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Abstract

This study theoretically investigates the effects of antidumping protection on tax-induced dumping. When the goods are exported from a high-tax to a low-tax country, the exporters have an incentive to set a lower internal price to their distribution affiliates in the destination country. By doing so, they are able to avoid high taxes and also gain a stronger position in the product market. The politically-motivated importing country can implement antidumping protection to protect domestic firms. It is shown that a more stringent regulation on transfer pricing can trigger the antidumping protection, which benefits the exporting country due to larger tax revenues and larger consumer surplus. It also improves the world welfare. However, when the antidumping protection is implemented, a further tightening of the transfer-price regulations may worsen the exporting country's welfare and the world welfare. These results suggest an important link between tax policies and trade policies.

Keywords: Transfer pricing; Anti-dumping; Trade liberalization
JEL classification: F13; F15; F23; H26; L11

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1 Introduction

For the last few decades, tax-avoidance behaviors of multinational enterprises (MNEs) have been one of the central policy discussions in the world economy. An important tax avoidance channel is the manipulation of prices on intra-firm trade, which is known as transfer pricing.[1] For example, Cristea and Nguyen (2016) concluded that Danish MNEs decrease their unit value of their exports to low tax countries by at least 5.7%. To prevent the tax-avoidance behaviors, the members of Organization for Economic Cooperation and Development (OECD) have launched the base erosion and profit shifting (BEPS) project and the arm's length principle (ALP) to tighten the regulations on profit shifting from high- to low-tax countries.[2]

As intra-firm trade is the basis for transfer pricing, trade policies that affect intra-firm trade should affect MNEs' tax avoidance.[3] Among others, this paper focuses on the importing countries' anti-dumping (AD) measures. AD measures are one of the most frequently used trade policies in recent decades. From January 1995 to June 2021, 6,422 AD initiations and 4,225 AD measures were reported in the World Trade Organization (WTO).[4] Blonigen and Prusa (2016) also showed an increase in the number of countries adopting AD laws. AD measures allow importing countries to impose an AD duty on imports when foreign exporters "dump" their goods, which causes material injury to the domestic firms producing the same goods. In the context of international trade, an exporter's pricing is deemed dumping if the free-on-board (FOB) export price is lower than the normal value. The normal value is usually the corresponding price of the good in the exporters' home market. Specifically, let r_H and r_F be the price charged by a firm in the home and foreign country, respectively. Then, the damping margin is defined as $d = r_H - (r_F - \tau)$, where τ is a per-unit trade cost. If the dumping margin is positive and the dumping decreases the domestic firms' profits in the importing country, the domestic firms can file a petition for AD measures to the government.

[1] Recent empirical studies, such as Swenson (2001), Clausing (2003), Bernard et al. (2006), Cristea and Nguyen (2016), and Davies et al. (2018), observed that MNEs manipulate their transfer prices for tax-avoidance purposes.

[2] Abusive transfer pricing is one of the central issues on global taxation. To prevent MNEs' tax avoidance behaviours, OECD launched 15 actions in the BEPS project. Three of fifteen projects, action 8-10, focus on transfer pricing. Among them, actions 9 and 10 deal with risks regarding transfer pricing. This study connects the risks of transfer pricing to trade policies.

[3] According to UNCTAD (2016), approximately one third of the exports were intrafirm trade. Moreover, using the U.S. data, Bernard et al. (2010) and Lanz and Miroudot (2011) also showed that about 46% of imports in 2000 and 50% of imports in 2009 were transacted by related firms. According to OECD's estimation, about 4% to 10% of the world's tax revenue is lost due to MNEs' tax-avoidance behaviors. The annual revenue loss is estimated at 100-240 US dollars. See `http://www.oecd.org/ctp/oecd-presents-outputs-of-oecd-g20-beps-project-for-discussion-at-g20-finance-ministers-meeting.htm`.

[4] See `https://www.wto.org/english/tratop_e/adp_e/adp_e.htm`.

Although there are many reasons to set a lower price in a foreign country compared to the domestic country, such as a third-price discrimination to take advantages of the difference in the market-sizes, price-elasticities, and predatory pricing to kick out foreign rival firms, the MNE's transfer pricing to avoid a high-tax in the home country is one reason to set an export price lower than the corresponding domestic price. The effect of AD measures on a so-called "tax-induced dumping" has been overlooked in the literature.

In reality, the intra-firm prices are sometimes subject to importing countries' AD investigations. Suppose that a producer exports its product to its distribution affiliates by charging an intra-firm export price. Then, the distribution affiliate sells the product to (unaffiliated) consumers with a sales price that is different from the export price. In the AD laws of the U.S., if the first sale to an unaffiliated person is made by an affiliated seller in the U.S., the "constructed" export price is used to calculate the dumping margin. The constructed export price is calculated by deducting the amount of expenses and profits of the affiliated seller in the U.S. from the sales price. Therefore, the dumping margin is calculated based on the intra-firm price, rather than the sales price to consumers.[5] The European Union also calculates the export price to the affiliated importer by the same method. Bown and Sykes (2008) reported some issues concerning transfer pricing and the calculation of dumping margin. Moreover, Al-Eryani et al. (1990) also concluded that legal considerations including AD influenced U.S. MNEs' transfer pricing decision.

Against this backdrop, this paper investigates the importing country's incentive to implement AD measures on a tax-induced dumping. Although there are AD cases targeting the dumping calculated by exporting firms' wholesale prices, no studies investigate the relationship between firms' transfer pricing and the importing country's AD protection. In particular, this study analyzes how a more stringent enforcement of the ALP changes the importing country's AD policy. A tighter enforcement of the ALP change exporting firms' settings of their wholesale prices and, thereby, changes the dumping margin and incentives to apply AD measures. As AD measures are used as a policy to protect domestic industries, changes in transfer pricing regulation can generate unexpected losses to exporters if it induces AD measures.

Despite the practical importance, AD measures and the regulation on transfer pricing have

[5]See the website of the International Trade Administration of the U.S.: https://enforcement.trade.gov/regs/uraa/saa-ad.html

been treated separately by different institutes; international trade and customs authorities treat AD issues while tax authorities treat transfer pricing issues. The World Customs Organization sets the guideline to foster mutual cooperation between customs and tax authorities to improve efficiency and financial gains in collecting duties and taxes (WCO, 2018).[6] Given the lack of academic insights in the link between AD policy and tax policy, the results of this study provide valuable information on how these two policies interact.

1.1 Preview of the model and results

We construct an international oligopoly model with a single MNE competing with a local firm in a high-tax home and low-tax foreign country. The MNE produces its goods in the home country and ships them to distribution affiliates in the home and foreign countries by charging wholesale prices. Then, the distribution affiliates whose decision rights are delegated by the MNE sell the goods to maximize their own profits.

Without AD protection, if a gap between the corporate taxes is large and a stringency of the ALP is weak, the MNE sets a FOB export price lower than its corresponding domestic price in the home country. This dumping is caused by the tax difference because the dumping margin cannot be positive without it. With AD protection, this price discrimination leads to an imposition of AD duty. As a result, the AD protection forces the MNE to set a uniform wholesale price between the two countries. The MNE's wholesale price decreases in the home country and its export price (i.e., transfer price) increases.

As AD protection increases the MNE's transfer price, it benefits the local firm in the importing country at the expense of consumers and tax revenues. Because the latter effect always dominates the former, AD protection always worsens the social welfare of the importing country. Hence, the importing country implements AD protection only if the policy maker places a lower weight on the social welfare relative to the profit of the local producer. Specifically, given that the dumping margin is positive, the importing country applies AD protection if the policy maker is politically motivated and its weight on social welfare is below the threshold level.[7]

Given this, we investigate how a tightening of transfer pricing regulation affects the im-

[6] WCO (2018) stated that "...the WCO is working with the OECD and World Bank Group to encourage Customs and tax administrations to establish bilateral lines of communication in order to exchange knowledge, skills and data, where possible, which will help ensure that each authority has the broadest picture of an business, its compliance record and can make informed decisions on the collect revenue liability."

[7] Nelson (2006) surveyed the literature about the political economy of AD protection.

porting country's AD protection. We find that a stricter enforcement of the ALP can trigger the importing country's AD protection. Seemingly, regulating transfer pricing prevents AD protection because it raises the transfer price and narrows the dumping margin. However, a smaller dumping margin actually encourages the policy maker to invoke an AD law because the welfare cost of implementing AD protection becomes smaller and this effect dominates the decrease in the profit gain of the local firm. As AD protection further increases the transfer price, it works as an additional tool to prevent the MNE's transfer pricing. If the stringency of the ALP is sufficiently large, the importing country does not apply the AD protection because the dumping margin becomes negative with a highly stringent ALP.

The AD protection induced by a tighter regulation on transfer pricing benefits the exporting country despite the profit loss of the MNE, because the inflows of the MNE's tax base increase the tax revenues. Additionally, the MNE's lower wholesale price in the home country intensifies the product market competition and decreases the consumer price, benefiting consumers. Given that the AD protection is implemented, a further tightening of the transfer price regulation may worsen the welfare of the exporting country because it increases the price in the home country. The same property is applied to world welfare. This worldwide welfare gain stems from the fact that AD protection results in efficient production patterns because the price adjustments of the MNE increase the supplies of the MNE in the exporting country that has a larger effective market size than the foreign country due to the absence of trade costs.

In contrast, a tighter regulation on transfer price worsens the welfare of the importing country. Although an increase in the transfer price benefits the local firm, the loss of tax revenues along and consumer's loss are larger. Furthermore, it triggers AD protection, and its welfare becomes even lower. This AD protection caused by a stricter transfer pricing regulation can be avoided by facilitating trade liberalization in the importing country. As trade costs decline, it is less likely that a tighter regulation triggers AD protection. This is because trade liberalization increases the dumping margin and, thereby, discourages the policy maker in the importing country to initiate AD protection.

1.2 Related literature

This study relates to the literature on transfer pricing. Since Copithorne (1971) and Horst (1971), many researchers have analyzed to MNEs' tax avoidance strategies with a focus on the

impact of regulation on transfer price manipulation, such as the ALP. [8] Gresik and Osmundsen (2008) analyzed how vertically separated MNE decides transfer pricing under different tests of the ALP and Choi et al. (2020) explored the impact on tax competition. Other studies analyzed the impact of the ALP on tacit collusion (Choe and Matsushima, 2013), the buying or making decision of the MNE (Bauer and Langenmayr, 2013), and location decision (Kato and Okoshi, 2019). Although the ALP does not allow MNEs to discriminate prices for *related and unrelated* firms, AD protection restricts MNEs to discriminate prices in domestic and foreign countries. Thus, by focusing on AD measures, this paper studies the interaction between two anti-price-discrimination policies.

Few studies deal with the connection between trade policies and international tax policies. Exceptions are Choi et al. (2018), Mukunoki and Okoshi (2021a) and Mukunoki and Okoshi (2021b). Choi et al. (2018) examined optimal tariff on goods of an MNE's intra-firm transaction to mitigate profit shifting. Mukunoki and Okoshi (2021a) and Mukunoki and Okoshi (2021b) investigated an impact of a free trade agreement (FTA) on an MNE's profit shifting strategies and showed that an MNE has an incentive to manipulate transfer price to meet rules of origins and grant tariff-free access within the FTA. As the focus of this study is on AD measures, it provides additional insights on the link between the two policies.

We also contribute to the literature of AD. There have been a lot of studies considering the effects of AD.[9] Some of these focused on the governments' incentives to use AD laws. Anderson et al. (1995) analyzed AD protections of two countries in an international oligopoly model and found that the welfare-maximizing governments have no incentives to implement AD laws, while politically-motivated governments that maximizes the domestic firm's profit invoke them. Although AD protection aims to protect the domestic producers, it results in the reciprocal AD and lowers the domestic prices and improves the social welfare of all countries at the cost of the producers. Miyagiwa et al. (2016) insisted that the country size matters in the AD wars between countries, and larger countries are more likely to implement AD protection against smaller countries. Mukunoki (2021) investigated whether trade liberalization promotes or prevents AD and found that it depends on the reasons for dumping. However, these studies have not considered how tax policies are related to AD policies.

[8] Another example of anti-profit-shifting policy is to introduce formula apportionment instead of separate accounting. See for example, Nielsen et al. (2003), Kind et al. (2005) and Gresik (2010). Additionally, following Janskỳ and Palanskỳ (2019), an internal debt is another important channel to shift profits and countries adopt thin capitalization rules. On the policy, see Haufler and Runkel (2012) and Mardan (2017) for instance.

[9] See Blonigen and Prusa (2016) for the survey of the literature.

The rest of the paper is organized as follows. Section 2 represents the model and derives the equilibrium with and without AD protection. Section 3 investigates the decisions of implementing AD protection by the politically motivated policy maker in the importing country. Moreover, it explores how the stringency of the regulations on transfer pricing affects the importing country's AD protection and its welfare impacts. Section 4 considers the effect of trade liberalization and how it affects the importing country's decisions on AD protection. Section 5 summarizes the findings of this study.

2 Model

There are two countries, a high-tax home country (country H) and a low-tax foreign country (country F). Two local firms, firm H and firm F, produce homogeneous final goods in country H and country F, respectively.

For these two firms, the marginal costs of producing final goods are identical and given by c. These firms only supply to their respective domestic markets. In addition to these two firms, another firm of country H (firm M) produces the same good in country H with a lower marginal cost, c_M ($\leq c$). Firm M is an MNE that supplies the good in both countries via its distribution affiliates located in country H (firm M_H) and in country F (firm M_F). Firm M sells the good to firm M_i by setting its intra-firm, wholesale price at r_i. To distinguish the two wholesale prices, we refer to r_H as *internal price* and r_F as *transfer price*. In exporting the good to firm M_F, firm M incurs the trade cost, τ. The profits of the MNE's distribution affiliate and the local firm in i are given by:

$$\pi_{Mi} = (p_i - r_i)x_{Mi}, \quad \text{and} \quad \pi_i = (p_i - c)x_i, \tag{1}$$

respectively.

The inverse demand function in $i \in \{H, F\}$ is given by:

$$p_i = a - (x_{Mi} + x_i), \tag{2}$$

where x_{Mi} and x_i are the supplies of the MNE and those of the local firm in country i, respectively.[10] The countries are symmetric except for the following two aspects. First, the

[10]The inverse demand function is derived from the utility of the representative consumer in country i, $U_i =$

MNE produces the good in country H because of the location advantages in that country, such as a large pool of skilled labor.[11] Second, country H imposes a higher corporate-tax rate than country F, $t_H \geq t_F$.[12]

By manipulating price for the intra-firm trade (i.e., transfer price), the MNE can shift its profits from the high-tax to the low-tax country. As country F imposes a lower corporate tax, the MNE has an incentive to lower its transfer price to shift profits from country H to country F. However, if such transfer price manipulation is detected by the tax authorities in a high tax country, the MNE is penalized. To avoid a potential sanction, the MNE incurs some costs to justify its pricing, for instance by hiring lawyers and consultants. Following the standard literature of transfer pricing, we assume the MNE incurs the following concealment costs:

$$C(r_F) = \frac{\delta(r_F - c_M - \tau)^2}{2}. \tag{3}$$

The quadratic-form function reflects two important aspects. First, as the transfer price deviates more from the marginal cost of exports, the concealment cost becomes larger.[13] This is because the tax authorities audit transfer pricing based on the ALP and it finds the deviation from the marginal cost more easily as the gap between r_F and $c_M + \tau$ increases. Second, δ captures the stringency of the ALP. The MNE's post-tax, total profit is given by:

$$\Pi_M = (1 - t_H)[(r_H - c_M)x_{MH} + (r_F - c_M - \tau)x_{MF} + \pi_{MH}] + (1 - t_F)\pi_{MF} - C(r_F). \tag{4}$$

In addition to avoiding the high-tax, the MNE has a strategic motivation to lower its transfer price. Given that the MNE delegates its decision rights to their distribution affiliates (i.e., firms M_H and M_F), these affiliates regard these wholesale prices as the costs. Then, the MNE sets low r_H and r_F to motivate these distributors to act more aggressively in their respective product markets and shifts the profits from the rival firms. Because both tax-avoidance and strategic motivations lower r_F, they do not conflict with each other. Therefore,

$a(x_i + x_{Mi}) - \frac{(x_i + x_{Mi})^2}{2} + y_i$, where y_i is the consumption of a numeraire good.

[11] More specifically, the industry needs skilled workers for conducting R&D intensive tasks. These skilled workers are abundant in high-tax industrialized countries, such as Japan and the U.S. These countries were frequently targeted by AD measures.

[12] In our analysis, we focus on the case where local firms and the MNE's distribution branches remain in the market, in which the tax difference is not so large, such that $t_H - t_F < \overline{\Delta T} \equiv \frac{(1-t_H)}{4}\left[\frac{a-c-2(c-c_M)}{a-c}\right]$ holds.

[13] The headquarters of the MNE incurs this concealment cost and it is deducted from the profits. Therefore, this cost is not subject to a corporate tax. Juranek et al. (2018) also employs the same assumption.

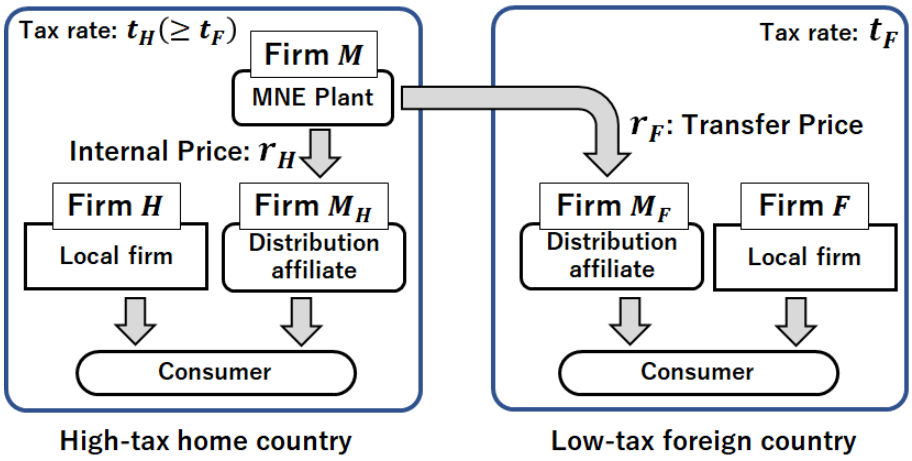

Figure 1: Model

the MNE chooses the decentralization of decision rights, rather than centralization.[14]

Figure 1 summarizes the structure of the model. We solve the following three-stage game. In the first stage, the government in country F decides whether to initiate AD protection. In the second stage, given the government's decision in the first stage, the MNE sets the internal and transfer prices to maximize its post-tax profits. In the third stage, the firms engage in Cournot competition. The rest of the section derives equilibrium without and with AD laws.

2.1 Equilibrium

Let us start with the equilibrium of the stage 3 subgame. In stage 3, firms M_H and M_F and the local firms maximize their own profits. By maximizing eq. (1) with respect to x_{Mi} and x_i, the optimal supplies of each firm become functions of r_i:

$$\widehat{x}_{Mi}(r_i) = \frac{a - 2r_i + c}{3} \quad \text{and} \quad \widehat{x}_i(r_i) = \frac{a - 2c + r_i}{3}. \tag{5}$$

A lower internal or transfer price of the MNE increases the equilibrium supplies of the MNE. By substituting (5) in (1), we have the equilibrium profits as $\widehat{\pi}_{Mi}(r_i)$, $\widehat{\pi}_i(r_i)$, and $\widehat{\Pi}_M(r_H, r_F)$. The equilibrium welfare of country F is given by:

$$\widehat{W}_F(r_F) = \frac{\{\widehat{x}_F(r_F) + \widehat{x}_{MF}(r_F)\}^2}{2} + (1 - t_F)\,\widehat{\pi}_F(r_F) + t_F\{\widehat{\pi}_F(r_F) + \widehat{\pi}_{MF}(r_F)\}, \tag{6}$$

[14] As Nielsen et al. (2008) shows, the motivations are in conflict with each other when the MNE ships its goods from a low-tax country to a high-tax country. In this case, the MNE may prefer centralization to decentralization.

where the first term is the consumer surplus, the second term is the post-tax profit of firm F, and the last term is tax revenues collected from firms F and M_F. Although firm F pays the corporate tax, its tax payment is cancelled out by its tax revenue. As we will see below, AD protection leads to price undertaking and an AD duty is not imposed in equilibrium. Therefore, we omit the revenues from AD duty from the welfare. Similarly, the equilibrium welfare of country H is given by:

$$\widehat{W}_H(r_H, r_F) = \frac{\{\widehat{x}_H(r_H) + \widehat{x}_{MH}(r_H)\}^2}{2} + (1 - t_F)\,\widehat{\pi}_H(r_H) + t_H\{\widehat{\pi}_H(r_H) + \widehat{\pi}_{MH}(r_H)\}\widehat{\Pi}_M(r_H, r_F). \tag{7}$$

The welfare of country H contains the post-tax profits of the MNE.

The equilibrium of stage 2 subgames depends on whether country F implements AD protection or not, which is subsequently analyzed in the following subsections.

2.1.1 No AD protection

Starting with the benchmark case without AD protection, in the second stage, the MNE sets r_H and r_F to maximize the post-tax profits. By solving the first order conditions, the optimal internal and transfer prices are:

$$r_H^N = c_M - \frac{a + c - 2c_M}{4}, \tag{8}$$

$$r_F^N = c_M + \tau - \frac{a + c - 2c_M - 2\tau}{4} - \frac{3(t_H - t_F)(a + c - 2c_M - 2\tau)}{2\{3(1 - t_H) - 2(1 - t_F)\}} + \frac{9\delta(1 + 3t_H - 4t_F)(a + c - 2c_M - 2\tau)}{4\{3(1 - t_H) - 2(1 - t_F)\}[9\delta + 4\{3(1 - t_H) - 2(1 - t_F)\}]}. \tag{9}$$

The second term of these prices captures the decrease in the wholesale prices due to the strategic motive. The third term of r_F^N captures the decrease in the wholesale prices due to the tax-avoidance motive. [15] Although these two motives enable the MNE to lower its transfer price, the existence of concealment costs prevents it from doing so, which is captured by the fourth term. Since $\frac{\partial r_F^N}{\partial \delta} > 0$ and $\lim_{\delta \to \infty} r_F^N \to c_M + \tau$, $r_F^N < c_M + \tau$ holds at any δ.

As explained in the introduction, the dumping margin is defined as the gap between the domestic price in the exporting country and the FOB price of exports, $d = r_H - (r_F - \tau)$. By

[15] The assumption of $t_H - t_F < \overline{\Delta T}$ ensures that the second-order conditions of the profit maximization always hold.

(8) and (9), the dumping margin is calculated as:

$$d^N = r_H^N - \left(r_F^N - \tau\right) = \frac{8\{3(t_H - t_F)(a + c - 2c_M - \tau) - (1 - t_F)\tau\} - 9(a + c - 2c_M)\delta}{4[9\delta + 4\{3(1 - t_H) - 2(1 - t_F)\}]}. \quad (10)$$

The dumping margin increase in the tax gap, $t_H - t_F$, and decrease in the trade cost, τ, and the stringency of the restrictions on transfer pricing, δ. A larger tax gap enhances the tax-avoidance transfer-pricing motive, and a lower trade cost enhances the strategic motive of transfer pricing because it expands the profit opportunity in the market of country F. We can confirm that:

$$d^N > 0 \iff \delta < \delta_d \equiv \frac{8\{3(t_H - t_F)(a + c - 2c_M - \tau) - (1 - t_F)\tau\}}{9(a + c - 2c_M)}. \quad (11)$$

Therefore, the dumping margin is positive only if δ is smaller than the threshold level, δ_d. Note that we have $\delta_d < 0$ when $t_H = t_F$ and $\delta_d > 0$ only when $t_H - t_F > \frac{(1-t_F)}{3(a+c-2c_M-\tau)}\tau$. Unless the corporate-tax rate of country H is sufficiently higher than that of country F, the MNE does not "dump" its product. Without the tax gap, the profit opportunity is larger in country H. Therefore, the gains from setting a lower wholesale price due to the strategic motive are larger in country H than in country F. As a result, the MNE sets $\widehat{r}_H < (\widehat{r}_F - \tau)$ without a tax gap. Only if the tax gap is sufficiently large and the tax-avoidance motive for lowering r_F^N dominates the strategic motive, the equilibrium dumping margin becomes positive. In this sense, the dumping detected in this model is a "tax-induced dumping." Thus, we have the following proposition.

Proposition 1. Without AD protection, the MNE's dumping margin is positive if the importing country's corporate tax is lower than the exporting country's corporate tax, the tax gap is large, and the trade cost and the stringency of the regulations on transfer price are small.

By substituting these equilibrium internal and transfer prices in (4) and (5), we have the equilibrium profits of the supplies of the MNE and the local firm as x_{Mi}^N, x_i^N, π_{Mi}^N, π_i^N, and Π_M^N. By substituting these prices in (6) and (7), the corresponding welfare of each country becomes W_F^N and W_H^N.

2.1.2 AD protection

Given that $d^N > 0$ holds, this subsection shows AD protection changes the MNE's internal and transfer pricing. Under AD protection, country F imposes the AD duty that is equal to the dumping margin. However, the MNE has an option to avoid the AD duty by manipulating the prices. Namely, if the MNE sets its wholesale prices such that the dumping margin is eliminated after an AD investigation, the AD duty is not imposed. This price commitment is know as "price undertaking." The MNE's post-tax profit with the AD duty that is contingent of the dumping margin, $d = r_H - (r_F - \tau)$, is

$$\Pi'_M = (1 - t_H)[(r_H - c_M)x_{MH} + (r_F - c_M - \tau - d)x_{MF} + \pi_{MH}] + (1 - t_F)\pi_{MF} - C(r_F). \quad (12)$$

It is optimal for the MNE to set r_H and r_F such that $d = 0$ holds, yielding the following equilibrium wholesale prices:

$$r_H^{AD} = r_H^N - \theta d^N, \quad \text{and} \quad r_F^{AD} = r_H^{AD} + \tau = r_F^N + (1 - \theta)d^N, \quad (13)$$

where $\theta \equiv \frac{9\delta+4\{3(1-t_H)-2(1-t_F)\}}{9\delta+8\{2(1-t_H)-(1-t_F)\}}$ ($\theta \in (0,1)$) is the extent of price adjustments in country H given d^N. Appendix A.1 explains why the MNE facing AD protection prefers to eliminate the dumping margin.

Thus, the MNE eliminates the dumping margin by decreasing r_H from r_H^N and increasing r_F from r_F^N. The degree of the price adjustments is proportional to the dumping margin under no AD protection, d^N. The increase in r_F reduces the effectiveness of transfer pricing and the MNE's profits shifted from the high-tax country (country H) to the low-tax country (country F). It also makes firm M_F less aggressive in country F's market, though it makes firm M_H more aggressive in country H's market. Therefore, AD protection has a role to discourages the MNE's tax avoidance and weakens the MNE's strong position in the product market in country F.

3 Decisions on AD protection

We have analyzed the condition under which the MNE's pricing generates a positive dumping margin and how AD protection eliminates the price gap between the countries. This section analyzes government F's decision to implement AD protection in stage 1.

Since a lower export price of the MNE hurts firm F, $\Delta\pi_F = \pi_F^{AD} - \pi_F^N > 0$ holds and firm F always prefers AD protection. In contrast, the AD protection increases the price in country F and worsens the consumer surplus. Moreover, the tax revenues decrease because firm M_F earns less profits in country F. We can confirm that these losses in consumer surplus and tax revenues always dominate the profit gains of firm F, implying that $\Delta W_F = W_F^{AD} - W_F^N < 0$.

Therefore, a welfare-maximizing government never implements AD protection. Hence, a political-economy consideration in implementing AD protection should be introduced. Specifically, the objective function of government F in implementing AD protection is given by:

$$G_F = \gamma W_F + (1-\gamma)(1-t_F)\pi_F, \tag{14}$$

where $\gamma \in [0,1]$ is a political weight of the government in country F on the social welfare. The government maximizes social welfare when $\gamma = 1$, and it places more weight on the post-tax profit of the local firm as γ approaches zero. The "government surplus" under no AD protection and under AD protection are given by $G_F^N = \gamma W_F^N + (1-\gamma)(1-t_F)\pi_F^N$ and $G_F^{AD} = \gamma W_F^{AD} + (1-\gamma)(1-t_F)\pi_F^{AD}$, respectively. Thus, given that the dumping margin under no AD case is positive (i.e., $\delta < \delta_d$), the government in country F implements AD protection if

$$\Delta G_F \equiv G_F^{AD} - G_F^N \geq 0 \iff \gamma \leq \widehat{\gamma} \equiv \frac{(1-t_F)\Delta\pi_F}{(1-t_F)\Delta\pi_F - \Delta W_F} \tag{15}$$

holds. Since $\Delta W_F < 0$ always holds, $\widehat{\gamma} < 1$. Thus, an AD protection needs a sufficiently low weight of government F on the welfare.

Proposition 2. Given that the dumping margin under no AD protection is positive, $d^N > 0$, the importing country implements AD protection if the government's weight on social welfare is sufficiently low to satisfy $\gamma \leq \widehat{\gamma}$, where $\widehat{\gamma}$ is the cut-off level.

3.1 Regulations on transfer pricing and AD protection

How does an incentive to implement AD protection associate with regulations on transfer pricing? As explained above, δ captures the stringency of the ALP. We can confirm that $\frac{\partial\widehat{\gamma}}{\partial\delta} > 0$ holds (see Appendix A.2 for the detailed calculation). As δ becomes larger, the tax-avoidance motive becomes lower and the MNE's transfer price becomes higher. As a result, the dumping margin becomes smaller and the extent of the welfare loss of AD protection, $|\Delta W_F|$, becomes smaller. Although the smaller dumping margin also decreases the profit

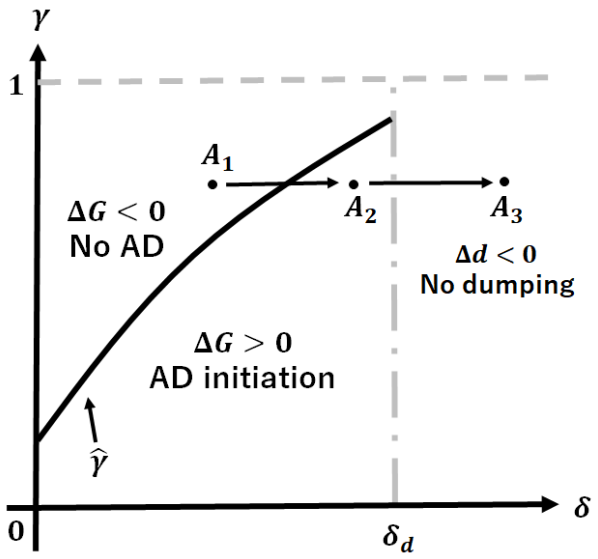

Figure 2: The stringency of the ALP and AD protection

gains from AD protection, $\Delta\pi_F$, the former effect dominates the latter and a more stringent regulation on transfer pricing makes AD protection more likely. $\widehat{\gamma}$ takes the minimum value denoted by $\underline{\gamma}$ at $\delta = 0$ and the maximum value ($\overline{\gamma}$) at $\delta = \delta_d$. If $\gamma > \overline{\gamma}$, the dumping margin is negative and AD protection can never occur.

The relationship between δ and $\widehat{\gamma}$ is presented in Figure 2. For instance, suppose that the combination of δ and γ is initially at the point A_1. At this point, $\gamma > \widehat{\gamma}$ and the government F does not implement AD protection. Starting from A_1, if the enforcement of the ALP is tightened and δ is increased from A_1 to A_2, $\gamma < \widehat{\gamma}$ holds and the government F implements AD protection. Thus, a stricter rule on transfer pricing can trigger the AD protection of the low-tax country. However, a further increase in δ to the point A_3 prevents AD protection because the dumping margin is negative.

The following proposition summarizes the effects of a stronger enforcement of the ALP on the incentive to implement AD protection.

Proposition 3. Given that the dumping margin under no AD protection is positive, a stronger enforcement of the ALP increases $\widehat{\gamma}$.

The proposition implies that a stronger enforcement of ALP makes AD protection more likely as it increases the threshold level of the government weight on social welfare, under which country F implements AD protection.

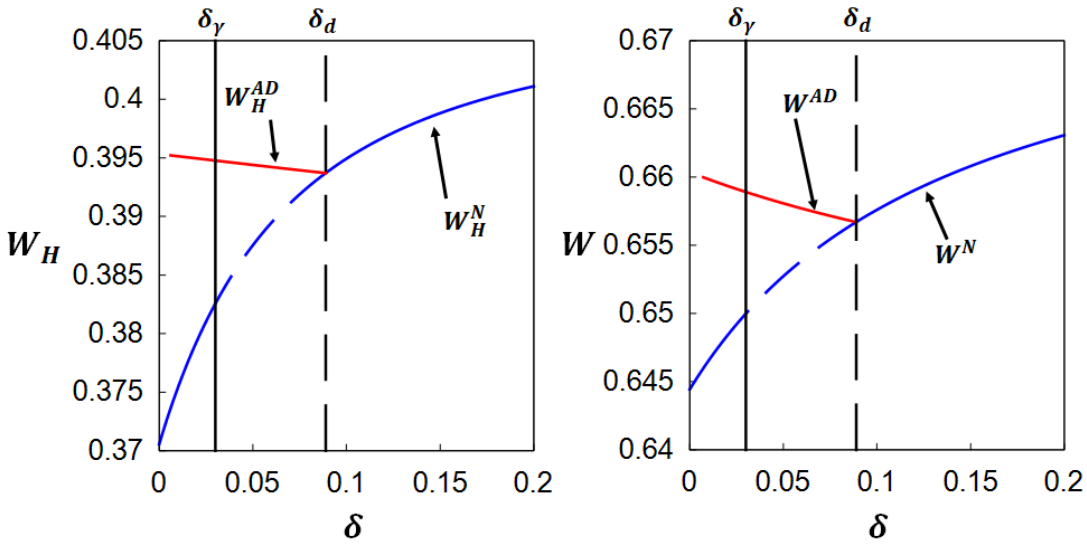

Figure 3: Welfare effects of stricter ALP

3.2 Welfare effects

We have investigated the effects of an increase in δ on the decisions of implementing AD protection. Here, we analyze how changes in the enforceability of the ALP affect the social welfare of the countries. The welfare of country H is given by (7) and the world welfare is $W = W_H + W_F$.

By transforming (15), we can define a thresholds δ_γ (depicted as the left-vertical line in each figure), above which the government F implements AD production given $d^N > 0$. As δ_d is the threshold level above which the dumping margin is negative, the range $\delta \in [\delta_\gamma, \delta_d]$ represents the case with AD protection. The dumping margin becomes negative and country F cannot implement AD protection when no dumping is realized when $\delta > \delta_d$ holds.

Figure 3 illustrates a numerical example of the welfare effects of a stricter regulation on transfer pricing.[16] The figure on the left represents the welfare change in country H and the figure on the right shows the changes in the world welfare. At $\delta = 0$, the equilibrium regime becomes no AD protection. Then, an increase in δ increases the welfare of country H because it increases r_F^N and country H earns a higher tax revenues without affecting consumer surplus and the local firm's profit in country H. If an increase in δ reaches δ_γ, country F implements AD protection and discretely increases W_H. This is because the AD protection increases the transfer price (r_F) and shifts a part of the tax revenue from country F to country

[16]The parameters are set at $a = 1$, $c_M = \frac{1}{16}$, $c = \frac{1}{8}$, $\tau = \frac{1}{3}$, $\gamma = \frac{3}{4}$, $t_H = \frac{3}{10}$, and $t_F = \frac{1}{10}$.

H. Additionally, because the AD protection decreases the internal price (r_H), it increases the consumer surplus in country H. Although a lower r_H intensifies the competition between firm H and the MNE and decreases the joint profits of these firms, the consumers' gains always dominates the firms' losses.

From $\delta = \delta_\gamma$, a further increase in δ can either increase or decrease the welfare of country H. On one hand, a larger δ under AD protection increases r_F^{AD} and recovers more tax revenues from country F. On the other hand, it also increases r_H^{AD} because it decreases the dumping margin under no AD protection and, thereby, diminishes the degree of price adjustments, θd^N.[17] The increase in r_H^{AD} hurts the consumers in country H. The former effect improves W_H, while the latter effect worsens it. In the numerical examples of Figure 3, a larger δ decreases W_H, implying that, once country F applies AD protection, a further enforcement of the ALP may hurt the high-tax country.

However, once δ becomes higher than δ_d, country F can no longer implement AD protection because the dumping margin is negative, in which case, an increase in δ only raises r_F and it always improves country H's welfare. The results suggests that a small increase in δ that triggers the foreign country's AD protection helps prevent tax avoidance. A further increase in δ, however, decreases the country H's welfare unless δ is high enough to eliminate the positive dumping margin.

Moreover, we can also confirm that AD protection improves the world welfare. Although the welfare of country F decreases with AD protection, the loss is dominated by the positive welfare gains in country H. Intuitively, the MNE's price adjustments due to the AD protection increases the equilibrium supply and lowers the price in country H, while it decreases the supply and raises the price in country F. Because of the trade costs, the effective market size of country F is smaller than that of country H. Accordingly, the consumers' gains in country H dominate that in country F. In addition, as the MNE has a cost advantage over the local firms, its increase in the market share in country H improves the overall efficiency of production. Conversely, the overall efficiency in country H becomes worse but its magnitude is lower because the effective market size is lower in country F. As in W_H, an increase in δ under AD protection can worsen the world welfare, while always improving it under no AD protection.

[17] Specifically, we have $\frac{\partial}{\partial \delta}(\theta d^N) = -18\frac{(1-t_H)(a+c-\tau-2c_M)+2(t_H-t_F)(a+c-2\tau-2c_M)}{[9\delta+8\{2(1-t_H)-(1-t_F)\}]^2} < 0$.

4 Trade liberalization

It is also interesting to explore how trade liberalization in terms of a reduction in trade costs affects country F's incentive to implement AD protection. We can confirm that $\frac{\partial \widehat{\gamma}}{\partial \tau} > 0$ holds. By (10), the dumping margin decreases in trade costs, τ. This is because a higher τ reduces the effective market size of country H, thereby weakening the tax-avoidance and strategic motives to lower the MNE's transfer price.

Proposition 4. Given that the dumping margin under no AD protection is positive, trade liberalization decreases $\widehat{\gamma}$.

We can reformulate the condition as,

$$d^N > 0 \iff \tau < \tau_d \equiv \frac{3\{8(t_H - t_F) - 3\delta\}(a + c - 2c_M)}{8\{1 - t_F + 3(t_H - t_F)\}}.$$

The negative relationship between trade costs and the dumping margin differs with the related literature, such as Mukunoki (2021). In the literature, exporting firms directly sell their products to foreign countries. Therefore, these firms set lower export prices in response to higher trade costs to absorb a part of the tariff burden to mitigate the negative profit effect from higher consumer prices. The imperfect pass-through of trade costs on consumer prices generates the positive relationship between τ and d in the studies.

By contrast, the exporter's dumping in our model is tax-induced, and the prices the exporter charges in the home and foreign countries are wholesale prices paid by the MNE's distribution affiliates. As τ becomes larger, the cost of the foreign affiliate becomes larger and its sales become smaller. Then, the MNE has a less incentive to lower its transfer price because a higher cost of the foreign affiliate weakens the profit gains from avoiding the high tax and motivating the foreign affiliate.

Figure 4 depicts the equilibrium outcomes in the (τ, γ) locus. Similar to the change in δ, a higher τ makes the AD protection more likely. For instance, a decrease in τ from B_1 to B_2 transforms an initially negative dumping margin into a positive dumping margin, and it changes the equilibrium outcome from no AD protection to AD protection. A further decrease in τ from B_2 to B_3 makes the equilibrium outcome revert to no AD protection. This is because lower trade costs raise the dumping margin, thereby increasing the welfare cost of AD protection in country F.

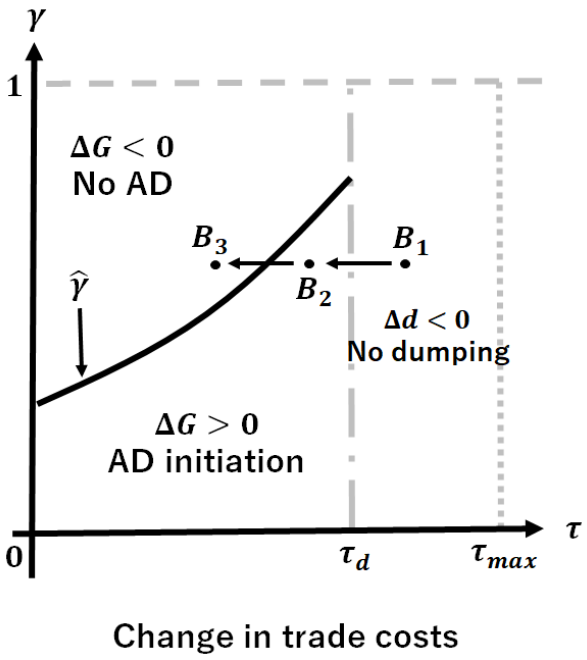

Figure 4: Trade liberalization and AD protection

5 Conclusion

Increases in intra-firm trade and MNEs' manipulations of transfer prices has been an important issue in the world economy. Meanwhile, countries frequently apply AD measures to protect the domestic firms. Although the prices of intra-firm trade are sometimes subject to AD investigations, no theoretical studies have considered the effects of AD protection targeting the dumping caused by MNEs' manipulations of transfer prices. A difference in corporate taxes gives MNEs incentives to set low transfer prices than the corresponding domestic prices, thereby becoming a reason for their dumping. Therefore, AD protection can prevent MNEs' tax avoidance by limiting the tax-induced dumping.

This study has investigated the connection between tax policies and AD policies in an international oligopoly model. The results suggest that a tighter enforcement of regulations on transfer pricing can trigger AD protection of the importing country, because a smaller dumping margin reduces the welfare cost of AD protection and encourages the importing country to implement AD protection. The AD protection serves as a tool to prevent the MNE's tax avoidance, which complements tighter regulations on transfer pricing.

This induced AD protection improves the welfare of the exporting country because of the larger tax revenue collected and the MNE's price adjustments benefit consumers in the

exporting country. This also improves the world welfare because the price adjustments of the MNE realize a more efficient allocation of the goods between countries. When AD protection is in effect, a further increase in the stringency of the regulations on transfer pricing may worsen the exporting country's welfare and world welfare. If the stringency of the regulations becomes a large enough, the dumping margin becomes negative and an increase in the stringency improves the exporting country's welfare as well as the world welfare. These results suggest that, if countries face difficulty to crackdown on MNEs' tax avoidance, AD protection in low-tax countries can be an effective tool to recover the tax revenues in high-tax countries. This effect has not been explored in the literature.

Although this study highlights the link between trade policy and tax avoidance activities of MNEs, there is room for further research. First, we have assumed that the AD protection leads to the MNE's price adjustments to avoid AD duty. However, the MNE may choose an advance pricing agreement on transfer pricing with tax authorities in advance. Second, as both AD protection and MNEs' tax avoidance have been intensively observed in R&D intensive industries, it is interesting to consider how tax policies and AD policies affect firms' R&D activities. Third, we need empirical supports on the impact of AD protection on transfer pricing.

Appendix

A.1 The MNE's pricing under AD protection

In our model, we have supposed that the MNE facing AD protection sets a uniform price to avoid AD duty. The MNE may still discriminate prices to avoid high taxes and take advantage of strategic effects, even though AD duty is imposed.

However, we can confirm that this alternative action is not optimal for the MNE. By substituting $d = r_H - r_F + \tau$ into (12), the profits of the MNE with AD duty can be rewritten as:

$$\Pi'_M = (1 - t_H)\{(p_H - c_M)x_{MH} + (r_F - c_M)x_{MF}\} + (1 - t_F)(p_F - r_H - 2\tau)x_{MF}.$$

Because we can confirm that $\frac{\partial \Pi'_M}{\partial r_F} > 0$ holds, the MNE sets r_F as high as possible as long as $d > 0$. Therefore, the optimal r_F must satisfy $d = r_H - (r_F - \tau) = 0$.

The intuition behind this is simple. Even if the MNE lowers the transfer price for the tax avoidance and strategic motives under AD protection, the decrease of the transfer price increases the AD duty by the same amount. Therefore, the marginal cost of the distribution affiliate in country F does not change and such a decrease in the transfer price neither affects the distribution affiliate's decision nor its post-tax profits, while the AD duty obviously reduces the profits of the MNE.

A.2 Proof of proposition 3

From eq.(15), we have,

$$\widehat{\gamma} = \frac{(1 - t_F)\Delta\pi_F}{(1 - t_F)\Delta_F - \Delta W_F} = \frac{2(1 - t_F)(x_F^{AD} + x_F)}{(1 - 2t_F)(x_F^{AD} + x_F) + (1 + 4t_F)(x_{MF}^{AD} + x_{MF})} = \frac{2(1 - t_F)}{1 - 2t_F + X}$$
$$\text{where} \quad X \equiv \frac{x_{MF}^{AD} + x_{MF}}{x_F^{AD} + x_F}.$$

First, the effect of transfer pricing regulation is computed as,

$$\frac{\partial \widehat{\gamma}}{\partial \delta} = -\frac{2(1 - t_F)(1 + 4t_F)}{(1 - 2t_F + X)^2}\frac{\partial X}{\partial \delta}.$$

As

$$\frac{\partial X}{\partial \delta} = -\frac{2(x_F^{AD} + x_F) + x_{MF}^{AD} + x_{MF}}{3(x_F^{AD} + x_F)^2}\left(\frac{\partial (r_F^{AD} + r_F)}{\partial \delta}\right)$$

and

$$\frac{\partial(r_F^{AD}+r_F)}{\partial\delta}=\frac{(1+t_H-2t_F)(a+c-2c_M-2\tau)+(1-t_H)\tau}{[9\delta+8\{2(1-t_H)-(1-t_F)\}]^2}+\frac{4\{3(1-t_H)-2(1-t_F)\}}{[9\delta+4\{3(1-t_H)-2(1-t_F)\}]^2}>0$$

hold, $\frac{\partial\widehat{\gamma}}{\partial\delta}>0$ is obtained.

Likewise, we have

$$\frac{\partial\widehat{\gamma}}{\partial\tau}=-\frac{2(1-t_F)(1+4t_F)}{(1-2t_F+X)^2}\frac{\partial X}{\partial\tau}>0,$$

because

$$\frac{\partial X}{\partial\tau}=-\frac{2(x_F^{AD}+x_F)+x_{MF}^{AD}+x_{MF}}{3(x_F^{AD}+x_F)^2}\left(\frac{\partial(r_F^{AD}+r_F)}{\partial\tau}\right)$$

and

$$\frac{\partial(r_F^{AD}+r_F)}{\partial\tau}=\frac{2(1+3t_H-4t_F)}{9\delta+8\{2(1-t_H)-(1-t_F)\}}+1+\frac{3\{2(1-t_H)+3\delta\}}{9\delta+4\{3(1-t_H)-2(1-t_F)\}}>0.$$

The above computation concludes Proposition 3. □

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