1 Introduction

Modern stakeholders in companies devote attention to environmental corporate social responsibility (ECSR). Companies themselves are also responding to ECSR. The Subaru Corporation CSR report states that "we include “Environment” in the Six Priority Areas for CSR and deem it important to conduct environmental activities as a precondition to continue our business activities." [1] In addition, from the Columbus McKinnon Corporation CSR Report, they state that "Columbus McKinnon recognizes its responsibility to be a good environmental steward. The company engages in proactive measures to meet environmental compliance and is continuously looking for opportunities to minimize our operational impact on the environment." [2] From these examples, one can infer the importance of considering ECSR for companies as a social initiative.

In fact, ECSR affects decision-making by managers. Emphasizing ECSR, managers try to reduce environmental damage by reducing waste. This reduction is expected to alleviate waste losses caused by over-production. In pursuit of ECSR, managers seek to reduce the quantities of products. Therefore, it is important to explore managers' decision-making with ECSR.

This study sheds light on internal decision-making because external decision-making (quantity and timing decision) has been investigated by Hirose *et al*. (2017). Management studies, especially those examining transfer pricing, assess internal decision-making by managers (e.g., Alles and Datar, 1998). Transfer pricing has an important influence on external decision-making in a product market. It is investigated based on oligopolistic competition in a product market. Therefore, we also consider decision-making of internal transfer pricing pursued under ECSR. Earlier transfer pricing studies explore the optimal level of transfer prices with duopolistic competition. Our study also considers the optimal level of transfer price with ECSR, based on the following research question. At what level do environmentally conscious managers set as a transfer price under ECSR in quantity competition?

To consider this point, we construct a model based on prior strategic transfer pricing research. In this model, two divisionalized firms, which comprise stream and downstream divisions, compete in a product market. Downstream divisions choose the quantity in the final product market. Products are produced in the upstream division and are transferred in exchange for a transfer price, which environmentally conscious managers set under ECSR. The timeline is the following: First, managers decide the observable transfer price to maximize their payoff. Next, the downstream divisions decide the production quantity. Therefore, our model's unique assumption is that we particularly examine environmentally conscious managers' preferences with strategic transfer pricing research.

The results of our model suggest that the internal transfer price, which is decided by managers with ECSR, exceeds the marginal cost in quantity competitions. Generally, in a quantity competition, the internal transfer price is below the marginal cost because the observable transfer price is used to commit an aggressive strategy in the quantity decision stage. However, our results demonstrate that the transfer price, which is settled by an environmentally conscious manager with ECSR, exceeds marginal cost in quantity competitions. This result can be attributed to the following rationale: environmentally conscious managers under ECSR aim to reduce production quantity in our setting because increasing production quantity harms the environment. For this reason, managers raise

[1] Subaru Corporation CSR Report 2020 (p.32). URL: https://www.subaru.co.jp/en/csr/report/pdf/2020/csr_report_2020_all.pdf (Last Accessed: August 11, 2021).

[2] Columbus McKinnon Corporation CSR Report 2021 (p.25). URL: https://s24.q4cdn.com/875787111/files/doc_financials/2021/ar/CMCO-2021-CSR-Report.pdf (Last accessed: August 11, 2021).

transfer prices to reduce the quantity chosen by the downstream division. In addition, this transfer price improves firms' profits through tacit collusion.

This study contributes to the context of decision-making by environmentally conscious managers in ECSR. It is apparent that environmentally conscious managers under ECSR will change their internal decision-making from a non-environmental case and will thereby affect competition in the market. Particularly addressing transfer prices, managers aim at reducing their overall environmental impact by increasing transfer prices, thereby reducing the amount of products supplied to the market. Consequently, one contribution of this study is to shed light on internal corporate decision-making by environmentally conscious managers under ECSR.

In addition, this study contributes to the strategic transfer pricing literature because it illustrates a new avenue of rationale as to why an internal transfer price might exceed marginal costs. In earlier studies described in the literature, the internal transfer price, in practice, is frequently above marginal cost (Tang, 1992). Analytically, the strategic transfer pricing literature attempts to explain this phenomenon. In particular, only a few reports have described demonstrations of an internal transfer price exceeding marginal cost in quantity competitions (e.g., Arya and Mittendorf, 2007). Therefore, this study provides a novel, additional explanation of transfer prices above marginal cost in quantity competition.

In the field of economics, manager preferences are investigated under corporate social responsibility (CSR) research. For example, a pioneering study of CSR by Matsumura and Ogawa (2014) includes consideration of a case in which managers emphasize social welfare in their objective function as a CSR[3]. Following Matsumura and Ogawa (2014), several studies have examined decision-making by specific preference managers (e.g., Chen *et al*., 2016; Hirose *et al*., 2017; Matsumura and Ogawa, 2016). Especially, this study examines environmental corporate responsibility (ECSR) based on work reported by Hirose *et al*. (2017). Hirose *et al*. (2017) and Liu *et al*. (2015) have conducted pioneering studies of ECSR: whereas Liu *et al*. (2015) considers ECSR in non-profit organizations Hirose *et al*. (2017) analyzes ECSR in for-profit organizations. Therefore, because this study is related to that by Hirose *et al*. (2017), we investigate internal decision-making by managers in pursuit of ECSR.

Similarly to our study, some earlier studies have examined players' preferences and decision-making in supply chain (e.g., Chen *et al*., 2016; Ouchida, 2019; Vroom, 2006). Some studies examine the effects of downstream or upstream division preferences on firm or supply chain strategies (Chen *et al*., 2016; Vroom, 2006). For example, Chen *et al*. (2016) assumes that the consumer-friendly upstream firm maximizes the weighted sum of their own profits and consumer surplus. Whereas we considere one aspect of an *integrated* firm, Ouchida (2019) assumes that downstream and upstream firms have preferences that emphasize CSR. Therefore, for our study, we consider new cases in the CSR literature with divisionalized firms.

Prior studies in managerial decision-making investigate the optimal level of internal transfer pricing (e.g., Alles and Datar, 1998; Göx, 2000; Narayanan and Smith, 2000). In particular, they shed light on the reason companies set the transfer price above the marginal cost in practice. This is because while Hirshleifer (1956), which is a classical economic analysis of transfer pricing, demonstrates that the optimal transfer price is equal to the marginal cost, Tang (1992) states that

[3]CSR research is based on a delegation game, as established by Vickers (1985) and by Fershtman and Judd (1987). Some studies have specifically considered endogenous weight on CSR, similar to their seminal work (e.g, Arya *et al*., 2019; Hino and Zennyo, 2017)

the internal transfer price generally exceeds the marginal cost in practice. Tang (1992) examines 143 Fortune 500 firms, which revealed that 46.2% of those companies use cost-based transfer prices. Among these, 7.7%, 53.8%, and 38.5% respectively use variable production costs, full production costs, and full production costs plus markup. In fact, Tang (1992) concludes that, in practice, many firms set transfer prices as higher than marginal cost. Since the work reported by Hirshleifer (1956), other investigations have analyzed the optimal transfer price in management using the market competition model (e.g., Alles and Datar, 1998; Hamamura, 2019, 2021; Matsui, 2011, 2012; Narayanan and Smith, 2000). Strategic transfer pricing refers to internal transfer prices determined by assuming competition in the product market. Based on the discussion presented above, this study assesses the optimal internal transfer price in a specific case.

2 Model Setup

Based on Hirose *et al.* (2017), we propose a model that describes transfer pricing in divisionalized firms with ECSR. Assume two firms, Firms 1 and 2, in an industry that engages in differentiated quantity competition in a final goods market. Firm i (i = 1, 2) has two divisions: the upstream division (U) and downstream division (D). Of them, U produces intermediate goods at marginal cost $c > 0$. Subsequently, D sells them in the final goods market at price p>0. As one might expect, D adds value to the intermediate goods before selling them in the final goods market. This study normalizes both this value and the cost of adding value to zero for simplicity.

The respective profit functions of Firm i (= 1, 2)'s D (π_i^D) and U (π_i^U) are

$$\pi_i^D = (p_i - t_i)q_i, \tag{1}$$
$$\pi_i^U = (t_i - c)q_i, \tag{2}$$

where p_i represents the market price, t_i denotes the transfer price, and q_i stands for the product quantity for firm i. In addition, transfer prices are observable by the competitor. Consistent with earlier reports of the literature, in this study, we assume that the D manager is evaluated based on D's own profit, which is calculated using the internal transfer price (e.g., Alles and Datar, 1998; Göx, 2000). Therefore, by setting the internal transfer price, the CEO can indirectly control the market price chosen by the D manager by choosing the D sales cost using an internal transfer price.

Consequently, the joint profit function of Firm i (Π_i) is the following:

$$\Pi_i = \pi_i^U + \pi_i^D = (p_i - c)q_i. \tag{3}$$

In this study, we consider an environmentally conscious manager. Therefore, managers have the payoff function of

$$V_i = \Pi_i - \alpha_i \eta q_i, \tag{4}$$

where $\alpha_i > 0$ is the internal emission price representing the degree of ECSR; $\eta > 0$ is the environmental damage which occurs when producing the product. For this study, based on Hirose *et al.* (2017), we assume that managers have different preferences related to ECSR (α_1 and α_2). The degree of ECSR from producing a product is equal among firms (η). In addition, without loss of generality, we assume $\alpha_1 \geq \alpha_2$ to evaluate comparative statistics.

Following the earlier strategic transfer pricing literature, firms engage in quantity competition in a product market (e.g., Arya and Mittendorf, 2007). Therefore, we follow Dixit (1979) in considering a standard duopoly setting with a linear demand function as

$$p_i = 1 - q_i - q_j, \quad (i,\ j) = (1,\ 2),\ (2,\ 1). \tag{5}$$

For this study, we consider homogeneous goods for simplicity. We assume that $1 > c$. The firm is assumed to set the transfer pricing used to transfer the product from U to D. [4]

In addition, based on Singh and Vives (1984), we assume that consumer surplus is computed as $CS = (q_1^2 + 2q_1q_2 + q_1^2)/2$. Using CS and Π_i, social welfare is computed as $SW = CS + \Pi_1 + \Pi_2$.

We consider the following timeline: First, managers decide on transfer prices to maximize Eq. (4). Next, Ds choose the sales quantities for a final goods market to maximize Eq. (1). Finally, profits are realized. We assume that all variables are observable after the decisions are made.

3 Results

3.1 Equilibrium outcome

We identify the equilibrium of the model under quantity competition using backward induction. Considering decisions by D in the second stage, Firm i's D chooses a quantity to maximize Eq. (1). The first-order condition for firm i is

$$\frac{\partial \pi_i^{DD}}{\partial q_i} = 1 - 2q_i - q_j - t_i = 0 \Leftrightarrow BR_i(q_j) = \frac{1 - q_j - t_i}{2}. \tag{6}$$

Using the best response function of Firm i, $BR_i(q_j)$, we obtain the strategy presented below in the second stage:

$$q_i = \frac{1 - 2t_i + t_j}{3}. \tag{7}$$

From this outcome and in this stage, ECSR can be observed to have an effect on quantity only through the internal transfer price. In addition, when t_i increases, q_i decreases; when t_j increases, q_i increases. This outcome directly represents the effects of strategic substitute competition in a product market.

Next, using Eq. (7), we assess the internal transfer price decision by managers. Managers maximize their own payoff function, which is represented by Eq. (4). The best response function for firm i's manager is

$$BR_i(t_j) = \frac{6\alpha_i\eta + 6c - t_j - 1}{4}. \tag{8}$$

This best response function implies that the level of t_i decreases when the competitor's t_j increases. Therefore, the relation between transfer prices is a strategic substitute.

[4] While Hirose *et al*. (2020) assumes general demand function, our study consider liner demand function. They demonstrate that ECSR is used as a collusive device under quantity competition. Therefore, according to Hirose *et al*. (2020), our main result may hold in general demand function.

Using Eq. (8), we obtain the following transfer price in equilibrium as

$$t_i^* = \frac{2(4\alpha_i - \alpha_j)\eta + 6c - 1}{5}, \tag{9}$$

where superscript $*$ denotes the equilibrium outcome. Using this outcome, we obtain all outcomes in equilibrium and assume $0 < \eta < (1-c)/(3\alpha_2 - 2\alpha_1)$ and $\alpha_2 \leq \alpha_1 < 3\alpha_2/2$ to ensure positive outcomes hereafter. From this analysis, we present the following proposition.

Proposition 1. *In equilibrium, quantity, transfer price, and firm-wide profits are as demonstrated below:*

$$\begin{aligned}
q_i^* &= \frac{2\left(1 - c - (3\alpha_i - 2\alpha_j)\eta\right)}{5}, \\
p_i^* &= \frac{1 + c + 2(\alpha_i + \alpha_j)\eta}{5}, \\
t_i^* &= \frac{2(4\alpha_i - \alpha_j)\eta + 6c - 1}{5}, \\
\Pi_i^* &= \frac{2\left(1 - c + 2(\alpha_i + \alpha_j)\eta\right)\left(1 - c - (3\alpha_i - 2\alpha_j)\eta\right)}{25}, \\
CS^* &= \frac{2\left(2(1-c) - (\alpha_1 + \alpha_2)\eta\right)^2}{25}, \\
SW^* &= \frac{2\left(2(1-c) - (\alpha_1 + \alpha_2)\eta\right)\left(3(1-c) + (\alpha_1 + \alpha_2)\eta\right)}{25}.
\end{aligned}$$

All outcomes are positive when $0 < \eta < (1-c)/(3\alpha_2 - 2\alpha_1)$ *and* $\alpha_2 \leq \alpha_1 < 3\alpha_2/2$ *is satisfied.*

Proof. Using Eqs. (3), (7), and (9), this outcome can be obtained in a straightforward manner. In addition, while $SW^* > 0$ under $0 < \eta < 2(1-c)/(\alpha_1 + \alpha_2)$, we can show that $(1-c)/(3\alpha_2 - 2\alpha_1) < 2(1-c)/(\alpha_1 + \alpha_2)$ in our model assumption. Therefore, we consider only the case where $0 < \eta < (1-c)/(3\alpha_2 - 2\alpha_1)$. Additionally, to ensure the existence of $0 < \eta < (1-c)/(3\alpha_2 - 2\alpha_1)$, we assume that $\alpha_2 \leq \alpha_1 < 3\alpha_2/2$. □

In Eq. (7), α_i and α_j have no influence on quantity. In equilibrium, quantity is affected by ECSR through the internal transfer price. When given that $\alpha_i = \alpha_j = 0$, then $q_i^* = 2(1-c)/5$, $t_i^* = (6c-1)/5$, and $\Pi_i^* = 2(1-c)^2/25$. In this case, $t_i^* < c$. Products are supplied excessively in a product market, comparing the case in the absence of transfer pricing. From this outcome, we can consider the transfer price level in equilibrium. First, t_i^* is positive when $\alpha_i > \alpha_j/4$ and $c > 1/6$ are satisfied. This result differs from the case in which $\alpha_i = \alpha_j = 0$.

Next, we demonstrate the level of transfer price, comparing the marginal cost, c. Considering $t_i^* - c$, we obtain the following proposition.

Proposition 2. *Assuming* $(1-c)/2(4\alpha_2 - \alpha_1) < \eta < (1-c)/(3\alpha_2 - 2\alpha_1)$ *and* $\alpha_2 \leq \alpha_1 < 3\alpha_2/2$*, when managers serve ECSR, strategic transfer prices in quantity competition exceed the marginal cost in equilibrium.*

Proof. Because the condition of Firm 2 is tighter than that of Firm 1 in $\alpha_2 \geq \alpha_1$, we consider $t_2^* - c$.

$$t_2^* - c = \frac{2(4\alpha_2 - \alpha_1)\eta + c - 1}{5}. \tag{10}$$

This outcome is positive when $\eta > (1-c)/2(4\alpha_2-\alpha_1)$ is satisfied. Therefore, when $(1-c)/2(4\alpha_2-\alpha_1)2 < \eta < (1-c)/(3\alpha_2-2\alpha_1)$ and $\alpha_2 \leq \alpha_1 < 3\alpha_2/2$ are satisfied, $t_2^* > c$ holds. In addition, when this condition is satisfied, $t_1^* - c > 0$ holds. Therefore, $t_i^* > c$ holds under these circumstances. □

This result is interesting because, in quantity competition, managers set observable strategic transfer prices below the marginal cost in equilibrium. In this game, the ECSR induces inventive managers to reduce quantity because environmental damage increases as q_i increases. Therefore, managers control Ds to reduce quantity through internal transfer pricing. As a result, managers set transfer prices above marginal cost in this case.

This result is led by ECSR. In particular, from Eq. (9), the transfer price is affected more by a manager's consciousness than that of the competitor. Therefore, combinations of α_1 and α_j have an important effect on the internal transfer price. Combinations of external variables are important when considering the transfer price level.

Next, we consider the effects of α_i. For this study, we assume that $\alpha_1 > \alpha_2$. Therefore, we analyze $\alpha_2 = 0$ to ascertain the transfer price and to obtain the following lemma.

Lemma 1. *When $\alpha_2 = 0$, t_2^* is invariably below the marginal cost.*

Proof. Substituting $\alpha_2 = 0$ in Eq. (9), we obtain

$$t_2^* - c = \frac{-2\alpha_1\eta + c - 1}{5}. \tag{11}$$

When $c > (1 + 2\alpha_1\eta)$ holds, Eq. (11) is positive. However, from positive conditions of the equilibrium outcome, $c > (1 + 2\alpha_1\eta)$ is not satisfied. Therefore, when $\alpha_2 = 0$, $t_2^* - c < 0$ holds. □

From Eq. (9), the manager sets a higher transfer price because of ECSR. This effect engenders a transfer price above the marginal cost. Therefore, in the absence of this effect, the strategic transfer price, which is settled by the *selfish* manager, is below the marginal cost because the manager aims at obtaining market share by committing an aggressive strategy in a product market using low transfer pricing.

3.2 Welfare analysis

In this section, we consider the impact of η, α_1, and α_2 on consumer surplus and social welfare. According to Matsui (2011), a transfer price above the marginal cost harms consumer surplus and social welfare. Matsui (2011) demonstrates that firm number and the degree of product differentiation have an important role in considering the level of consumer surplus and social welfare. However, our model normalizes the degree of product differentiation and number of firms. Therefore, in our model, we examine the impact of other variables on welfare.

First, we consider the impact of η, α_1, and α_2 on consumer surplus. Differentiating CS^* by η, α_1, and α_2, we obtain the following outcomes under positive outcome conditions in the previous section.

$$\frac{\partial CS^*}{\partial \eta} = -\frac{4(\alpha_1+\alpha_2)(2(1-c)-(\alpha_1+\alpha_2)\eta)}{25} < 0, \tag{12}$$

$$\frac{\partial CS^*}{\partial \alpha_1} = \frac{\partial CS^*}{\partial \alpha_2} = -\frac{4\eta(2(1-c)-(\alpha_1+\alpha_2)\eta)}{25} < 0. \tag{13}$$

This outcome indicates that the consumer surplus decreases as the internal emission price and environmental damage increase. This is because when firms emphasize environmental considerations, the supplied quantity decreases. Therefore, from our analysis, the actions of managers who try to avoid negative externality do not necessarily lead to good results for consumers.

Next, we consider the impact of η, α_1, and α_2 on social welfare. Differentiating SW^* by η, α_1, and α_2, we obtain the following outcomes under positive outcome conditions in the previous section.

$$\frac{\partial SW^*}{\partial \eta} = -\frac{2(\alpha_1+\alpha_2)(1-c+2(\alpha_1+\alpha_2)\eta)}{25} < 0, \tag{14}$$

$$\frac{\partial SW^*}{\partial \alpha_1} = \frac{\partial SW^*}{\partial \alpha_2} = -\frac{2\eta(1-c+2(\alpha_1+2\alpha_2)\eta)}{25} < 0. \tag{15}$$

This outcome indicates that social welfare decreases as the internal emission price and environmental damage increase. The negative effect of reducing product on consumer surplus directly leads this outcome.

In addition, we include negative externality in social welfare. In this case, social welfare is computed as $SW^{NE} = CS + \Pi_1 + \Pi_2 - \eta(q_1+q_2)$, where the superscript NE denotes the case in which the negative externality of environmental damage is included in social welfare. We obtain SW^{NE} as follows.

$$SW^{NE} = \frac{2\left(6(1-c)^2 + \eta^2(\alpha_1+\alpha_2)\left(5-(\alpha_1+\alpha_2)\right) - (1-c)\eta(10+\alpha_1+\alpha_2)\right)}{25}. \tag{16}$$

We consider the impact of η, α_1, and α_2 on SW^{NE}. Differentiating SW^{NE} by η, α_1, and α_2, we obtain the following outcomes under positive outcome conditions in the previous section.

$$\frac{\partial SW^{NE}}{\partial \eta} = -\frac{2\left((1-c)\left(10+\alpha_1+\alpha_2\right) + 2\eta(\alpha_1+\alpha_2)\left(5-(\alpha_1+\alpha_2)\right)\right)}{25} < 0, \tag{17}$$

$$\frac{\partial SW^{NE}}{\partial \alpha_1} = \frac{\partial SW^{NE}}{\partial \alpha_2} = -\frac{2\eta(1-c-\eta(5-2(\alpha_1+\alpha_2)))}{25}. \tag{18}$$

From this outcome, we obtain $\partial SW^{NE}/\partial \alpha_i > 0$ under a specific economic environment. We identify the case as $\partial SW^*/\partial \alpha_i > 0$ as $\alpha_2 < 1$, adding to the positive conditions of the outcomes. When $(1-c)/(5-2(\alpha_1+\alpha_2)) < \eta$ is satisfied, $\partial SW^{NE}/\partial \alpha_i > 0$ holds. However, from the positive condition of outcomes, $0 < \eta < (1-c)/(3\alpha_2 - 2\alpha_1)$ and $\alpha_2 \leq \alpha_1 < 3\alpha_2/2$ are satisfied. Therefore, when $(1-c)/(5-2(\alpha_1+\alpha_2)) < (1-c)/(3\alpha_2-2\alpha_1)$ is satisfied ($\alpha_2 < 1$), the condition $\partial SW^{NE}/\partial \alpha_i > 0$ exists. We conclude this result in the following proposition.

Proposition 3. *When* $(1-c)/(5-2(\alpha_1+\alpha_2)) < \eta < (1-c)/(3\alpha_2-2\alpha_1)$ *and* $\alpha_2 \leq \alpha_1 < 3\alpha_2/2$ *are satisfied under* $\alpha_2 < 1$*, social welfare that includes negative externality of environmental damage improves as* α_1 *increases.*

This condition implies that when η is large, the degree of environmental damage is large and increasing internal emission price (environmental consideration), α_i reduces environmental damage. These environmental activities help to improve social welfare. In addition, firm i raises internal transfer price as α_i increase. Therefore, managers participate in reducing environmental damage by increasing the internal transfer price in our model. In this case, because social welfare includes the negative externality of environmental damage, reducing the supplied quantity positively affects social welfare only through managers' decision-making. Therefore, we can obtain the positive effect of managers' environmental considerations in this case.

Our model assumes negative externality and the negative effects generate important result. In our model, firms desire to reduce negative externality, which has backfired for social welfare and consumer surplus.

4 Discussion and Conclusion

This study considered transfer prices determined by ECSR-conscious managers engaging in quantity competition. Whereas the observable strategic transfer price is generally below marginal cost in circumstances of quantity competition, our results suggest that the transfer price, which is settled for ECSR, exceeds marginal cost in quantity competition. This result can be attributed to the following rationale: Under ECSR, managers aim at curtailing production to reduce their environmental load. Consequently, managers raise transfer prices to reduce the quantity chosen by the downstream division. In addition, this transfer price improves firms' profits through tacit collusion. Therefore, the study suggests that ECSR is useful for collusive devices. Therefore, managers can improve firm-wide profits by declaring "our firm emphasizes environmental damage reduction."

One contribution of this study is that it sheds light on internal corporate decision-making by environmentally conscious managers with ECSR. Furthermore, this study provides a rationale as to why the internal transfer price exceeds marginal cost, which is observed in practical management scenarios (Tang, 1992). Based on seminal work conducted on economic transfer pricing research by Hirshleifer (1956), the optimal transfer price is theoretically equal to marginal cost. However, our results suggest that ECSR raises transfer prices beyond marginal cost.

This study has a few limitations. First, we assume that internal transfer price is observable after the decisions are made toward competitors. In practice, it is difficult for firms to know a competitor's transfer prices. Some prior literature attempts to demonstrate that managers set transfer prices above the marginal cost in the absence of an observable assumption of transfer pricing (e.g., Göx, 2000; Hamamura, 2019; Narayanan and Smith, 2000). However, Göx (2000) stated that "it might be reasonable to assume that the firms in a small industry do know their competitors' transfer prices" (Göx, 2000, 328). Therefore, one may infer that our assumption about the observability of transfer pricing is reasonable. Second, while prior strategic transfer pricing studies assume price competition (e.g., Alles and Datar, 1998; Göx, 2000), this study considers only quantity competition. This is because, in price competition, we can demonstrate that internal transfer pricing exceeds the marginal cost without ECSR from strategic complementarity, as shown by many prior studies (e.g., Alles and Datar, 1998). Therefore, under price competition, our main result is based on a model analysis. Third, this study model only considers the case in which managers emphasize environmental consideration. One may infer a case in which the downstream or upstream division considers environmental damage. However, in practice, the behavior of firms' managers is frequently scrutinized, and the environmental action of divisions is overlooked. While we can access information about managers' environmental activity through the proxy statement, it is difficult to obtain information about divisions' behavior through primary information. Therefore, we only consider the case in which managers consider environmental damage in this study.

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