Disclosure in Oligopolies. *The Accounting Review*, 83(1): 111-132. https://doi.org/10.2308/accr.2008.83.1.111

Kopel, M., and E. Putz. 2021. Sharing Managerial Contract Information in a Vertically Related Market. *Managerial and Decision Economics*, 42(4): 1037-1047. https://doi.org/10.1002/mde.3290

Lee, D., and J. Oh. 2022. Strategic Commitments of Downstream Investment Firms. *Managerial and Decision Economics*, 43(6): 2098-2107. https://doi.org/10.1002/mde.3511

Parker, P., and L. Röller. 1997. Collusive Conduct in Duopolies: Multimarket Contact and Cross-Ownership in The Mobile Telephone Industry. *RAND Journal of Economics*, 28(2): 304-322. https://doi.org/10.2307/2555807

Rey, P., and T. Vergė. 2004. Bilateral Control with Vertical Contracts. *RAND Journal of Economics*, 35(4): 728-746. https://doi.org/10.2307/1593770