Does stigma against tax avoidance improve social welfare?

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Abstract

Stigma can restrain tax avoidance. Tax avoidance behavior by multinational firms has become a public economics problem. Tax avoidance by firms may entail a kind of psychological cost, known as stigma. We analyze the impact of a multinational firm's profit shifting by multinational transfer pricing on social welfare using a simple model that assumes the existence of stigma. The results are as follows. First, stigma improves domestic social welfare more than the absence of stigma does. Second, stigma improves global social welfare more than the arm's length principle, which is the OECD consensus on transfer pricing of cross-border transactions. Third, the optimal degree of public exposure increases with the domestic tax rate and foreign market demand. Our study has the following implications. First, our results imply that stigma has implications for improving social welfare. Second, our results imply that regulators should eschew the arm's length principle and instead use stigma to improve the calibration of society as a whole by restricting the behavior of firms, which can cause problems in trade between nations. Third, in our study, because we find that choosing a positive degree of public exposure maximizes domestic social welfare, our results suggest that public exposure effectively stops the decline in social welfare caused by tax avoidance behavior in firms.

Keywords: tax avoidance, stigma, transfer price, arm's length principle, multinational firm

JEL classification: D43, D91, H26, L12

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1 Introduction

Multinational firms, such as Amazon, Coca-Cola, Facebook, Google, Microsoft, Nintendo, and Starbucks, are now focused on social media, and use various management practices to increase their profits. In particular, tax avoidance by multinational firms using multinational transfer pricing has long been a focus of attention, the arm's length principle has been used to prevent this behavior; this principle was adopted by the OECD as the transfer pricing standard for cross-border transactions[1]. Unless tax authorities take pains to administer the arm's length principle, tax avoidance would reduce a government's tax revenue and significantly impact social welfare.

Despite the existence of the arm's length principle, regulators have not been able to prevent tax avoidance by multinational firms. For example, Amazon pays less corporate tax by designating a Luxembourg corporation, which has a lower tax rate, as the owner of its inventories. Starbucks has also increased its profits by consolidating royalties from intellectual property in different countries into the Netherlands, where the tax rate is lower. In addition, Starbucks has charged high transfer prices for beans from Switzerland to the UK, thereby increasing profits in Switzerland, which has a lower tax rate. The arm's length principle may indeed prevent tax avoidance through transfer pricing to some extent; however, as this example shows, it is limited. Furthermore, there are examples of tax avoidance through multinational transfer pricing even when the arm's length principle is actually used. This shows that the arm's length principle is not a completed principle[2].

Consumers and national and other local governments that rely on tax revenue have a negative view of tax avoidance. For example, in the UK, consumers have boycotted Starbucks, which earns large after-tax profits through tax avoidance, causing damage to Starbucks' profits (REUTERS Business News, 2014). In addition, Ethical Consumer called a boycott of Amazon over its excessive tax avoidance, and Amazon's reputation has taken a knock from this boycott (Ethical Consumer, 2021). From these examples, it is evident that consumers frown upon tax avoidance by multinational firms, which in turn has negative consequences for businesses. Of course, as the Starbucks example shows, the firm's profits may be harmed directly, but there may also be indirect effects, such as limiting managers' future behavior as they would have developed a negative reputation. Such

[1] Recently, the arm's length principle has led to a focus on tax avoidance using cost sharing.

[2] Even if taxing authorities could fully regulate corporations using the arm's length principle, this would not necessarily be effective for society, as some studies have shown in theory (Choe and Matsushima, 2013; Matsui, 2011).

examples imply that negative social reputation may play a role in regulating tax avoidance by firms.

Focusing on this negative reputation of firms and managers, stigma can be said to accompany tax avoidance. Stigma refers to social stigma against a person or community. Individuals who suffer stigma have some psychological stress. Stigma has been the focus of much attention in sociology and psychology research to date, pioneered by Goffman (1963). As in the previous example, firms face a stigma in society if they have a poor tax avoidance reputation. This not only results in psychological costs for the firm's manager, but may also harm the firm's future profits. For example, Jeff Bezos, CEO of Amazon, was voted "World's Worst Executive" by the International Trade Union Confederation because of Amazon's shoddy working conditions and his brazen tax avoidance (International Trade Union Confederation, 2014). This obviously lowers Amazon's reputation and causes psychological costs to Bezos. Another example of stigma occurs when firms do not pay taxes. The New York Times quoted an employee of Italy's internal revenue service saying, "along with a new blitz of public service announcements trying to raise the social stigma on tax evasion, have become crucial as Italy struggles to reduce its $2.5 trillion public debt and fend off speculative attacks" (New York Times, 2011). This example shows that the stigma arising from not paying taxes in Italy and tax evasion or avoidance has a serious and negative impact on the nation's tax revenue.

In this study, we ask the following question: what are the implications of stigma from tax avoidance for multinational firms and society? Stigma is expected to help prevent tax avoidance because it is costly for firms and managers. In particular, because it is difficult in the current climate to regulate transfer pricing by methods other than the arm's length principle, stigma is expected to be a new measure to prevent tax avoidance, replacing the arm's length principle. If the psychological cost of stigma can prevent firms from avoiding taxes, then the cost to the tax authority of applying the arm's length principle would decrease. Therefore, would it be desirable for society to use stigma instead of the arm's length principle? To consider this issue, in this study, we set the following research questions. (i) How does stigma change the transfer pricing choices of firms? (ii) Does stigma improve domestic social welfare compared to doing nothing or the arm's length principle? (iii) Does stigma improve global social welfare compared to doing nothing or the arm's length principle?

We construct the following simple two-country model in this study. We explore a case in which a multinational firm has a monopoly in its domestic country and a foreign country. The headquarters in the domestic country supply products to the foreign subsidiary in the other country. This multinational firm manufactures products in the domestic country and transfers them to the foreign subsidiary using multinational transfer pricing. While the multinational firm determines multinational transfer pricing to maximize the foreign subsidiary's firm-wide profit and the domestic country profit, it determines transfer pricing to maximize only the domestic country profit under the arm's length principle. This model is the simplest model for analyzing tax avoidance by a multinational firm in the two-country case. In addition, in this study, we assume that when a multinational firm (and its manager) engages in tax avoidance behavior, they carry a stigma, which is costly. We derive the optimal degree of public exposure to maximize social welfare[3]. We assume that the regulator (tax authorities) cannot determine the level of stigma costs but can, to some extent, influence the actual stigma costs incurred by managers by exposing information on corporate tax avoidance behavior.

Our analysis demonstrates that stigma is an effective means of preventing tax avoidance by multinational firms. First, we show that cases with stigma improve domestic social welfare more than cases without stigma and without using the arm's length principle. This is because the psychological cost of stigma discourages tax avoidance by multinational firms. In addition, while we are unable to show that the stigmatized case improves domestic social welfare more than the arm's length principle, we show that stigma improves global social welfare more than the arm's length principle. This is because the arm's length principle deprives foreign social welfare due to higher multinational transfer prices. Meanwhile, stigma can eliminate the unnatural "distortions" caused by the arm's length principle and improve global social welfare, because the multinational firm can respond to cases in which tax rates in foreign countries are higher. This study also identifies the optimal degree of public exposure. We analyze whether regulators (tax authorities) should be encouraged to expose tax avoidance information by multinational firms.

The economic analysis of tax avoidance by multinational transfer pricing in the product market from a political viewpoint dates back to Copithorne (1971) and Horst (1971). The literature then

[3]As a policy variable for the regulator, we consider the degree of public exposure introduced by Blumkin et al. (2015).

analyzed the interaction between firms' tax evasion strategies and tax policies (e.g., Bond, 1980; Bond and Gresik, 1996; Calzolari, 2004; Devereux and Keuschnigg, 2009; Elitzur and Mintz, 1996; Gresik and Nelson, 1994; Gresik, 1999; Gresik and Osmundsen, 2008; Haufler and Schjelderup, 2000; Levinsohn and Slemrod, 1993; Prusa, 1990; Schjelderup and Sorgard, 1997; Schjelderup and Weichenrieder, 1999; Stoughton and Talmor, 1994; Weichenrieder, 1996). Our study differs from these works in that we explore the impact of stigma on firms' behavior and social welfare. Therefore, our examination has a unique assumption that affects firms' behavior and social welfare.

Some research demonstrates the negative effect of the arm's length principle. For example, assuming the existence of a parallel importer, Autrey and Bova (2012) explore the optimal level of multinational transfer pricing to maximize firm-wide profit. They demonstrate that, in a specific economic environment, the arm's length principle harms both domestic and global social welfare. The arm's length principle increases the multinational transfer price and market price of the foreign country. In this case, because the parallel importer incurs higher marginal cost by the higher market price, product market competition in the domestic country is modified, and consumer surplus decreases. As a result, domestic social welfare decreases. While Autrey and Bova (2012) assume the existence of a parallel importer, our study assumes monopolistic competition in each country. In addition, Choe and Matsushima (2013) examine competition by two unrelated vertical market structures. They demonstrate that the arm's length principle leads to tacit collusion by unrelated supply chains and harms social welfare. While Choe and Matsushima (2013) analyze two supply chains and demonstrate the dark side of the arm's length principle, we consider monopolistic competition in each market and, by considering stigma, show that the arm's length principle harms social welfare. Matsui (2011) also demonstrates the negative effect of the arm's length principle, assuming two countries, each with importers and exporters. While Matsui (2011) assumes an oligopoly market of importers and exporters, we find that an exporter produces (and supplies) goods in the domestic country and an importer supplies goods in the foreign country.

There are few studies on the stigma of corporate tax avoidance, but there have been many studies on the stigma of tax evasion in income reporting[4]. Gordon (1989) introduces social stigma into the tax evasion model of Allingham and Sandmo (1972). Myles and Naylor (1996) analyzes tax

[4]Myles (1995) and Hindriks and Myles (2013) provide an excellent explanation and survey of tax evasion models of income reporting.

evasion in terms of group conformity and social custom. Kim (2003) analyzes the stigma model of tax evasion by considering income distribution and more generalized taxation. Casal and Mittone (2016) experimentally test the effects of self-esteem and social stigma on tax evasion in income reporting. They suggest that social stigma has a stronger effect on tax compliance than social esteem does[5].

Stigma belongs to the analysis field of behavioral economics in a broad sense. In the last decade, there has been a growing number of behavioral economics studies on tax evasion (Hashimzade et al., 2013). For example, Trotin (2010) and Piolatto and Rablen (2017) analyze tax evasion behavior based on prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992). Our study extends the literature by applying stigma to tax avoidance. Based on real-world experience, we assume that multinational firms face stigma from tax avoidance, as the Starbucks and Amazon examples show.

The following stigma studies have been conducted in economics: welfare stigma (Besley and Coate, 1992; Kroft, 2008; Blumkin et al., 2015; Cremer and Roeder, 2015; Kurita et al., 2020; Itaya and Kurita, 2020), financial stigma (Ennis and Weinberg, 2013; Armantier et al., 2015), stigma in the labor market (Sessions, 1994), stigma faced by criminals for illegal behavior (Rasmusen, 1996; Harel and Klement, 2007), and COVID-19-related stigma (Katafuchi et al., 2020; Kurita and Managi, 2020). However, most previous stigma studies in economics have analyzed exogenous public exposure. In other words, there are few studies on public exposure, which is the extent to which regulators expose and stigmatize negative corporate behavior in society (Blumkin et al., 2015; Itaya and Kurita, 2020). While most previous studies do not consider endogenous public disclosure by tax authorities, we identify optimal public exposure to maximize domestic social welfare.

This study makes the following contributions to the tax avoidance literature on multinational transfer pricing. First, we incorporate stigma from tax avoidance using a simple model. The analysis indicates that stigma is effective in influencing taxation, which is a first step in tax research focused on stigma. In addition, this study demonstrates that stigma improves the global social surplus and that domestic social welfare can be increased up to a certain level. One of the major contributions of this study is that the arm's length principle does not improve global social welfare as much as stigma does. Another contribution is our analysis of the optimal level of public exposure

[5]Choo et al. (2016) conduct a laboratory experiment on tax compliance.

for society. Most prior studies, except Blumkin et al. (2015) and Itaya and Kurita (2020), have not considered public exposure as a policy tool, and it is not clear how regulators can create stigma. Therefore, by analyzing the optimal public exposure for tax avoidance, this study makes an important contribution by clarifying the extent to which multinational firms' tax avoidance must be exposed as an alternative to the arm's length principle.

This study has the following implications for tax authorities and regulators. First, if the arm's length principle is imperfect, then the benefits of using stigma as an alternative might be greater, because stigma can be created by actively exposing the tax avoidance behavior of multinational firms to society, thereby increasing domestic social welfare up to a certain level. Even using the arm's length principle, tax avoidance by multinational corporations has not been successfully deterred. While it is important to rely on regulations and other mechanisms, there are real psychological factors weighing against the managers of firms that can be used to change firms and their managers' behavior. In addition, our analysis of the optimal public exposure degree suggests that revealing the tax avoidance behavior of firms to society with firmness could increase the stigma of firms and managers and influence their tax avoidance behavior.

The structure of the rest of this paper is as follows. Section 2 presents the basic model and setting. Section 4 conducts social welfare analysis. Section 5 analyzes the optimal degree of public exposure. The final section concludes.

2 Basic model

A multinational firm sells products in a domestic country (D) and also sells products in a foreign country (F). The multinational firm's headquarters is responsible for selling products in the domestic country, while the subsidiary is responsible for selling products in the foreign country. In addition, the factory is located in the domestic country, and it is assumed that the headquarters manufactures the product. In addition, we assume that the tax rates in the domestic country and the foreign country are different: the domestic country's tax rate is τ_D and that of the foreign country is τ_F.

The subsidiary has the authority to make decisions on quantity in the foreign country. In this study, the foreign subsidiary transfers the products manufactured at the headquarters at a per-unit

transfer price of t. Hence, the divisional profit of the subsidiary, π_F, is

$$\pi_F = (p_F - t)q_F, \tag{1}$$

where p_F denotes the market price in the foreign country and q_F denotes the quantity in the foreign country. From Eq. (1), the subsidiary's after-tax profit is defined as $(1 - \tau_F)\pi_F$. Because the performance of the foreign subsidiary is evaluated by this profit, the decision is made to maximize Eq. (1)[6].

The headquarters of the multinational firm manufactures the product at the marginal cost of c. For simplicity, we normalize $c = 0$. Firm-wide profit is the sum of the firm's profit in the domestic country and the foreign subsidiary's profit. To define the profit of the multinational firm, we define the profit in the domestic country, π_D, as follows:

$$\pi_D = p_D q_D + t q_F. \tag{2}$$

In this case, the after-tax profit is $(1 - \tau_D)\pi_D$. Given Eqs. (1) and (2), and the assumption that both countries face different tax rates, the after-tax firm-wide profit of the multinational firm, Π, is computed as $\Pi = (1 - \tau_D)\pi_D + (1 - \tau_F)\pi_F$. In addition, the manager of the multinational firm has the following payoff function, V.

$$V = \Pi - ST, \tag{3}$$

where ST represents the degree of stigma felt by the managers of the multinational firm. This setting of the stigma cost function regards the transfer price under the arm's length principle as a kind of "social norm" that the multinational firm must comply with. This means that in this economy, those who deviate from social norms are stigmatized. This stigma against deviance was first discussed in Goffman (1963), and Besley and Coate (1992) modeled a stigma cost function

[6]Deciding to maximize after-tax profit or before-tax profit does not change the foreign subsidiary's decision making. Therefore, we assume that the decision is made to maximize pre-tax profit.

based on this stigma. This stigma function ST is

$$ST = \frac{1}{2} s \left(t^{arm} - t\right)^2, \tag{4}$$

where $s > 0$ is the public exposure degree of stigmatization, which is assumed to be larger than $\underline{s} := \tau_D - \tau_F$ to ensure non-negative outcomes[7]. This stigma function shows that when the multinational firm uses multinational transfer pricing to avoid taxes, there is a psychological cost of stigma for the manager. In this study, the transfer pricing established by the arm's length principle is used as a criterion to determine whether a multinational firm is engaged in tax avoidance. The arm's length principle is an important principle established by the OECD, and tax avoidance through transfer pricing in violation of the principle is a major problem for the international community. Therefore, s represents the degree of psychological cost of tax avoidance for managers through public exposure. This setting of the stigma cost function implies that the arm's length principle is the social norm in this model, and this norm is deviated from, the stronger the stigma becomes. The headquarters determines the transfer price and quantity in the domestic country to maximize Eq. (3).

The multinational firm faces a monopoly in both markets [8]. Therefore, we assume the following demand functions.

$$p_i = a_i - q_i, \qquad i = D,\, F, \tag{5}$$

where a_i is positive constant.

In addition, according to Singh and Vives (1984), we define consumer surplus as follows:

$$CS_i = \left(a_i q_i - \frac{1}{2} q_i^2\right) - p_i q_i = \frac{1}{2} q_i^2. \tag{6}$$

[7] An additional analysis using the stigma function constructed with after-tax profits is conducted in Section ¥refsec:dis, and we propose that our main result holds for other stigma functions.

[8] In Section 6.2, we propose that a domestic competitor does not have a significant impact on our main result.

Table 1: Notations

Variable	
π	divisional profit
Π	firm-wide profit of the multinational firm
V	payoff function of the manager, which combines firm-wide profit and stigma cost
ST	stigma cost
τ	tax rate
p	market price
q	quantity
t	multinational transfer price
D	subscript indexing the domestic country
F	subscript indexing the foreign country
G	subscript indexing global
i	subscript indexing a firm
arm	superscript indexing the arm's length transfer price
$stig$	superscript indexing a stigma case
s	the public exposure degree of stigmatization: positive constant of stigma
a	positive constant
SW	social welfare

Using consumer surplus, social welfare in country i is defined as [9]

$$SW_i = \pi_i + CS_i. \tag{7}$$

In addition, global social welfare is

$$SW_G = SW_D + SW_F. \tag{8}$$

We describe the timeline of our model. First, a manager at the headquarters of a multinational firm determines the multinational transfer price t. Then, the foreign subsidiary and the headquarters determine the quantities q_D and q_F. The notations are presented in Table 1.

[9] In this study, we assume that ST is not included in social welfare. In our social welfare, we do not include the stigma costs following Blumkin et al. (2015).

3 Analysis

3.1 Arm's length transfer price

In this section, we examine the case of the arm's length principle. In this case, considering the ST function, $ST = 0$ because t^{arm} is assigned to t. By backward induction, we start by looking at the foreign supply decisions of the subsidiary and the headquarters in the second stage.

First, we analyze with decision making in foreign markets. We assume that the foreign market is a monopoly market for player F (foreign subsidiary). The profit maximization problem in the second stage of the foreign subsidiary is formulated as follows:

$$\begin{aligned}\max_{q_F} \pi_F &= (p_F - t)q_F, \\ &= (a_F - q_F - t)q_F.\end{aligned}$$

The foreign subsidiary determines its own quantity, given the headquarters' transfer price in the first stage. Hence, the first-order condition is

$$\frac{\partial \pi_F}{\partial q_F} = a_F - 2q_F - t = 0.$$

The optimal quantity of player F in the second stage is

$$q_F = \frac{a_F - t}{2}. \tag{9}$$

Next, we consider the domestic market. The domestic market is a monopoly market for the headquarters. The profit maximization problem of the headquarters in the second stage can be formulated as follows[10]:

$$\begin{aligned}\max_{q_D} \Pi &= (1 - \tau_D)\pi_D + (1 - \tau_F)\pi_F, \\ &= (1 - \tau_D)\left[(a_D - q_D)q_D + tq_F\right] + (1 - \tau_F)(a_F - q_F - t)q_F.\end{aligned}$$

The headquarters determines its own quantity, given the transfer price t that it determines in the

[10] In this case, the objective function of the manager, V, is equal to Π because $ST = 0$.

first stage. The first-order condition is given as follows:

$$\frac{\partial \pi_D}{\partial q_D} = (1 - \tau_D)(a_D - 2q_D) = 0.$$

We obtain

$$q_D = \frac{a_D}{2}. \tag{10}$$

In the first stage, the headquarters determines the transfer price for the subsidiary based on the decisions made in the second stage. Because we are now considering the arm's length principle, based on Autrey and Bova (2012), the objective function of the headquarters in this case is the profit in the domestic country. Therefore, the optimization problem can be formulated as follows.

$$t^{arm} \in \arg\max_t \ \pi_D(t),$$

where the superscript arm represents the outcome in the arm's length principle. Form Eqs. (9) and (10), $\pi_D(t)$ is as follows:

$$\begin{aligned} \pi_D(t) &= (a_D - q_D)q_D + tq_F, \\ &= \left(a_D - \frac{a_D}{2}\right)\frac{a_D}{2} + t\frac{a_F - t}{2}. \end{aligned}$$

The first-order condition is

$$\frac{\partial \pi_D}{\partial t} = \frac{a_F - 2t}{2} = 0.$$

We obtain the optimal multinational transfer price in the arm's length principle as follows:

$$t^{arm} = \frac{a_F}{2}. \tag{11}$$

From the analysis, the quantities realized in the sub-game perfect Nash equilibrium are given by

$$q_F^{arm} = \frac{a_F}{4},$$
$$q_D^{arm} = \frac{a_D}{2}.$$

Under the arm's length principle, the domestic headquarters behaves as if it were dealing with a third party when dealing with a foreign subsidiary. In other words, when determining the transfer price, the decision is made to maximize the profit of the headquarters. The analysis in the next subsection is based on t^{arm} obtained here.

In addition, SW_i^{arm} in this case are as follows:

$$SW_D^{arm} = \frac{3a_D^2 + a_F^2}{8}, \tag{12}$$
$$SW_F^{arm} = \frac{3a_F^2}{32}. \tag{13}$$

We obtain the following global social welfare SW_G^{arm}.

$$SW_G^{arm} = SW_D^{arm} + SW_F^{arm} = \frac{12a_D^2 + 7a_F^2}{32}. \tag{14}$$

3.2 Stigma as a preventing device of tax avoidance

Next, by considering the existence of stigma, we consider a case in which firms avoid taxes without the arm's length principle. Here, the headquarters' objective function at the stage of setting transfer pricing is different from that in the previous subsection. The maximization problem in this case can be formulated as follows.

$$\max_t \ V = (1-\tau_D)\left[\left(a_D - \frac{a_D}{2}\right)\frac{a_D}{2} + tq_F\right] + (1-\tau_F)\left(a_F - \frac{a_F - t}{2} - t\right)\frac{a_F - t}{2} - \frac{1}{2}s\left(t^{arm} - t\right)^2. \tag{15}$$

From Eq. (15), we obtain following result.

Result 1 *Under stigma, the outcomes are as follows:*

$$
\begin{aligned}
t^{stig} &= \frac{a_F\left(s-\tau_D+\tau_F\right)}{2s-2\tau_D+\tau_F+1},\\
q_D^{stig} &= \frac{a_D}{2},\\
q_F^{stig} &= \frac{(1-\tau_D+s)a_F}{2(2s-2\tau_D+\tau_F+1)},\\
\pi_D^{stig} &= \frac{1}{4}\left[a_D^2+\frac{2a_F^2(s-\tau_D+1)(s-\tau_D+\tau_F)}{(2s-2\tau_D+\tau_F+1)^2}\right],\\
\pi_F^{stig} &= \frac{a_F^2(s-\tau_D+1)^2}{4(2s-2\tau_D+\tau_F+1)^2},\\
\Pi^{stig} &= (1-\tau_D)\pi_D^{stig}+(1-\tau_F)\pi_F^{stig}\\
V^{stig} &= \Pi^{stig}-\frac{1}{2}s\left(t^{arm}-t^{stig}\right)^2.
\end{aligned}
$$

In addition, SW_i^{stig} in this case are as follows:

$$SW_D^{stig} = \frac{3a_D^2}{8}+\frac{a_F^2(s-\tau_D+1)(s-\tau_D+\tau_F)}{2(2s-2\tau_D+\tau_F+1)^2}, \tag{16}$$

$$SW_F^{stig} = \frac{3a_F^2(1+s-\tau_D)^2}{8(2s-2\tau_D+\tau_F+1)^2}. \tag{17}$$

We obtain the following global social welfare SW_G^{stig}.

$$SW_G^{stig} = SW_D^{stig}+SW_F^{stig}. \tag{18}$$

In addition, we define the case in which there is no stigma ($s=0$) and no arm's length principle, as a benchmark case to consider the stigma effect. Substituting $s=0$ in Result 1, we obtain the

following outcomes:

$$
\begin{aligned}
t^B &= \frac{a_F\left(\tau_F-\tau_D\right)}{1-2\tau_D+\tau_F},\\
q_D^B &= \frac{a_D}{2},\\
q_F^B &= \frac{(1-\tau_D)a_F}{2(1-2\tau_D+\tau_F)},\\
\pi_D^B &= \frac{1}{4}\left[a_D^2+\frac{2a_F^2(1-\tau_D)(\tau_F-\tau_D)}{(1-2\tau_D+\tau_F)^2}\right],\\
\pi_F^B &= \frac{a_F^2(1-\tau_D)^2}{4(1-2\tau_D+\tau_F)^2},\\
\Pi^B &= V^B=(1-\tau_D)\pi_D^B+(1-\tau_F)\pi_F^B,
\end{aligned}
$$

where superscript B denotes the benchmark case. In this case, SW_i is as follows:

$$SW_D^B=\frac{3a_D^2}{8}+\frac{a_F^2(1-\tau_D)(\tau_F-\tau_D)}{2(1-2-\tau_D+\tau_F)^2}, \tag{19}$$

$$SW_F^B=\frac{3a_F^2(1-\tau_D)^2}{8(1-2\tau_D+\tau_F)^2}. \tag{20}$$

In addition, global social welfare is

$$SW_G^B=SW_D^B+SW_F^B. \tag{21}$$

4 Social welfare analysis

4.1 Does stigma improve social welfare?

Does stigma improve social welfare? We compare domestic social welfare SW_D in the absence of stigma (without assuming that it follows the arm's length principle) with the domestic social welfare SW_D^{stig} under stigma. The difference, $SW_D^B-SW_D^{stig}$, is given by

$$SW_D^B-SW_D^{stig}=\frac{sa_F^2\left(1-\tau_F\right)^2\left(2\tau_D-\tau_F-s-1\right)}{2\left(-2\tau_D+\tau_F+1\right)^2\left(-2\tau_D+\tau_F+2s+1\right)^2}, \tag{22}$$

From Eq. (22), we obtain the following proposition:

Proposition 1 *Stigma improves domestic social welfare, which is higher than in the benchmark*

case. Formally, $SW_D^B < SW_D^{stig}$ *always holds.*

Proof. See Appendix. ■

The intuition of this proposition is as follows. Under stigma, a psychological cost arises based on the arm's length principle. The arm's length principle improves domestic social welfare because the headquarters maximizes domestic profit without damaging consumer surplus in our model. Therefore, under stigma, the headquarters sets multinational transfer pricing between the benchmark case and the arm's length transfer price for a psychological cost. This multinational transfer pricing leads to improved domestic social welfare in our model.

Proposition 1 suggests that stigma improves social welfare, as managers curtail tax avoidance to reduce stigma costs, even though the government does not conduct tax audits. This result shows that stigma is one of the most effective ways to prevent tax avoidance. Certainly, stigma is not a set mechanism, nor is it a direct penalty. While it is difficult for regulators and tax authorities to regulate with certainty, stigma, if it exists, can restore the social welfare that multinational tax avoidance reduces. This implies that focusing on stigma has implications for improving social welfare. Therefore, in the next subsection, we consider whether stigma improves domestic or global social welfare and argue that stigma is an effective tool for public economics.

4.2 Does the arm's length principle improve social welfare?

Using the results of the previous analysis, in this subsection, we explore whether the arm's length principle improves social welfare. First, we compare domestic social welfare. From Eqs. (12) and (16), the difference between the arm's length and stigma cases is as follows:

$$SW_D^{arm} - SW_D^{stig} = \frac{a_F^2(1-\tau_F)^2}{8(1+2s-2\tau_D+\tau_F)^2} > 0. \tag{23}$$

From Eq. (23), $SW_D^{arm} > SW_D^{stig}$ always holds. Hence, the arm's length principle improves domestic social welfare because it encourages the multinational firm to set the multinational transfer price to maximize domestic profit irrespective of the consumer surplus in the domestic country. While this outcome theoretically indicates the arm's length principle's effectiveness, in practice, some multinational firms deviate from regulation or avoid tax by other means under the arm's length principle. In addition, under the arm's length principle, the tax authority plays an important mon-

itoring role of the principle and incurs huge costs doing so. While the arm's length principle incurs huge regulation costs by the tax authority, stigma incurs only public exposure costs. Therefore, stigma plays an important role in regulating the tax avoidance of multinational firms. We discuss the optimal degree of public exposure in Section 5.

Next, we analyze $SW_G^{arm} - SW_G^{stig}$ and obtain the following outcome.

$$SW_G^{arm} - SW_G^{stig} = -\frac{a_F^2(1-\tau_F)(5+12s-12\tau_D+7\tau_F)}{32(1+2s-2\tau_D+\tau_F)^2}. \tag{24}$$

From Eq. (24), when $5 + 12s - 12\tau_D + 7\tau_F > 0$ is satisfied, $SW_G^{arm} < SW_G^{stig}$ holds, because $SW_G^{arm} - SW_G^{stig}$ is negative. Hence, $s > (12\tau_D - 7\tau_F - 5)/12$ is satisfied, and stigma improves global social welfare. From this outcome, we obtain the following proposition.

Proposition 2 *Stigma improves global social welfare in a specific economic condition more than the arm's length principle does. Formally, $SW_G^{arm} < SW_G^{stig}$ holds when $s > (12\tau_D - 7\tau_F - 5)/12$.*

This proposition indicates that a large degree of public exposure effectively prevents tax avoidance by multinational firms in multinational transfer pricing. In particular, stigma does not improve domestic social welfare but does improve foreign social welfare, and thus, restricts tax avoidance by multinational firms. In addition, we rewrite $s > (12\tau_D - 7\tau_F - 5)/12$ as $\tau_D > (7\tau_F + 12s + 5)/12$. This condition indicates that when the domestic tax rate, τ_D, is large, $SW_G^{arm} < SW_G^{stig}$ holds, because stigma prevents tax avoidance by the multinational firm in the domestic country in favor of seeking a lower tax rate in the foreign country.

This result shows that the arm's length principle is not a panacea[11]. The arm's length principle is currently considered an effective tool for regulating tax avoidance. However, we find that using the arm's length principle instead of stigma would be beneficial to exporters but would be very damaging to the social welfare of importers. This result implies that regulators (tax authorities) should use stigma, rather than the arm's length principle, to improve the calibration of society as a whole by restricting the behavior of firms, as the arm's length principle can cause problems in trade between nations. For example, when a large country exports a product to a country with a relatively weak economy, and uses the arm's length principle to focus only on its own tax revenue, this might aggravate the social welfare of other countries with which it is trading.

[11]Matsui (2011) also demonstrates the arm's length principle.

5 Optimal degree of public exposure

This section presents the optimal degree of public exposure s. We assume that the cost function of the degree of public exposure is as follows:

$$\sigma(s) = \gamma s. \tag{25}$$

Net social welfare, NSW, is given by

$$NSW_D = SW_D^{stig} - \sigma(s), \tag{26}$$

We define s^* as the optimal degree of public exposure to maximize net social welfare. s^* is given by the following proposition.

Proposition 3 *The optimal degree of public exposure is as follows:*

$$s^* = \frac{2\tau_D - \tau_F - 1}{2} + \left[\frac{a_F(1-\tau_F)}{2\gamma}\right]^{\frac{2}{3}},$$

Proof. See Appendix. ■

Figure 1 shows the determination of the optimal degree of public exposure. The red line is a curve showing the marginal benefit of an increase in the degree of public exposure, and the blue line shows the marginal cost of an increase in the degree of public exposure. Their intersection corresponds to the socially optimal point.

While most previous studies have not analyzed endogenous public exposure, in this study, we identify the optimal public exposure degree. Our results imply that regulators or tax authorities can reduce the negative impact of tax avoidance by multinational firms on social welfare by properly exposing tax avoidance behavior. It is important to note that, in this study, s represents the extent to which a firm's tax avoidance behavior is exposed. Therefore, we assume that the regulator causes firms engaged in tax avoidance behavior to be stigmatized by exposing their behavior. In the real world, the extent to which a firm faces stigma by exposing its tax avoidance behavior depends on the situation. However, it will face some degree of harm, as the examples in this study show. In our study, because we find that choosing $s > 0$ maximizes domestic social welfare, our results

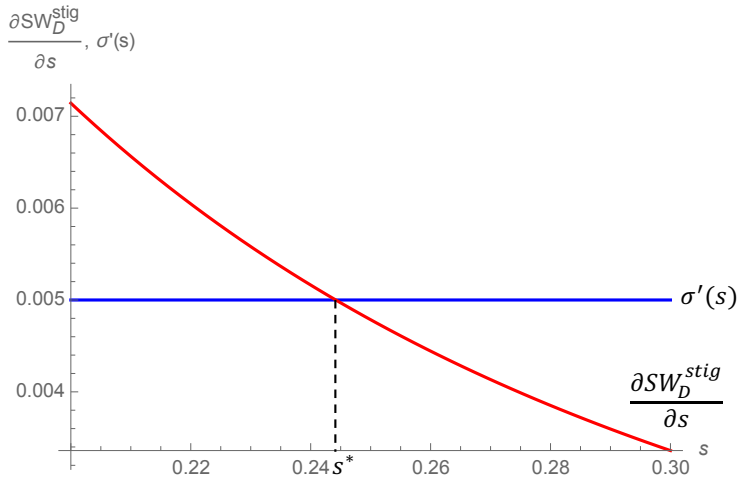

Figure 1: Optimal public stigma exposure s^*

Notes: The figure shows the determination of the optimal public stigma exposure. The red line corresponds to $\partial SW_D^{stig}/\partial s$, and the blue line corresponds to $\sigma'(s)$. The figure is drawn by numerical plotting with the parameter setting: $a_D = a_F = 0.1$, $\tau_D = 0.5$, $\tau_F = 0.3$, and $\gamma = 0.005$.

suggest that public exposure is effective in stopping the decline in social welfare caused by firms' tax avoidance behavior.

The effects of changes in parameters on the optimal degree of public exposure are summarized in the following proposition.

Proposition 4 *The comparative statics of s^* with respect to the change in $\gamma, \tau_D, \tau_F, a_D$, and a_F is given by*

$$\frac{\partial s^*}{\partial \gamma} < 0, \ \frac{\partial s^*}{\partial \tau_D} > 0, \ \frac{\partial s^*}{\partial \tau_F} < 0, \ \frac{\partial s^*}{\partial a_D} = 0, \ \frac{\partial s^*}{\partial a_F} > 0.$$

Proof. See Appendix. ■

On the one hand, an increase in the marginal cost of exposure and the foreign tax rate reduces the optimal degree of exposure; on the other hand, an increase in the domestic tax rate and the intercept of the inverse demand function for the foreign market. This result implies that the higher the domestic tax rate and demand in the foreign market, the stronger the incentive for the multinational firm's manager to avoid taxes, and thus, the higher the optimal degree of public

exposure.

6 Robustness check

6.1 An alternative assumption of stigma function

In this subsection, we assume the following stigma function, ST:

$$ST = s\left(\frac{\Pi}{\Pi^{arm}}\right). \tag{27}$$

This function becomes larger when the firm-wide profit after tax is larger than that at the time of the arm's length principle. Meanwhile, if the firm-wide profit after tax is smaller than the firm-wide profit after tax at the time of the arm's length principle, the function becomes smaller, because the firm is taking actions that contribute more to society. While the effective tax rate can be used, the denominator includes transfer pricing, making the analysis complicated. In addition, if the stigma arises from the consumer, as in the Starbucks example in the UK, it is easier to understand profit rather than effective tax rates. This is because not all consumers understand the effective tax rate, and they often argue against the multinational "making too much money."

In this model, we obtain the following outcomes.

$$\begin{aligned}
t^{Add} &= \frac{(\tau_F - \tau_D)a_F}{1 - 2\tau_D + \tau_F}, \\
q_D^{Add} &= \frac{a_D}{2}, \\
q_F^{Add} &= \frac{a_F(1-\tau_D)}{2(1 - 2\tau_D + \tau_F)}, \\
\pi_D^{Add} &= \frac{1}{4}\left[a_D^2 + \frac{2a_F^2(1-\tau_D)(\tau_F - \tau_D)}{(1 - 2\tau_D + \tau_F)^2}\right], \\
\pi_F^{Add} &= \frac{a_F^2(1-\tau_D)^2}{4(1 - 2\tau_D + \tau_F)^2}, \\
\Pi^{Add} &= \frac{(1-\tau_D)\left[a_F^2(1-\tau_D) + a_D^2(1 - 2\tau_D + \tau_F)\right]}{4(1 - 2\tau_D + \tau_F)}, \\
V^{Add} &= \Pi^{Add} - s\left(\frac{\Pi^{Add}}{\Pi^{arm}}\right).
\end{aligned}$$

where superscript Add denotes the outcomes in Section 6.1. In this subsection, we assume $\tau_D <$

$(1+\tau_F)/2$ to ensure positive outcomes. Surprisingly, in this subsection, the degree of public exposure does not affect outcomes, with the exception of V^{Add}.

In addition, we obtain the following social welfare.

$$SW_D^{Add} = \frac{3a_D^2}{8} + \frac{a_F^2(1-\tau_D)(\tau_F-\tau_D)}{2(1-2\tau_D+\tau_F)^2}, \tag{28}$$

$$SW_F^{Add} = \frac{3a_F^2(1-\tau_D)^2}{8(1-2\tau_D+\tau_F)^2}. \tag{29}$$

From Eqs. (28) and (29), global social welfare is

$$SW_G^{Add} = \frac{1}{8}\left[3a_D^2 + \frac{a_F^2(1-\tau_D)(3-7\tau_D+4\tau_F)}{(1-2\tau_D+\tau_F)^2}\right]. \tag{30}$$

Using Eqs. (12), (14), (28), and (30), we compare social welfare in the arm's length principle with that in this subsection.

$$SW_D^{arm} - SW_D^{Add} = \frac{a_F^2(1-\tau_F)^2}{8(1-2\tau_D+\tau_F)^2} > 0,$$

$$SW_G^{arm} - SW_G^{Add} = -\frac{a_F^2(5-12\tau_D+7\tau_F)(1-\tau_F)}{32(1-2\tau_D+\tau_F)^2}.$$

From these outcomes, while $SW_D^{arm} > SW_D^{Add}$ always holds, the sign of the difference between SW_G^{arm} and SW_G^{Add} alters the economic environment. When $\tau_D < (5+7\tau_F)/12$ holds, we obtain $SW_G^{arm} < SW_G^{Add}$. In this additional analysis, because we take the reciprocal of the effective tax rate, the magnitude of the tax rate and the effect of tax avoidance prevention are reversed from the economic environment in our main analysis. However, this outcome indicates that stigma improves global social welfare more than the arm's length principle. Therefore, while the mechanism of results between the main model and additional analysis is different, we consider our main result to be robust with other ST functions.

6.2 The impact of a competitor

In this subsection, we examine the impact of an additional competitor (denoted as R) in the domestic market. We assume the following inverse-demand function in the domestic market.

$$p_D = a_D - q_D - \theta q_R,$$
$$p_R = a_D - q_R - \theta q_D,$$

where θ represents substitutability of products supplied by the two firms. In addition, the profit function of the domestic competitor is

$$\pi_R = p_R q_R.$$

We use Eq. (1) and (3) as the objective function of a subsidiary and a multinational firm, respectively. The timeline of events in this subsection is the same as in the main model. First, the multinational firm decides the multinational transfer price. Next, all players decide quantities. The analysis for this subsection is described in the appendix.

We obtain the following sub-game perfect Nash equilibrium.

$$\tilde{t}^{arm} = \frac{a_F}{2},\ \tilde{q}_D^{arm} = \tilde{q}_R^{arm} = \frac{a_D}{2+\theta},\ \tilde{q}_F^{arm} = \frac{a_F}{4},$$

where $\tilde{}$ denotes the outcome in this case. In addition, profits are

$$\begin{aligned}
\tilde{\pi}_D^{arm} &= \frac{a_F^2}{8} + \frac{a_D^2}{(2+\theta)^2}, \\
\tilde{\pi}_F^{arm} &= \frac{a_F^2}{16}, \\
\tilde{\pi}_R^{arm} &= \frac{a_D^2}{(2+\theta)^2}, \\
\tilde{\Pi}^{arm} &= \tilde{V}^{arm} = \frac{8a_D^2 + a_F^2(2+\theta)^2}{8(2+\theta)^2}(1-\tau_D) + \frac{a_F^2}{16}(1-\tau_F).
\end{aligned}$$

Social welfare is

$$S\tilde{W}_D^{arm} = \frac{a_F^2}{8} + \frac{2a_D^2(1+\theta)}{(2+\theta)^2}, \tag{31}$$

$$S\tilde{W}_F^{arm} = \frac{3a_F^2}{32}, \tag{32}$$

and

$$S\tilde{W}_G^{arm} = \frac{7a_F^2}{32} + \frac{2a_D^2(1+\theta)}{(2+\theta)^2}. \tag{33}$$

Next, we identify the sub-game perfect Nash equilibrium under stigma without the arm's length principle.

$$\tilde{t}^{stig} = \frac{a_F(s-\tau_D+\tau_F)}{1+2s-2\tau_D+\tau_F},\ \tilde{q}_D^{stig} = \tilde{q}_R^{stig} = \frac{a_D}{(2+\theta)},\ \tilde{q}_F^{stig} = \frac{a_F(1+s-\tau_D)}{2(1+2s-2\tau_D+\tau_F)}.$$

Profits and payoff are

$$\begin{aligned}
\tilde{\pi}_D^{stig} &= \frac{a_D^2}{(2+\theta)^2} + \frac{a_F^2(1+s-\tau_D)(s-\tau_D+\tau_F)}{2(1+2s-2\tau_D+\tau_F)^2},\\
\tilde{\pi}_F^{stig} &= \frac{a_F^2(1+s-\tau_D)}{4(1+2s-2\tau_D+\tau_F)^2},\\
\tilde{\pi}_R^{stig} &= \frac{a_D^2}{(2+\theta)^2},\\
\tilde{\Pi}^{stig} &= (1-\tau_D)\tilde{\pi}_D^{stig} + (1-\tau_F)\tilde{\pi}_F^{stig},\\
\tilde{V}^{stig} &= \tilde{\Pi}^{stig} - s\left(\tilde{t}^{arm} - \tilde{t}^{stig}\right).
\end{aligned}$$

In addition, social welfare is

$$S\tilde{W}_D^{stig} = \frac{2a_D^2(1+\theta)}{(2+\theta)^2} + \frac{a_F^2(1+s-\tau_D)(s-\tau_D+\tau_F)}{2(1+2s-2\tau_D+\tau_F)^2}, \tag{34}$$

$$S\tilde{W}_F^{stig} = \frac{3a_F^2(1+s-\tau_D)^2}{8(1+2s-2\tau_D+\tau_F)^2}, \tag{35}$$

and

$$S\tilde{W}_G^{stig} = \frac{2a_D^2(1+\theta)}{(2+\theta)^2} + \frac{a_F^2(1+s-\tau_D)(3+7s-7\tau_D+4\tau_F)}{8(1+2s-2\tau_D+\tau_F)^2}. \tag{36}$$

Using the above results, we compare social welfare under stigma with that under the arm's length principle. First, consider $S\tilde{W}_D^{arm} - S\tilde{W}_D^{stig}$ and obtain following outcome.

$$S\tilde{W}_D^{arm} - S\tilde{W}_D^{stig} = \frac{a_F^2(1-\tau_F)^2}{8(1+2s-2\tau_D+\tau_F)^2} > 0. \tag{37}$$

Therefore, in this case, $S\tilde{W}_D^{arm} > S\tilde{W}_D^{stig}$ holds. In addition, consider $S\tilde{W}_G^{arm} - S\tilde{W}_G^{stig}$ and obtain the following outcome:

$$S\tilde{W}_G^{arm} - S\tilde{W}_G^{stig} = -\frac{a_F^2(1-\tau_F)(5+12s-12\tau_D+7\tau_F)}{32(1+2s-2\tau_D+\tau_F)^2}. \tag{38}$$

When $s > (12\tau_D - 7\tau_F - 5)/12$ holds, we obtain $S\tilde{W}_G^{arm} < S\tilde{W}_G^{stig}$. This condition is the same as $\tau_D > (12s + 5 + 7\tau_F)/12$. Hence, in this case, stigma prevents tax avoidance by multinational firms in the domestic country in favor of seeking a lower tax rate in the foreign country. This outcome indicates that stigma improves global social welfare more than the arm's length principle. Therefore, we consider our main result to be robust to the presence of a domestic competitor.

7 Implications and conclusion

This study analyzes the tax avoidance behavior of multinational corporations using transfer pricing from the perspective of stigma. Our results and contributions are as follows. We show that stigma improves domestic social welfare using a simple model. Furthermore, we demonstrate that stigma yields higher global social welfare than the arm's length principle. These are our unique contributions to the literature on tax avoidance by multinational firms using multinational transfer pricing. Moreover, from the additional analysis, we demonstrate that our main result is robust. Hence, our simple model is robust and makes an important contribution to public economics.

Our study has the following implications. First, our results imply that focusing on stigma has implications for improving social welfare. From the results, stigma is one of the most effective

ways to prevent tax avoidance. Certainly, stigma is not a set mechanism, nor is it a direct penalty. While it is difficult for regulators or tax authorities to regulate with certainty, stigma, if it exists, can restore the social welfare that multinational tax avoidance reduces. Second, our results imply that regulators, rather than using the arm's length principle, need to use stigma to improve the calibration of society as a whole by restricting the behavior of firms, as the arm's length principle can cause problems in trade between nations. Third, in our study, because we find that choosing a positive degree of public exposure maximizes domestic social welfare, our results suggest that public exposure effectively stops the decline in social welfare caused by tax avoidance behavior in firms.

In reality, the reputation (positive and negative) of a company is formed within country. In future research, we aim to analyze stigma competition, such as tax competition, in a situation in which stigma exists in each country, and each government can manipulate the stigma exposure rate. In addition, as in Autrey and Bova (2012), future research can assume the existence of a gray market, which would have a key impact on the decisions of the multinational firm. Therefore, the impact of the gray market should be investigated in future research. Furthermore, the impact of factory location is important. Matsui (2011) considers an oligopoly market of importers and exporters. Therefore, we can apply the assumptions of Matsui (2011) to stigma in future research.

References

Allingham, M. G. and A. Sandmo (1972): "Income tax evasion: A theoretical analysis," *Journal of Public Economics*, 1, 323–338.

Armantier, O., E. Ghysels, A. Sarkar, and J. Shrader (2015): "Discount window stigma during the 2007–2008 financial crisis," *Journal of Financial Economics*, 118, 317–335.

Autrey, R. L. and F. Bova (2012): "Gray markets and multinational transfer pricing," *The Accounting Review*, 87, 393–421.

Besley, T. and S. Coate (1992): "Understanding welfare stigma: Taxpayer resentment and statistical discrimination," *Journal of Public Economics*, 48, 165–183.

Blumkin, T., Y. Margalioth, and E. Sadka (2015): "Welfare Stigma Re-Examined," *Journal of Public Economic Theory*, 17, 874–886.

Bond, E. W. (1980): "Optimal transfer pricing when tax rates differ," *Southern Economic Journal*, 191–200.

Bond, E. W. and T. A. Gresik (1996): "Regulation of multinational firms with two active governments: A common agency approach," *Journal of Public Economics*, 59, 33–53.

Calzolari, G. (2004): "Incentive regulation of multinational enterprises," *International Economic Review*, 45, 257–282.

Casal, S. and L. Mittone (2016): "Social esteem versus social stigma: The role of anonymity in an income reporting game," *Journal of Economic Behavior & Organization*, 124, 55–66.

Choe, C. and N. Matsushima (2013): "The arm's length principle and tacit collusion," *International Journal of Industrial Organization*, 31, 119–130.

Choo, C. L., M. A. Fonseca, and G. D. Myles (2016): "Do students behave like real taxpayers in the lab? Evidence from a real effort tax compliance experiment," *Journal of Economic Behavior & Organization*, 124, 102–114.

Copithorne, L. W. (1971): "International corporate transfer prices and government policy," *Canadian Journal of Economics*, 4, 324–341.

Cremer, H. and K. Roeder (2015): "Means testing versus basic income: the (lack of) political support for a universal allowance," *Economics Letters*, 136, 81–84.

Devereux, M. P. and C. Keuschnigg (2009): "The distorting arm's length principle," CEPR Discussion Paper No. DP7375.

Elitzur, R. and J. Mintz (1996): "Transfer pricing rules and corporate tax competition," *Journal of Public Economics*, 60, 401–422.

Ennis, H. M. and J. A. Weinberg (2013): "Over-the-counter loans, adverse selection, and stigma in the interbank market," *Review of Economic Dynamics*, 16, 601–616.

Ethical Consumer (2021): "Boycott Amazon," URL: `https://www.ethicalconsumer.org/ethicalcampaigns/boycott-amazon` (Accessed on March 30, 2021).

Goffman, E. (1963): *Stigma: Notes on the Management of Spoiled Identity*, Prentice-Hall.

Gordon, J. P. (1989): "Individual morality and reputation costs as deterrents to tax evasion," *European Economic Review*, 33, 797–805.

Gresik, T. A. (1999): "Arm's-length transfer pricing and national welfare," *Advances in Applied Microeconomics*, 8, 187–208.

Gresik, T. A. and D. R. Nelson (1994): "Incentive compatible regulation of a foreign-owned subsidiary," *Journal of International Economics*, 36, 309–331.

Gresik, T. A. and P. Osmundsen (2008): "Transfer pricing in vertically integrated industries," *International Tax and Public Finance*, 15, 231–255.

Harel, A. and A. Klement (2007): "The economics of stigma: Why more detection of crime may result in less stigmatization," *Journal of Legal Studies*, 36, 355–377.

Hashimzade, N., G. D. Myles, and B. Tran-Nam (2013): "Applications of behavioural economics to tax evasion," *Journal of Economic Surveys*, 27, 941–977.

Haufler, A. and G. Schjelderup (2000): "Corporate tax systems and cross country profit shifting," *Oxford Economic Papers*, 52, 306–325.

Hindriks, J. and G. D. Myles (2013): *Intermediate public economics*, MIT Press.

Horst, T. (1971): "The theory of the multinational firm: Optimal behavior under different tariff and tax rates," *Journal of Political Economy*, 79, 1059–1072.

International Trade Union Confederation (2014): "Amazon's Jeff Bezos Wins ITUC's World's Worst Boss Poll," URL: `https://www.ituc-csi.org/amazon-s-jeff-bezos-wins-ituc-s?lang=en` (Accessed on March 30, 2021).

Itaya, J. and K. Kurita (2020): "Replicator evolution of welfare stigma: Welfare fraud vs incomplete take-up," *CESifo Working Paper*, 1–29, URL: `https://www.cesifo.org/en/publikationen/2020/working-paper/replicator-evolution-welfare-stigma-welfare-fraud-vs-incomplete`, (Accessed on November 5, 2020).

Kahneman, D. and A. Tversky (1979): "Prospect theory: An analysis of decision under risk," *Econometrica*, 47, 263–292.

Katafuchi, Y., K. Kurita, and S. Managi (2020): "COVID-19 with stigma: Theory and

evidence from mobility data," *Economics of Disasters and Climate Change*, 1–25.

Kim, Y. (2003): "Income distribution and equilibrium multiplicity in a stigma-based model of tax evasion," *Journal of Public Economics*, 87, 1591–1616.

Kroft, K. (2008): "Takeup, social multipliers and optimal social insurance," *Journal of Public Economics*, 92, 722–737.

Kurita, K., N. Hori, and Y. Katafuchi (2020): "Stigma model of welfare fraud and non-take-up: Theory and evidence from OECD panel data," *International Journal of Economic Theory*, 1–29.

Kurita, K. and S. Managi (2020): "COVID-19 and stigma: Evolution of self-restraint behavior," *MPRA Paper*, 1–25, URL: `https://mpra.ub.uni-muenchen.de/103719/`.

Levinsohn, J. and J. Slemrod (1993): "Taxes, tariffs, and the global corporation," *Journal of Public Economics*, 51, 97–116.

Matsui, K. (2011): "Intrafirm trade, arm's-length transfer pricing rule, and coordination failure," *European Journal of Operational Research*, 212, 570–582.

Myles, G. D. (1995): *Public economics*, Cambridge University Press.

Myles, G. D. and R. A. Naylor (1996): "A model of tax evasion with group conformity and social customs," *European Journal of Political Economy*, 12, 49–66.

New York Times (2011): "Italy Tries Raising the Social Stigma on Tax Evaders," URL: `https://www.nytimes.com/2011/12/25/world/europe/italy-tries-to-raise-the-social-stigma-on-tax-evasion.html` (Accessed on March 30, 2021).

Piolatto, A. and M. D. Rablen (2017): "Prospect theory and tax evasion: a reconsideration of the Yitzhaki puzzle," *Theory and Decision*, 82, 543–565.

Prusa, T. J. (1990): "An incentive compatible approach to the transfer pricing problem," *Journal of International Economics*, 28, 155–172.

Rasmusen, E. (1996): "Stigma and Self-Fulfilling Expectations of Criminality," *The Journal of Law and Economics*, 39, 519–543.

REUTERS Business News (2014): "Starbucks suffers first UK sales drop after tax criticism," URL: `https://www.reuters.com/article/uk-starbuckstaxbritain-idUKBREA3N0X020140424` (Accessed on March 30, 2021).

Schjelderup, G. and L. Sorgard (1997): "Transfer pricing as a strategic device for decentralized multinationals," *International Tax and Public Finance*, 4, 277–290.

Schjelderup, G. and A. J. Weichenrieder (1999): "Trade, multinationals, and transfer pricing regulations," *Canadian Journal of Economics*, 817–834.

Sessions, J. G. (1994): "Unemployment Stigma and Multiple Labour Market Equilibria: A Social-Psychological Interpretation of Hysteresis," *Labour*, 8, 355–376.

Singh, N. and X. Vives (1984): "Price and quantity competition in a differentiated duopoly," *RAND Journal of Economics*, 546–554.

Stoughton, N. M. and E. Talmor (1994): "A mechanism design approach to transfer pricing by the multinational firm," *European Economic Review*, 38, 143–170.

Trotin, G. (2010): "Tax evasion decision under cumulative prospect theory," *EQUIPPE, Université Charles-de-Gaulle Lille*, 3.

Tversky, A. and D. Kahneman (1992): "Advances in prospect theory: Cumulative representation of uncertainty," *Journal of Risk and Uncertainty*, 5, 297–323.

Weichenrieder, A. J. (1996): "Transfer pricing, double taxation, and the cost of capital," *Scandinavian Journal of Economics*, 445–452.

Appendix

Proof of Proposition 1

Recall Eq. (22),

$$SW_D^B - SW_D^{stig} = \frac{sa_F^2 (1-\tau_F)^2 (2\tau_D - \tau_F - s - 1)}{2(1-2\tau_D+\tau_F+1)^2 (1-2\tau_D+\tau_F+2s)^2},$$

The sign of $SW_D^B - SW_D^{stig}$ is determined by the sign of $(2\tau_D - \tau_F - s - 1)$, because the other terms are squared and positive. Thus, we obtain the following:

$$\text{sign}\left[SW_D^B - SW_D^{stig}\right] = \text{sign}[2\tau_D - \tau_F - s - 1].$$

We define $\hat{s} := 2\tau_D - \tau_F - 1$. The difference between $\underline{s}$ and $\hat{s}$ is given by

$$\underline{s} - \hat{s} = 1 - \tau_D > 0.$$

Therefore, stigma improves domestic social welfare. ■

Proof of Proposition 3

$$\frac{\partial NSW_D}{\partial s} = \frac{\partial SW_D^{stig}}{\partial s} - \sigma'(s) = 0. \tag{A.1}$$

From (16) and (25), we obtain the optimal degree of public exposure as follows:

$$s^* = \frac{2\tau_D - \tau_F - 1}{2} + \left[\frac{a_F(1-\tau_F)}{2\gamma}\right]^{\frac{2}{3}}. \tag{A.2}$$

■

Proof of Proposition 4

From Proposition 3, all outcomes are obtained in a straightforward manner. ■

Analysis for Section 6.2

We analyze the model in Section 6.2. Because, in the foreign market, the decision of the subsidiary is not affected by the competitor, we apply the outcome of Eq. (9) as a subsidiary quantity in the second stage ($q_F = (a_F - t)/2$). The domestic market is an oligopoly market between players D (the parent company) and R (domestic competitors). The profit maximization problems of the multinational firm and the domestic competitor in the second stage can be formulated as follows:

$$\max_{q_D} \pi_D = (a_D - q_D - \theta q_R)q_D + tq_F,$$
$$\max_{q_R} \pi_R = (a_D - q_R - \theta q_D)q_R.$$

Solving this maximization problem, we obtain the equilibrium in the domestic market in the second stage as follows:

$$q_D = q_R = \frac{a_D}{2+\theta} \tag{A.3}$$

Under the arm's length principle, the headquarters behaves as if it were dealing with a third party when dealing with a foreign subsidiary. In other words, when determining transfer pricing, decisions are made to maximize domestic profits. In the first stage, player D determines the transfer price for player F based on the decisions of the second stage. The optimization problem can be formulated as follows:

$$\tilde{t}^{arm} \in \arg\max_{t} \ \pi_D(t),$$

where $\tilde{}$ denotes the outcome in this case. Here, from $q_F = (a_F - t)/2$, and Eq. (A.3), $\pi_D(t)$ is given by

$$\pi_D(t) = (1-\tau_D)\left[\left\{a_D - (1+\theta)\frac{a_D}{2+\theta}\right\}\frac{a_D}{2+\theta} + t\frac{a_F - t}{2}\right].$$

The first-order condition is given as follows:

$$\frac{\partial \pi_D}{\partial t} = (1-\tau_D)\left(\frac{a_F - 2t}{2}\right) = 0$$

We obtain the following multinational transfer pricing under the arm's length principle with competitors.

$$\tilde{t}^{arm} = \frac{a_F}{2}. \tag{A.4}$$

As a result, we obtain the following sub-game perfect Nash equilibrium.

$$\tilde{q}_F^{arm} = \frac{a_F}{4},\ \tilde{q}_D^{arm} = \frac{a_D}{2+\theta},\ \tilde{q}_R^{arm} = \frac{a_D}{2+\theta}.$$

Profits are

$$\begin{aligned}
\tilde{\pi}_D^{arm} &= \frac{a_F^2}{8} + \frac{a_D^2}{(2+\theta)^2}, \\
\tilde{\pi}_F^{arm} &= \frac{a_F^2}{16}, \\
\tilde{\pi}_R^{arm} &= \frac{a_D^2}{(2+\theta)^2}, \\
\tilde{\Pi}^{arm} &= \tilde{V}^{arm} = \frac{8a_D^2 + a_F^2(2+\theta)^2}{8(2+\theta)^2}(1-\tau_D) + \frac{a_F^2}{16}(1-\tau_F).
\end{aligned}$$

In addition, social welfare is

$$S\tilde{W}_D^{arm} = \frac{a_F^2}{8} + \frac{2a_D^2(1+\theta)}{(2+\theta)^2}, \tag{A.5}$$

$$S\tilde{W}_F^{arm} = \frac{3a_F^2}{32}, \tag{A.6}$$

and

$$S\tilde{W}_G^{arm} = \frac{64a_D^2 + 28a_F^2 + 64a_D^2\theta + 28a_F^2\theta + 7a_F^2\theta^2}{32(2+\theta)^2}. \tag{A.7}$$

Next, we analyze the sub-game perfect Nash equilibrium under stigma with competitors. In this case, the outcomes of the second stage are the same as those in the arm's length principle case, and the multinational firm faces the following maximization problem in the first stage.

$$\max_t \ V = (1-\tau_D)\pi_D + (1-\tau_F)\pi_F - \frac{1}{2}s(\tilde{t}^{arm} - t). \tag{A.8}$$

As a result, we obtain following outcomes.

$$\tilde{t}^{stig} = \frac{a_F(s-\tau_D+\tau_F)}{1+2s-2\tau_D+\tau_F},\ \tilde{q}_D^{stig} = \tilde{q}_R^{stig} = \frac{a_D}{(2+\theta)},\ \tilde{q}_F^{stig} = \frac{a_F(1+s-\tau_D)}{2(1+2s-2\tau_D+\tau_F)}.$$

Profits are

$$\begin{aligned}
\tilde{\pi}_D^{stig} &= \frac{a_D^2}{(2+\theta)^2} + \frac{a_F^2(1+s-\tau_D)(s-\tau_D+\tau_F)}{2(1+2s-2\tau_D+\tau_F)^2}, \\
\tilde{\pi}_F^{stig} &= \frac{a_F^2(1+s-\tau_D)}{4(1+2s-2\tau_D+\tau_F)^2}, \\
\tilde{\pi}_R^{stig} &= \frac{a_D^2}{(2+\theta)^2}, \\
\tilde{\Pi}^{stig} &= (1-\tau_D)\tilde{\pi}_D^{stig} + (1-\tau_F)\tilde{\pi}_F^{stig}, \\
\tilde{V}^{stig} &= \tilde{\Pi}^{stig} - s\left(\tilde{t}^{arm} - \tilde{t}^{stig}\right).
\end{aligned}$$

In addition, social welfare is

$$S\tilde{W}_D^{stig} = \frac{2a_D^2(1+\theta)}{(2+\theta)^2} + \frac{a_F^2(1+s-\tau_D)(s-\tau_D+\tau_F)}{2(1+2s-2\tau_D+\tau_F)^2}, \tag{A.9}$$

$$S\tilde{W}_F^{stig} = \frac{3a_F^2(1+s-\tau_D)^2}{8(1+2s-2\tau_D+\tau_F)^2}, \tag{A.10}$$

and

$$S\tilde{W}_G^{stig} = \frac{2a_D^2(1+\theta)}{(2+\theta)^2} + \frac{a_F^2(1+s-\tau_D)(3+7s-7\tau_D+4\tau_F)}{8(1+2s-2\tau_D+\tau_F)^2}. \tag{A.11}$$