

# Antidumping on Tax-Induced Dumping\*

Hiroshi Mukunoki<sup>†</sup>

Hirofumi Okoshi<sup>‡</sup>

July 22, 2023

## Abstract

When multinational firms export their products from a high-tax to a low-tax country, they have incentives to set lower internal prices for avoiding high taxes. However, such low transfer prices may be regarded as dumping and the low-tax country can implement antidumping measures. This study theoretically demonstrates that possible antidumping measures complicate the welfare effects of regulating transfer pricing. When a tightening of the transfer-price regulation triggers the antidumping protection, it improves the welfare of the high-taxed country. However, given that the antidumping protection is in place, a further tightening of the transfer-price regulation may worsen the high-taxed country's welfare.

**Keywords:** Transfer pricing; Anti-dumping; Trade liberalization

**JEL classification number:** F13; F15; F23; H26; L11

---

\*This study is conducted as a part of the Project "Economic Policy Issues in the Global Economy" undertaken at the Research Institute of Economy, Trade and Industry (RIETI). We thank Jota Ishikawa, Hayato Kato, Jee-Hyoeng Park, Mi-Ryeong Ra, Dirk Schindler, Eiichi Tomiura, Makoto Yano, and participants of 79th annual meeting of JSIE and KIEA winter conference 2022. Hiroshi Mukunoki acknowledges financial support from JSPS KAKENHI Grant Numbers JP20K01659. Hirofumi Okoshi acknowledges financial support from JSPS KAKENHI Grant number JP22K13390. The usual disclaimer applies.

<sup>†</sup>Faculty of Economics, Gakushuin University, Mejiro 1-5-1, Toshima-ku, Tokyo 171-8588, Japan

<sup>‡</sup>Faculty of Economics, Okayama University, Tsushima 3-1-1, Kita-ku, Okayama, 700-8530, Japan

# 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.<sup>1</sup> 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.<sup>2</sup>

As intra-firm trade is the basis for transfer pricing, such MNEs' tax avoidance is subject to trade policies.<sup>3</sup> For instance, lower transfer prices as in the Cristea and Nguyen (2016) are potentially regarded as "dumping" in nature. According to the World Trade Organization (WTO), "*[I]f a company exports a product at a price lower than the price it normally charges on its own home market, it is said to be "dumping" the product. Is this unfair competition? Opinions differ, but many governments take action against dumping in order to defend their domestic industries.*"<sup>4</sup> Therefore, even if an MNE has no intention to dump its goods aiming at hurting the domestic industry, a low-tax importing country may claim "tax-induced" transfer prices as dumping and conduct a political action.

Such action taken by importing countries is known as anti-dumping (AD) measures that are one of the most frequently used trade policies in recent decades. AD measures allow importing countries to impose an AD duty on imports when an exporter's pricing is concluded as dumping and the dumping causes material injuries to the domestic industry. From January 1995 to June 2022, 6,541 AD initiations and 4,412 AD measures were reported in WTO.<sup>5</sup>

---

<sup>1</sup>Empirical evidence on MNEs' profit shifting has been accumulated from the beginning of 2000 (Swenson, 2001; Clausing, 2003; Bernard et al., 2006). Recent empirical studies, such as Cristea and Nguyen (2016), and Davies et al. (2018), observed that MNEs manipulate their transfer prices for tax-avoidance purposes.

<sup>2</sup>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.

<sup>3</sup>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>.

<sup>4</sup>See [https://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/agrm8\\_e.htm](https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm8_e.htm).

<sup>5</sup>See [https://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](https://www.wto.org/english/tratop_e/adp_e/adp_e.htm).

Blonigen and Prusa (2016) also demonstrated an increase in the number of countries adopting AD laws. Indeed, we can also confirm a non-negligible number of AD initiations from a low-tax country to high-tax countries. For 20 years from 2001 to 2020, our data samples show that 1,014 out of 3,438 country-pairs are the cases where a low tax country initiated AD investigation on firms in high-tax countries.<sup>6</sup> This means that recent AD measures can be strong restrictions on MNEs' transfer pricing decisions.

This potential link between tax-induced transfer pricing and AD measures has been overlooked in the literature, but there exist some anecdotes. For example, OECD (2022) describe that “[T]here are some circumstances in which a taxpayer will consider that an arm’s length price must be adjusted to account for government interventions such as ... antidumping duties ...” Moreover, Al-Eryani et al. (1990) also concluded that legal considerations including AD influenced U.S. MNEs' transfer pricing decision. Patricia Lewis, a tax attorney in Washington DC, made a statement that “I have had cases where there were simultaneously transfer pricing audits, ... and dumping cases, ...”<sup>7</sup>

Even though these anecdotes imply that tax-induced transfer pricing is associated with AD measures, we know little about the link between them. In fact, AD measures and the regulation on transfer pricing have been treated separately by different institutes; international trade and customs authorities treat AD issues while tax authorities treat transfer pricing issues. The communication between these institutes has become important recently. For instance, 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).<sup>8</sup> Against this backdrop, this paper investigates whether stricter enforcement of the transfer pricing regulation accelerates or prevents AD measures. It also examines whether the stricter enforcement still benefits a high-tax country when we take into account its effect on AD measures.

We construct an international oligopoly model, where a single MNE competes with a local

---

<sup>6</sup>We use data on AD initiation and corporate tax rate released by The World Bank and OECD, respectively. Data are available from <https://thedocs.worldbank.org/en/doc/daa244edaf15115d5450d0fed90d436c-0350042021/temporary-trade-barriers-database-underlying-data> and [https://stats.oecd.org/Index.aspx?DataSetCode=CTS\\_CIT](https://stats.oecd.org/Index.aspx?DataSetCode=CTS_CIT), respectively. Some country-pairs are dropped from our sample due to lack of information on corporate tax rate.

<sup>7</sup>See <https://ccbjournal.com/articles/what-you-really-need-know-about-transfer-pricing>.

<sup>8</sup>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.”

firm in each of a high-tax home and low-tax foreign country. The MNE produces its goods in the high-tax home country and sells them to the home and low-tax foreign countries through its distribution affiliates. The MNE charges wholesale prices on its distribution affiliates, whose decision rights are delegated by the MNE. The distribution affiliates determine their supplies of the goods such that they maximize their own profits. The foreign government, which decides whether it implements an AD measure, is politically-motivated and places an additional weight on the domestic producers' profits in the welfare components.<sup>9</sup> 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 foreign government's political weight on the local firm's profits is sufficiently large. The feature of this study is how the enforcement of ALP is linked to countries' incentives to implement AD measures.

Without AD protection, if the gap of the corporate taxes between the two countries is large and the stringency of the ALP is weak, the MNE's transfer price charged to its foreign affiliates are lower than the wholesale price to its domestic affiliates. The lower transfer price can be regarded as a "dumping" if it hurts the local firm in the importing country. A stricter enforcement of the ALP decreases the price gap. With AD protection, the MNE decreases their wholesale price in the home country and increases transfer price in the foreign country to avoid the imposition of AD duty.

We found that a *stricter* enforcement of ALP in the high-tax country triggers an AD measure in the low-tax country. With a weak enforcement of ALP, the price gap (i.e., the dumping margin) is large. Although a larger price gap hurts the local firm in the importing country more, it also increases the tax revenues because the MNE's tax base is shifted more to the importing country. Because the latter effect dominates the former, the low-tax, importing country is reluctant to implement an AD measure. With a strong enforcement of ALP, however, the tax-avoidance of the MNE is limited and the damage on the local firms becomes relatively important, leading to an AD measure.

If the enforcement of ALP is strong enough, however, the importing country never imple-

---

<sup>9</sup>As argued in Jabbour et al. (2019), "*producer groups are more successful in lobbying their governments toward the support of AD measures for protection of domestic industries, while importers, retailers, outsourcers and consumers have less political weight in lobbying national and EU authorities.* For the evidence, see, De Bièvre and Eckhardt (2011) and Eckhardt (2011, 2013) for the evidence. See also Nelson (2006) for a survey of the literature about the political economy of AD protection.

ments AD measure because the dumping margin becomes positive. When the tax-avoidance is impossible, the MNE has an incentive to set a lower wholesale price to the home country than a transfer price to the foreign country. Because of the trade cost, the MNE has a larger incentives to lower the marginal cost of its distribution affiliates in the home country to make them stronger in the product market. Therefore, With a sufficiently strong enforcement of ALP, the MNE sets a wholesale price lower than a transfer price.

These findings suggest that a tightening of ALP in a high-tax country has a non-monotone effect on AD measures in a low-tax country. Seemingly, a stronger ALP reduces the dumping margin and prevents AD protection. However, the result is opposite unless the enforcement of ALP is strong enough, because lower tax revenues due to a tighter ALP shifts the the low-tax country's interest from earning tax revenues to protecting the local firm. Once the ALP is strong enough, the MNE stops dumping because it loses interests in avoiding a high tax, and instead sets a lower price in he home country to motivate its distribution affiliates and shifts more profits from the rival firms in the product market.

The welfare effect of a stricter enforcement of ALP depends on whether the importing country implements AD protection. When the enforcement of ALP is weak such that the dumping margin is positive but the importing country does not implement an AD measure, a stricter enforcement benefits the high-tax country because of a larger tax revenues. At the point where a stricter ALP triggers AD measures, the welfare of the high-tax discretely increases because the price adjustment of the MNE leads to larger consumer surplus and tax revenues. A further tightening of ALP, however, decreases the high-tax country's welfare because the AD measure already regulates the tax-avoidance motives of transfer pricing, while it prevents the MNE's transfer pricing for shifting profits from the rival firms. Once the stringency of the ALP exceeds the level above which the dumping margin is negative, a further increase in the stringency improves the welfare of the high-tax country because it decreases the exports but instead increases the home sales, benefiting the home consumers.

These results provides an important policy implication: Contrary to the conventional wisdom, if the importing country implements AD protection, tightening the enforcement of ALP worsens the welfare of the high-tax country.

## 1.1 Intra-firm trade and antidumping

AD measures allow importing countries to impose an AD duty on imports when foreign exporters “dump” their goods and 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 dumping margin is defined as  $d = r_H - (r_F - \tau)$ , where  $\tau$  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. As tax-induced transfer price is low when an MNE ships its goods from a high-tax country to a low-tax country, such transfer prices can be subject to AD protection.

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.<sup>10</sup> The European Union also calculates the export price to the affiliated importer by the same method.

Moreover, “zeroing” is another concern related to the potential link between AD protection and transfer pricing. Zeroing is known as a calculation method that the U.S. uses for AD duty. With zeroing, the U.S. calculates average dumping margin for a certain period by regarding negative dumping margin as zero. As European Union describes, “*WTO rulings have confirmed that this method increases, often substantially, the exporter’s margin of dumping and thus the amount of anti-dumping duty that the exporter has to pay.*”<sup>11</sup> This implies tax-induced dumping can be sensitive issue for MNEs. Bown and Sykes (2008) also reported some issues concerning transfer pricing and the calculation of dumping margin.

---

<sup>10</sup>See <https://enforcement.trade.gov/regs/uraa/saa-ad.html>.

<sup>11</sup>See [https://ec.europa.eu/commission/presscorner/detail/en/MEMO\\_12\\_73](https://ec.europa.eu/commission/presscorner/detail/en/MEMO_12_73).

Even if an importing country initiates AD protection, it is not necessary for an exporter to be imposed AD duty: the targeted exporting firms has an option to increase its export prices voluntarily to avoid imposition of AD duty. This is known as “price undertaking” and the Article VIII of the WTO Anti-Dumping Agreement stipulates AD investigation may be suspended or terminated by price undertaking.<sup>12</sup> If MNEs face a (potential) imposition of an AD duty, they may prefer pursuing price undertaking for avoiding the AD duty.

## 1.2 Related literature

This study relates to the literature on transfer pricing. Since Copithorne (1971) and Horst (1971), many researchers have analyzed MNEs’ tax avoidance strategies with a focus on the impact of regulation on transfer price manipulation, such as the ALP.<sup>13</sup> Gresik and Osmundsen (2008) analyzed how a vertically separated MNE decides its transfer pricing, and Choi et al. (2020) explored the impact of transfer price regulation 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). While the ALP does not allow MNEs to discriminate prices for *related and unrelated* firms, AD protection restricts MNEs to discriminate prices between domestic and foreign countries. These two measures restricting firms’ price discrimination can interact and change the role of the ALP to limit firms’ tax avoidance.

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 the optimal tariff on an MNE’s intra-firm transaction to mitigate profit shifting. Mukunoki and Okoshi (2021a) and Mukunoki and Okoshi (2021b) investigated impacts of a free trade agreement (FTA) on an MNE’s profit-shifting strategies. They showed that an MNE has an incentive to manipulate transfer price to comply with rules of origins and gain tariff-free access within the FTA. This study focusing on AD protection provides additional insights on the link between trade and tax policies.

We also contribute to the literature on AD protection. There have been a lot of studies con-

---

<sup>12</sup>See [https://www.wto.org/english/res\\_e/publications\\_e/ai17\\_e/anti\\_dumping\\_art8\\_jur.pdf](https://www.wto.org/english/res_e/publications_e/ai17_e/anti_dumping_art8_jur.pdf).

<sup>13</sup>Another example of anti-profit-shifting policy is introducing a formula apportionment instead of a separate accounting. See for example, Nielsen et al. (2003), Kind et al. (2005) and Gresik (2010). Janský and Palanský (2019) suggests that an internal debt is another important channel to shift profits, and countries adopt thin capitalization rules to prevent it. See also Haufler and Runkel (2012) and Mardan (2017) for capitalization rules.

sidering the effects of AD protection.<sup>14</sup> Some of these studies focused on the governments' incentives to use AD laws. For instance, 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.

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 or the price elasticity 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.

There have been AD cases targeting the dumping calculated by exporting firms' wholesale prices, but 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.

Some papers also considered interaction between foreign direct investment and AD protection. Belderbos et al. (2004) showed that a foreign firm has an incentive to engage in foreign direct investment for protection-jumping purpose by considering AD duty and price undertaking, while Ishikawa and Miyagiwa (2008) extended Belderbos et al. (2004) by introducing voluntary export restrictions. Davies and Liebman (2006) analyzed the sustainability

---

<sup>14</sup>See Blonigen and Prusa (2016) for the survey of the literature.



of collusion between a local firm and an MNE. Unlike these studies, we focus on intra-firm pricing and its relation to AD protection.

Section 2 sets up the model and derives the equilibrium with and without AD protection. It explores how the stringency of the ALP affects the importing country's AD protection. Section 3 analyzes the welfare effect of a stricter enforcement of the ALP. Section 4 discusses additional results and the validity of the model's assumptions. Section 5 summarizes the findings and concludes.

## 2 Model

We construct an international oligopoly with two countries, a high-tax home country (country  $H$ ) and a low-tax foreign country (country  $F$ ). In each country, there are two firms supplying a homogeneous products, a local firm (firm  $i \in \{H, F\}$ ) and an MNE (firm  $M$ ). The MNE produces the good in country  $H$  because of the location advantages in that country, such as a large pool of skilled labor.<sup>15</sup> Hence, the MNE exports its goods to country  $F$ . Let  $t_i$  denote a corporate-tax rate in country  $i$ . Since  $t_H \geq t_F$ , the MNE has an incentive to shift profits from country  $H$  to country  $F$  via transfer price manipulation.<sup>16</sup>

The individuals in the two country share the same utility function,  $U_i = a(x_i + x_{Mi}) - \frac{(x_i + x_{Mi})^2}{2} + y_i$ , where  $y_i$  is the consumption of a numéraire good. This yields the following inverse demand function in  $i \in \{H, F\}$ :

$$p_i = a - (x_{Mi} + x_i), \quad (1)$$

where  $x_{Mi}$  and  $x_i$  are the supplies of the MNE and those of the local firm in country  $i$ , respectively.

On the production side, the two local firms (firms  $H$  and  $L$ ) in countries  $H$  and  $L$  produce a final good and supply it only in their respective domestic markets. The marginal costs of production for these two firms are identical and given by  $c$ . The MNE (firm  $M$ ) produces the same good in country  $H$  with a lower marginal cost,  $c_M (\leq c)$ . Firm  $M$  supplies the good in

<sup>15</sup>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.

<sup>16</sup>In our analysis, we focus on the case where the tax difference is not so large,  $t_H - t_F < \bar{\Delta T} \equiv \frac{(1-t_H)}{4} \left[ \frac{a-c-2(c-c_M)}{a-c} \right]$ , such that both the MNE and the local firm supply their products in both markets.

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,  $\tau$ .

As explained in Section 1.1, the dumping margin is defined as the difference between the FOB transfer price (i.e., the transfer price minus the trade costs) and the corresponding internal price,  $r_H - (r_F - \tau)$ . The MNE has a tax-saving motivation to lower  $r_F$ . By doing so, the MNE increases the post-tax profits because lowering the transfer price increases its profits earned in the low-tax foreign country and decrease those earned in the high-tax domestic country. Given the internal price in the domestic market, the decrease in the transfer price becomes a factor that expands the dumping margin.

There is another reason for manipulating transfer pricing. In line with literature of vertically separated firms, we assume the MNE delegates the decisions on the supplies of goods to the managers of its distribution affiliates.<sup>17</sup> The decentralization benefits the MNE because the MNE is able to manipulate both the internal price and the transfer price to motivate the distribution affiliates and make them more aggressive in the product market. This strategic motive of transfer pricing further decrease the transfer price.<sup>18</sup> The strategic motive, however, reduces or even eliminates the dumping margin of the MNE because it decreases the internal price to the domestic distributor more than the transfer price. This effect is explained more in Section 2.1.1.

Specifically, the MNE's distribution affiliate and the local firm in  $i$  maximize

$$\pi_{Mi} = (p_i - r_i)x_{Mi} \quad \text{and} \quad \pi_i = (p_i - c)x_i, \quad (2)$$

respectively. The MNE can encourage the affiliates to supply more in the product market and shifts the profits from the local firm, by lowering the internal/transfer prices that are costs for the affiliates.

The headquarter of the MNE sets its internal price and transfer price to maximize the overall profits: the sum of the profits of selling goods to the distribution affiliates and the

---

<sup>17</sup>This setting corresponding the situation where the headquarters evaluates the managers of the affiliates based on their profits.

<sup>18</sup>Some papers such as Schjelderup and Sørsgard (1997) and Choi et al. (2018) transfer pricing by the decentralized MNE. As Nielsen et al. (2008) showed, the motivations of transfer pricing 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 the centralization of decision-makings to the decentralization.

profits of those affiliates. On top of that, the MNE needs to incur “concealment costs” of transfer pricing. As explained above, the MNE has an incentive to lower transfer price to avoid a high corporate tax. If the tax authority in the high-tax country detects such transfer price manipulation, it penalizes the MNE. To avoid a potential sanction, the MNE incurs some costs to justify its pricing, by hiring lawyers and consultants, for instance.

Following the standard literature of transfer pricing such as Kind et al. (2005) and Nielsen et al. (2008), we assume the MNE incurs the following concealment costs:<sup>19</sup>

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

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.<sup>20</sup> This is because the tax authority audits 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,  $\delta$  captures the stringency of the ALP. Facing outflows of the MNE’s tax base, the government in the high-tax country may strengthen the enforcement of the ALP. A stricter enforcement of the ALP increases  $\delta$  and makes it harder for the MNE to conceal its transfer-price manipulation.

With the concealment cost, the MNE’s post-tax, total profit is given by:

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

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 in the product markets.

The rest of this section derives the equilibrium outcomes without and with AD protection, and also examines whether the importing country implements AD protection.

---

<sup>19</sup>One may think the concealment costs also depend on the volume of intra-firm trade, because tax authorities are more likely to audit an MNE as the volume of its transaction increases. Therefore, the MNE may need to incur larger concealment costs to avoid sanctions. We show in section 4.3 that the main results still go through even if we consider quantity-dependent concealment costs.

<sup>20</sup>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. See Juraneck et al. (2018) for a study employing the same assumption.

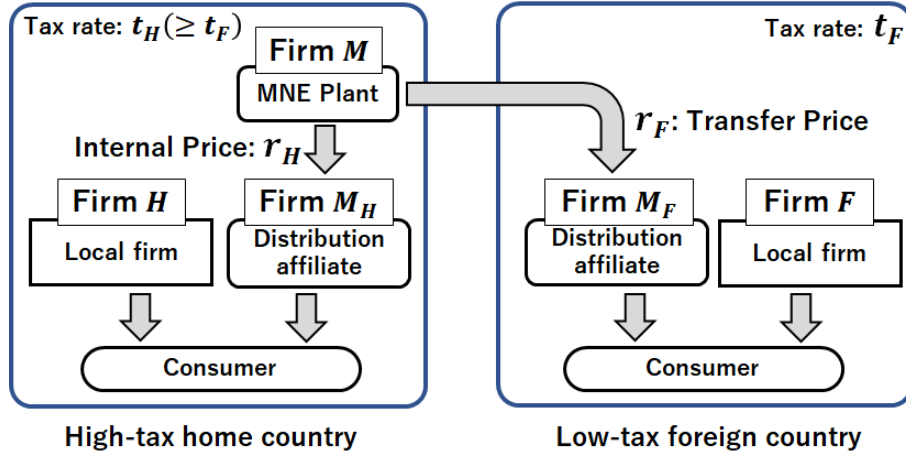


Figure 1: Model

## 2.1 Equilibrium

Let us start with the equilibrium of the stage-3 subgame. In stage 3, firm  $M_H$ , firm  $M_F$ , and the local firms maximize their own profits. By maximizing (2) with respect to  $x_{Mi}$  and  $x_i$ , the optimal supply of each firm in country  $i$  becomes a functions of  $r_i$ :

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

Because  $r_i$  is regarded as a cost for firms  $M_H$  and  $M_F$ , a lower internal or transfer price of the MNE increases the equilibrium supply of the MNE and decreases those of the local firms.

The equilibrium outcomes of stage-2 subgames depend on whether country  $F$  implements AD protection or not, which are subsequently analyzed in the next two sections.

### 2.1.1 No AD protection

Without AD protection, the MNE sets  $r_H$  and  $r_F$  in stage 2 to maximize the post-tax profits without any additional constraint. By solving the first order conditions, the optimal internal and transfer prices are:

$$r_H^N = c_M - \frac{a + c - 2c_M}{4}, \quad (6)$$

$$r_F^N = c_M + \tau - \frac{a + c - 2c_M - 2\tau}{4} - \frac{3(t_H - t_F)(a + c - 2c_M - 2\tau)}{2\{3(1 - t_H) - 2(1 - t_F)\}} + \frac{9\delta(1 + 3t_H - 4t_F)(a + c - 2c_M - 2\tau)}{4\{3(1 - t_H) - 2(1 - t_F)\}[9\delta + 4\{3(1 - t_H) - 2(1 - t_F)\}]} \quad (7)$$

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.<sup>21</sup> Although these two motives incentives the MNE to set its transfer price as low as possible, the existence of concealment costs prevents it from doing so. The fourth term captures this effect. Since we have  $\frac{\partial r_F^N}{\partial \delta} > 0$  and  $\lim_{\delta \rightarrow \infty} r_F^N \rightarrow c_M + \tau$ ,  $r_F^N < c_M + \tau$  holds at any  $\delta$ .

As explained in Section 1.1, 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 (6) and (7), the dumping margin is calculated as:

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

The sign of  $d^N$  is ambiguous and depends on the MNE's gains from transfer pricing. When the MNE benefits a lot from tax avoidance, the transfer price becomes lower than the internal price and the dumping margin becomes positive. We can define a threshold level of  $\delta$ ,  $\delta_d$ , below which the equilibrium dumping margin is positive:

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

A weaker enforcement of the transfer-pricing regulation reduces the concealment costs and lowers the transfer price.  $\delta_d$  is increasing in  $t_H - t_F$  and decreasing in  $\tau$ . A larger tax gap increases the gains from tax avoidance, and so does lower trade costs because of a larger volume of intra-firm trade. We have the following proposition.

**Proposition 1.** *Without AD protection, the MNE's dumping margin is more likely to be positive as the tax gap between the low-tax importing country and the high-tax exporting country becomes larger, trade costs becomes smaller, and the enforcement of the regulations on transfer price becomes weaker.*

Our model points out that countries' tax-difference can be a reason why dumping occurs. It is worth mentioning that our model sheds lights on the novel channel that corporate taxes can be the reason of an MNE's dumping. Note that  $\delta_d < 0$  holds when  $t_H = t_F$  and  $\delta_d > 0$  holds only if  $t_H - t_F > \frac{(1-t_F)}{3(a+c-2c_M-\tau)}\tau$ . Unless the corporate-tax rate of country  $H$  is sufficiently higher than that of country  $F$ , the MNE does not "dump" its product. Because of

<sup>21</sup>The assumption of  $t_H - t_F < \overline{\Delta T}$  ensures that the second-order conditions of the profit maximization always hold.

trade costs, a strategic motive of lowering the wholesale price is larger in country  $H$  than in country  $L$ . Therefore, the MNE sets  $\hat{r}_H < (\hat{r}_F - \tau)$  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 observed in this model is a “tax-induced dumping.”

### 2.1.2 AD protection

Given that  $d^N > 0$  holds, this subsection examines how 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 known as “price undertaking.” The MNE’s post-tax profit with the AD duty that is equal to the dumping margin,  $d = r_H - (r_F - \tau)$ , becomes

$$\Pi'_M = (1 - t_H)[(r_H - c_M)x_{MH} + (r_F - c_M - \tau - d)x_{MF} + \pi_{MH}] + (1 - t_F)\pi_{MF} - C(r_F). \quad (10)$$

As explained in Appendix A.1, it is optimal for the MNE to set  $r_H$  and  $r_F$  such that  $d = 0$  holds, yielding the following equilibrium wholesale prices:

$$r_H^{AD} = r_H^N - \theta d^N \quad \text{and} \quad r_F^{AD} = r_H^{AD} + \tau = r_F^N + (1 - \theta)d^N, \quad (11)$$

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  $d^N$ . 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,  $d^N$ .

Before we analyze the low-tax country’s incentive to implement AD protection, it is helpful to understand how AD protection and the stringency of the ALP affect the transfer price and the welfare in the low-tax country. An increase in  $r_F$  due to AD protection makes firm  $M_F$  less aggressive in country  $F$ ’s market, which benefits the local firm and hurts consumers. Country  $F$  also reduces tax revenues due to less inflows of the MNE’s tax base. Therefore, AD protection has a role to discourage the MNE’s tax avoidance and weaken the MNE’s strong position in the product market in country  $F$ . Similarly, a stricter enforcement of the

ALP leads to the same direction of the welfare change because it makes the manipulation of transfer price harder and increases  $r_F$ .

## 2.2 Decisions on AD protection

We have analyzed the conditions under which the MNE's pricing generates a positive dumping margin and how AD protection eliminates the price gap between the countries. Here, we analyze government  $F$ 's decision on implementing AD protection in stage 1.

The welfare of country  $F$  consists of consumer surplus, the post-tax profit of firm  $F$ , and the tax revenues collected from firms  $F$  and  $M_F$ , which is given by

$$\widehat{W}_F(r_F) = \frac{\{\widehat{x}_F(r_F) + \widehat{x}_{MF}(r_F)\}^2}{2} + (1 - t_F)\widehat{\pi}_F(r_F) + t_F\{\widehat{\pi}_F(r_F) + \widehat{\pi}_{MF}(r_F)\}. \quad (12)$$

Although firm  $F$  pays the corporate tax, its tax payment is cancelled out by the government's tax revenue in the welfare.<sup>22</sup>

We assume that the policy maker in the low-tax country is politically-motivated and makes his decision based on a weighted social welfare with special interests on the profits of the local firm.<sup>23</sup> Such special interests on the local firm includes lobbying by special groups in the same industry.<sup>24</sup> Specifically, the objective function of government  $F$  in implementing AD protection is given by:

$$G_F = \gamma W_F + (1 - \gamma)(1 - t_F)\pi_F, \quad (13)$$

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  $\gamma$  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

$$\Delta G_F \equiv G_F^{AD} - G_F^N \geq 0 \iff \gamma \leq \widehat{\gamma} \equiv \frac{(1 - t_F)\Delta\pi_F}{(1 - t_F)\Delta\pi_F - \Delta W_F} \quad (14)$$

<sup>22</sup>As discussed in the previous section, AD protection leads to price undertaking and an AD duty is not imposed on the MNE in equilibrium. Therefore, the revenues from AD duty do not appear in the welfare.

<sup>23</sup>See Rosendorff (1996) for an early study to incorporate a political weight on governments' AD decisions.

<sup>24</sup>See Baldwin (1987) for the establishment of the politically realistic objective function. Feenstra and Lewis (1991) also showed that the same specification can be derived from a median voter model of Mayer (1984).

holds.

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  $\Delta W_F = W_F^{AD} - W_F^N < 0$ . Since  $\Delta W_F < 0$  and  $\Delta\pi_F > 0$  always hold, we have  $0 < \hat{\gamma} < 1$ . Therefore, a welfare-maximizing government ( $\gamma = 1$ ) never implements AD protection, and the political-economy consideration must be sufficiently significant for implementing AD protection.

### 2.2.1 Regulations on transfer pricing and AD protection

How does an incentive to implement AD protection associate with regulations on transfer pricing? As explained above,  $\delta$  captures the stringency of the ALP. Because the low-tax country implements AD protection if  $\gamma \leq \hat{\gamma}$  holds,  $\hat{\gamma}$  is the maximum weight on the social welfare with which the importing country implements AD protection. Therefore, a larger  $\hat{\gamma}$  corresponds to a higher likelihood of AD protection. As shown in Appendix A.2 a stronger enforcement of the ALP increases the maximum weight.

**Proposition 2.** *Given that the dumping margin under no AD protection is positive, a stronger enforcement of the ALP increases  $\hat{\gamma}$ .*

The proposition implies that a stronger enforcement of the ALP makes AD protection more likely, even though it reduces the dumping margin. The intuitive explanation is as follow. A lower transfer price benefits the low-tax country because of larger consumer surplus and tax revenues. With a weak enforcement of the ALP,  $r_F^N$  is very low and AD protection significantly increases the transfer price. Consequently, the welfare loss from AD protection is significant. Although the large increase in the transfer price benefits the local firm more, the welfare effect dominates and AD protection is less likely to be implemented as  $\delta$  becomes smaller. In other words, a stronger enforcement of the ALP can trigger AD protection.

Since  $\hat{\gamma}$  is increasing in  $\delta$ ,  $\hat{\gamma}$  takes the minimum value denoted by  $\underline{\gamma}$  at  $\delta = 0$  and the maximum value ( $\bar{\gamma}$ ) at  $\delta = \delta_d$ . This indicates that, for any  $\gamma \in [\underline{\gamma}, \bar{\gamma}]$ , there exists a unique  $\delta_\gamma$  such that  $\Delta G = 0$  holds at  $\delta = \delta_\gamma$ . The government of country  $F$  does not implement AD protection for  $\delta < \delta_\gamma$ , and it does so for  $\delta_\gamma < \delta$ .



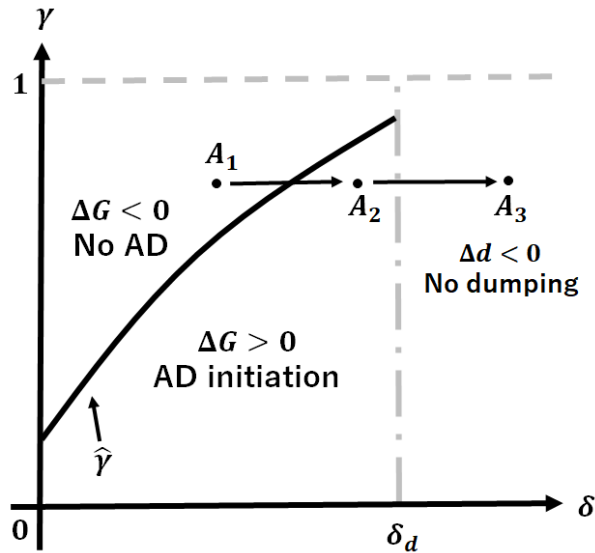


Figure 2: The stringency of the ALP and AD protection

The above discussion is illustrated in Figure 2. In the figure, the relationship between  $\delta$  and  $\hat{\gamma}$  is presented with the solid curve. Note that  $\Delta G > 0$  holds below the curve. For instance, suppose that the combination of  $\delta$  and  $\gamma$  is initially at the point  $A_1$ . At this point,  $\gamma > \hat{\gamma}$  and the government  $F$  does not implement AD protection. Starting from  $A_1$ , if the enforcement of the ALP is tightened and  $\delta$  is increased from  $A_1$  to  $A_2$ ,  $\gamma < \hat{\gamma}$  holds and the government  $F$  implements AD protection. Therefore, a stricter rule on transfer pricing can trigger the AD protection of the low-tax country. However, a further increase in  $\delta$  to the point  $A_3$  prevents AD protection because the dumping margin becomes negative.

Seemingly, a stronger enforcement of the ALP prevents AD protection because it reduces the dumping margin. As long as the dumping margin is positive, however, a smaller dumping margin actually triggers AD protection because it reduces the welfare cost of AD protection relative to the profit gains of the local firm. Only if the stringency of the ALP is strong enough, it prevents AD protection because the dumping margin becomes negative.

The next question is whether the high-tax country has an incentive to increase  $\delta$ , if it can trigger/prevent AD protection. The next section answers this question.

### 3 Welfare Analysis

We have investigated the effects of an increase in  $\delta$  on the decisions of implementing AD protection. Here, as high-tax countries usually take initiatives of strengthening the ALP to

aim at preventing outflows of tax bases and improving its welfare, we analyze how changes in the enforceability of the ALP affect the social welfare of the high tax country.

Similar to welfare in country  $F$ , the equilibrium welfare of country  $H$  is the sum of consumer surplus, profits of firms  $H$  and  $M$ , and tax revenues:

$$\begin{aligned} \widehat{W}_H(r_H, r_F) = & \frac{\{\widehat{x}_H(r_H) + \widehat{x}_{MH}(r_H)\}^2}{2} + (1 - t_H) \widehat{\pi}_H(r_H) + \widehat{\Pi}_M(r_H, r_F) \\ & + t_H \{\widehat{\pi}_H(r_H) + (r_H - c_M) \widehat{x}_{MH}(r_H) + (r_F - c_M - \tau) \widehat{x}_{MF}(r_F) + \widehat{\pi}_{MH}(r_H)\}. \end{aligned} \quad (15)$$

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

First, consider the case without AD protection. By differentiating  $W_H^N$  with respect to  $\delta$ , we have

$$\frac{\partial W_H^N}{\partial \delta} = \frac{(1 + 3t_H - 4t_F)(a + c - 2c_M - 2\tau)^2(9\omega_1^N \delta + 4\omega_2^N)}{2[9\delta + 4\{3(1 - t_H) - 2(1 - t_F)\}]^2},$$

$$\text{where } \omega_1^N = 3t_H + 4t_F - 1, \quad \text{and } \omega_2^N = 9t_H^2 + 6(2 - 5t_F)t_H + 8t_F^2 + 2t_F - 1.$$

Note that  $\omega_1^N > 0$  and  $\omega_2^N > 0$  hold when  $\frac{1-4t_F}{3} \equiv t_{\omega_1}^N < t_H$  and  $t_F + \frac{\sqrt{(1-t_F)(5-17t_F)}-2(1-t_F)}{3} \equiv t_{\omega_2}^N < t_H$  hold, respectively.<sup>25</sup> Hence, irrespective of  $\delta$ ,  $\frac{\partial W_H^N}{\partial \delta} < 0$  holds when  $t_F < t_H < t_{\omega_2}^N$  whereas  $\frac{\partial W_H^N}{\partial \delta} > 0$  holds when  $t_{\omega_1}^N < t_H < 1$  holds. In the range of  $t_H \in [t_{\omega_2}^N, t_{\omega_1}^N]$ , the sign of  $\frac{\partial W_H^N}{\partial \delta}$  is positive if and only if  $\delta < -\frac{4\omega_2^N}{9\omega_1^N}$  whereas it is negative otherwise. These three cases are drawn in the left figure of Figure 3.

The different signs of  $\frac{\partial W_H^N}{\partial \delta}$  comes from two sources. On the one hand, as a lower transfer price induces the foreign distribution affiliates of the MNE to steal market share, transfer pricing regulation decreases the MNE's profits and the welfare effect is likely to be negative. On the other hand, as the foreign distribution affiliate of the MNE is taxed and the MNE's gains from a lower transfer price partly accrue to country  $F$ , transfer pricing regulation tends to increase welfare in country  $H$ . With a low  $t_F$ , the first effect dominates the second and thus the sign of  $\frac{\partial W_H^N}{\partial \delta}$  is negative. If the corporate tax rate in country  $F$  is high enough, the latter effect is the dominant effect and  $\frac{\partial W_H^N}{\partial \delta} > 0$  holds. Under intermediate  $t_F$ , business stealing benefits are dominant when  $\delta$  is low, and  $\frac{\partial W_H^N}{\partial \delta} < 0$  holds.

With AD protection, we can obtain similar thresholds  $t_{\omega_1}^{AD}$  and  $t_{\omega_2}^{AD}$  to the ones above. Specifically, as shown in the Appendix,  $\frac{\partial W_H^{AD}}{\partial \delta} > 0$  holds when  $t_{\omega_1}^{AD} < t_H$  holds whereas

<sup>25</sup>Under  $t_F \leq t_H$ ,  $t_F + \frac{\sqrt{(1-t_F)(5-17t_F)}-2(1-t_F)}{3} = t_{\omega_2}^N < t_{\omega_1}^N = \frac{1-4t_F}{3}$  is confirmed.

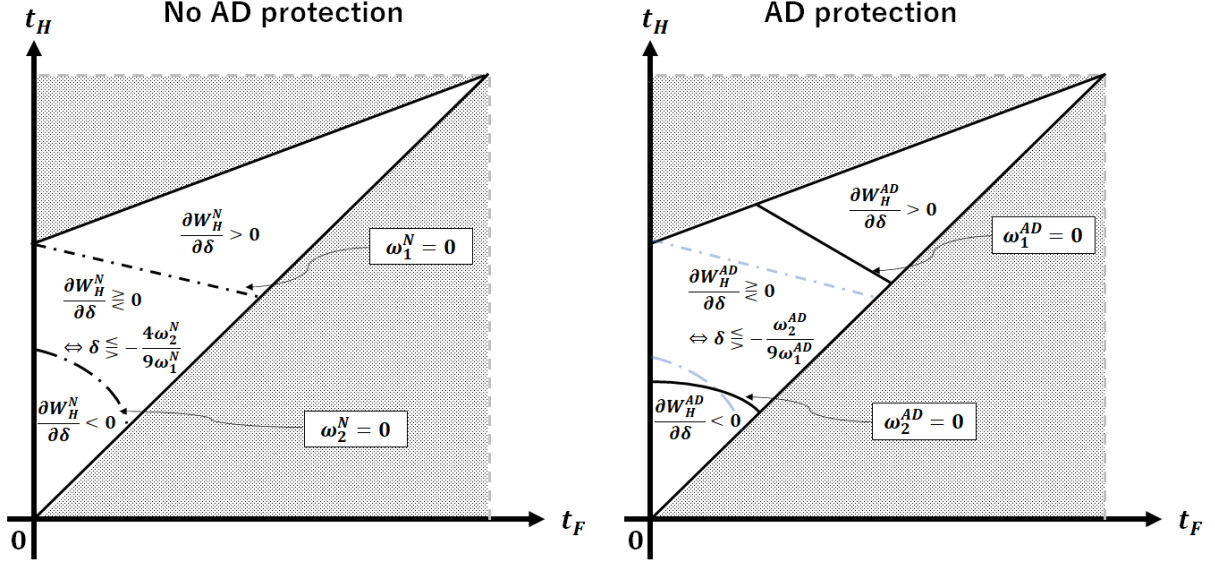


Figure 3: Welfare effect of stringent ALP

$\frac{\partial W_H^{AD}}{\partial \delta} < 0$  holds when  $t_H < t_{\omega_2}^{AD}$  holds. Moreover,  $\frac{\partial W_H^{AD}}{\partial \delta} \geq 0$  holds if  $t_{\omega_2}^{AD} < t_H < t_{\omega_1}^{AD}$  and  $\delta \leq -\frac{\omega_2^{AD}}{9\omega_1^{AD}}$ . The above results are summarized as the following proposition.

**Proposition 3.** *Without AD protection, strengthening the enforceability of the ALP improves welfare in the high-tax country when (i)  $t_{\omega_1}^N < t_H$  holds or (ii)  $t_{\omega_2}^N < t_H < t_{\omega_1}^N$  and  $\delta < -\frac{4\omega_2^N}{9\omega_1^N}$  hold. Similarly, with AD protection, stricter enforcement of the ALP increases welfare in the high-tax country when (i)  $t_{\omega_1}^{AD} < t_H$  holds or (ii)  $t_{\omega_2}^{AD} < t_H < t_{\omega_1}^{AD}$  and  $\delta < -\frac{\omega_2^{AD}}{9\omega_1^{AD}}$  hold.*

*Proof.* See Appendix.

In the right figure of Figure 3, the three cases in the presence of AD protection are illustrated. Note that the dashed curves represent the thresholds such that  $\omega_1^N = 0$  and  $\omega_2^N = 0$  hold as seen in the case without AD protection. From the figure, it is notable to consider the case above the threshold  $\omega_1^N = 0$  and below  $\omega_1^{AD} = 0$  because the welfare impact of strengthening the ALP can be opposite.<sup>26</sup> Without AD protection, stricter ALP benefits the high-tax country because of preventing tax base out flow. However, if  $\delta > -\frac{\omega_2^{AD}}{9\omega_1^{AD}}$  holds, stricter enforcement of the ALP worsens welfare in the high-tax country. As the MNE's transfer pricing strategy is also regulated with AD protection, the outflow of the MNE's tax base is not much

<sup>26</sup>Although we can see two other possibilities that AD protection affect the sign of  $\frac{\partial W_H^i}{\partial \delta}$ , we ignore the cases because they are not much interesting with the following reasons. Those possibilities happens only when both countries impose quite small corporate tax less than  $\frac{\sqrt{5}-2}{3} \approx 0.0786$ , which seems unrealistic situation. In these situations, governments and an MNE do not much care about the currently discussed profit shifting issues seriously and thus other mechanisms outside the model can be much more important. In addition, in one case, we have  $\frac{\partial W_H^N}{\partial \delta} < 0$  which means the high-tax country does not strengthen the enforcement of the ALP and  $\delta$  is less than  $\delta_d$ .

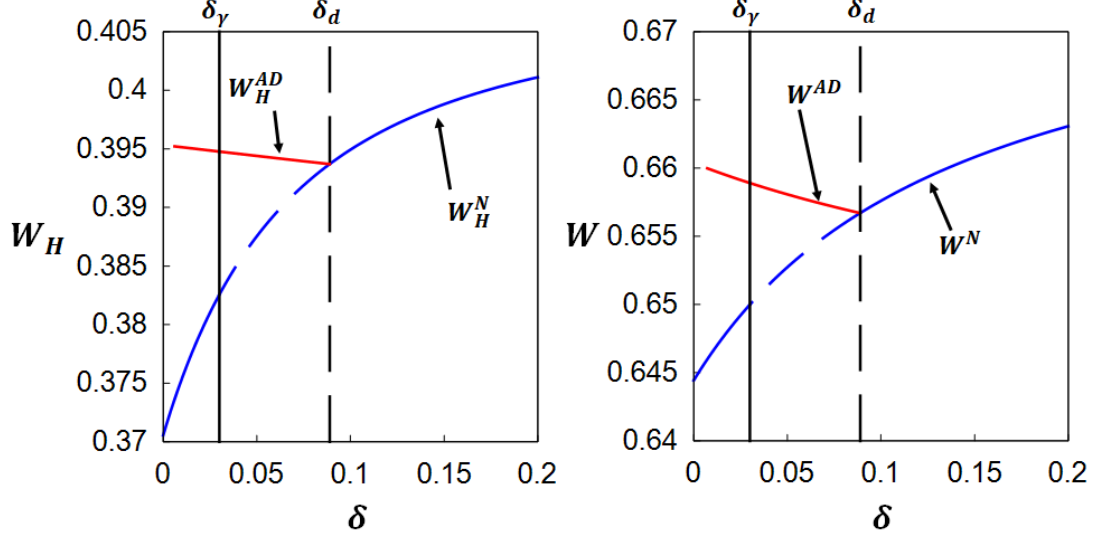


Figure 4: Welfare effects of stricter ALP

flowed into a low-tax country and the negative impact stemmed from weak business stealing effect dominates the positive welfare effect.

The above argument is indeed numerically confirmed in the left figure of Figure 4 given  $t_H = \frac{3}{10}$  and  $t_F = \frac{1}{10}$ .<sup>27</sup> In the figure, two curves represent welfare in the high-tax country without and with AD protection. Note that above a thresholds  $\delta_\gamma$  depicted as the left-vertical line, the government  $F$  implements AD production given  $d^N > 0$  whereas  $\delta_d$  is the threshold such that dumping margin is negative defined by (8). Thus, the solid parts represent the realized welfare level in equilibrium.

At  $\delta = 0$  where the MNE's profit shifting is highly efficient and transfer pricing is very low, an increase in consumer surplus and sufficient amounts of tax base inflow to the low-tax country benefit the low-tax country and induce it not to initiate AD protection. Hence, the equilibrium regime becomes no AD protection. Moreover, as explained above, an increase in  $\delta$  increases the welfare of country  $H$  because it prevents flows of the MNE's tax base. Note that further increase in  $\delta$  reaching  $\delta_\gamma$  encourages the low-tax country to begin AD initiation because less tax base of the MNE is shifted and the relative importance to protect the local firm increases. As the MNE adjusts its pricing decision by decreasing the internal price by  $\theta d^N$  and increasing transfer pricing by  $(1 - \theta)d^N$ , consumer surplus in the high-tax country increases and the MNE's tax base is more taxed in the high-tax country. With these reasons, welfare in the high-tax country increases. Therefore, strengthening enforcement of the ALP

<sup>27</sup>The parameters are set at  $a = 1$ ,  $c_M = \frac{1}{16}$ ,  $c = \frac{1}{8}$ ,  $\tau = \frac{1}{3}$ , and  $\gamma = \frac{3}{4}$ .

improves welfare in the high-tax country if  $\delta$  is low enough, or specifically  $\delta \leq \delta_\gamma$  holds.

However, further increase in  $\delta$  worsens off the high-tax country under AD protection. On one hand, a larger  $\delta$  under AD protection increases  $r_F^{AD}$  and improves welfare in country  $H$  by preventing outflows of the foreign distribution affiliate of the MNE via tax revenue in country  $F$ . On the other hand, it also increases  $r_H^{AD}$  because it decreases the dumping margin under AD protection and, thereby, diminishes the degree of price adjustments,  $\theta d^N$ .<sup>28</sup> Hence, tighter transfer pricing regulation generates production efficiency losses and the increase in  $r_H^{AD}$  hurts the consumers in country  $H$ . In addition, the MNE's transfer price is inefficient for profit shifting and high transfer price discourages the MNE's foreign affiliate to operate in the market and stricter enforcement of the ALP magnifies the negative effect. Therefore, a larger  $\delta$  decreases  $W_H^{AD}$ , implying that, once country  $F$  applies AD protection, a further enforcement of the ALP may hurt the high-tax country. However, once  $\delta$  becomes higher than  $\delta_d$ , country  $F$  can no longer implement AD protection because the dumping margin is negative and the same positive welfare effect as the case of  $\delta < \delta_\gamma$  applies.

Moreover, from the right figure of Figure 4, we can also confirm that AD protection improves the world welfare defined with  $W = W_H + W_F$ . 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  $\delta$  under AD protection can worsen the world welfare, while always improving it under no AD protection.

The above argument clearly provides us with the importance of considering the interlink between transfer pricing and AD protection because the marginal effect of stricter enforcement of the ALP is non-monotone. In many high-tax countries, it is widely believed that stricter enforcement of the ALP is beneficial for high-tax countries. Once we take AD protection into account, it is true only when low-tax importing countries do not or cannot begin

<sup>28</sup>Specifically, we have  $\frac{\partial}{\partial \delta}(\theta d^N) = -18 \frac{(1-t_H)(a+c-\tau-2c_M)+2(t_H-t_F)(a+c-2\tau-2c_M)}{[9\delta+8\{2(1-t_H)-(1-t_F)\}]^2} < 0$ .

AD initiation. In reality, however, the number of AD initiation grows over years and non-negligible number of country-pairs are the combination of high-tax exporting country and low-tax importing country. This indicates that implementing further stricter enforcement of the ALP may hurt high-tax countries and/or the world (although the welfare levels are greater than the case without AD protection).

## 4 Discussion

### 4.1 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  $\frac{\partial \hat{\gamma}}{\partial \tau} > 0$  holds. By (8), the dumping margin decreases in trade costs,  $\tau$ . This is because a higher  $\tau$  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  $\hat{\gamma}$ .*

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  $\tau$  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  $\tau$  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.

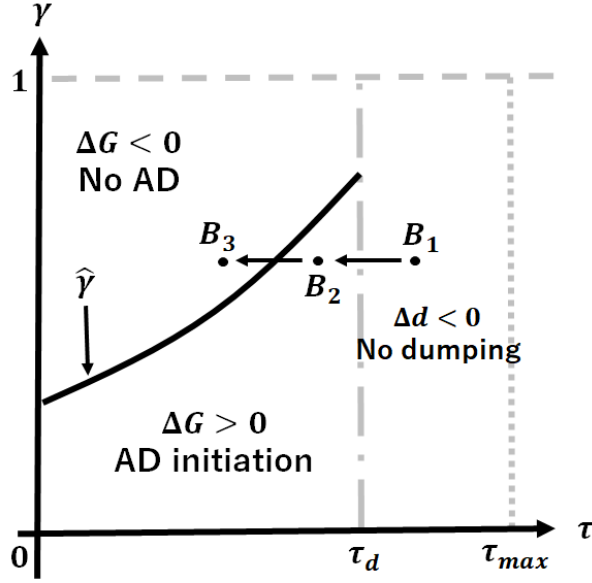


Figure 5: Trade liberalization and AD protection

Figure 4.1 depicts the equilibrium outcomes in the  $(\tau, \gamma)$  locus. Similar to the change in  $\delta$ , a higher  $\tau$  makes the AD protection more likely. For instance, a decrease in  $\tau$  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  $\tau$  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  $F$ .

## 4.2 Weight on tax revenue

In the main analysis, we assumed that the policy maker in the low-tax country considers that protecting the local firm is important and its objective function is weighted social welfare with special interests on the local firm. In this subsection, we investigate how the policy maker's incentive to initiate AD protection changes if she also puts another weight on tax revenue. As low-tax countries benefit inflows of MNEs' tax base, policy makers in the low-tax country may put more weights on tax revenues.

Let us modify the weighted objective function of the policy maker as,

$$G_F = (\gamma_{PS} + \gamma_{TR} - 1)W_F + \gamma_{PS}(1 - t_F)\pi_F + \gamma_{TR}t_F(\pi_F + \pi_{MF}).$$

The main analysis corresponds with the case  $\gamma_{PS} = \gamma$  and  $\gamma_{TR} = 0$ . Similar to the main analysis, the policy maker initiates AD investigation if

$$\begin{aligned} \Delta G_F &= G_F^{AD} - G_F^N \geq 0 \\ \iff \gamma &\leq \hat{\gamma}_{PS} \equiv \frac{\Delta CS_F}{\Delta CS_F + \Delta TR_F} - \gamma_{TR} \left( \frac{\Delta CS_F + (1 - t_F)\Delta\pi_F}{\Delta CS_F + t_F(\Delta\pi_F + \Delta\pi_{MF})} \right) \\ &= \frac{\Delta CS_F}{\Delta CS_F + \Delta TR_F} - \gamma_{TR} \left( \frac{3(2c - r_F^N - r_F^{AD}) + 2t_F(2a - 4c + r_F^N + r_F^{AD})}{4a - 2c - r_F^N - r_F^{AD} + 2t_F(2a + 3r_F^N + 3r_F^{AD})} \right) \end{aligned}$$

holds. Note that the large parenthesis in the second term is positive. Hence, an increase in  $\gamma_{TR}$  reduces  $\hat{\gamma}_{PS}$  which means AD initiation is less likely to happen.

The result is intuitive and understood as follows. As in the main analysis, the low-tax country benefits from inflow of the MNE's tax base. As AD initiation induces an increase in transfer price, the MNE's tax base is less inflowed into the country. Thus, if the policy maker cares and puts more weights on tax revenue, AD initiation is less likely to happen.

### 4.3 Quantity-dependent concealment cost

In the main analysis, our setup assumed the concealment cost depends only on how much a transfer price is deviated from its marginal cost of exports for the purpose of tractability. However, one may wonder the concealment costs depend also on the volume of intrafirm trade because the concealment cost also reflects expected penalties. In this subsection, we argue robustness of our result by modifying the concealment cost as  $C(r_F, x_{MF}) = \frac{\delta(r_F - c_M - \tau)^2 x_{MF}}{2}$ . See appendix A.4 for detail computation.

Note that in the main analysis, we implicitly assumed  $x_{MF}$  is fixed and unity in the concealment cost. Thus, if the volume of intrafirm trade is greater than unity, the concealment cost in the main analysis is undervalued and the current modification increases transfer price. Likewise, if the amount of intrafirm trade is less than unity, the optimal transfer price decreases because the concealment costs in the main analysis is overvalued.

Intuitively, the change in transfer price affects the dumping margin. If the optimal transfer price increases, the dumping margin decreases and the transfer price is less likely to be concluded as dumping. Hence,  $\delta_d$  decreases. On contrary, if the optimal transfer price decreases,  $\delta_d$  increases because the dumping margin increase and the transfer pricing is easily concluded as dumping.



Such changes in a transfer price also affect the low-tax importing country's incentive to initiate AD measures. When the new concealment cost enhances the optimal transfer price, the MNE's profit shifting is less effective and less tax base inflows into the low-tax country. This reduction in tax revenue in the low-tax country encourages the policy maker in the low-tax importing country to initiate AD investigation because of an increase in relative importance to protect the local firm. On contrary, when the optimal transfer price decreases due to the modification of concealment costs, more tax revenues in the low-tax country realize and the welfare losses by AD initiation and an increase in a transfer price is huge. Hence, the above discussion indicates  $\delta_\gamma$  decreases when  $r_F^{NQ} > r_F^N$  but  $\delta_\gamma$  increases when  $r_F^{NQ} < r_F^N$ .

In appendix A.4., our numerical analysis shows the above patterns of changes in  $\delta_d$  and  $\delta_\gamma$ . In addition, the numerical analysis also show the similar patterns of effects of stricter enforcement of transfer pricing regulation on welfare in the high-tax exporting country.

## 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 (10), 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 2

From eq.(14), we have,

$$\hat{\gamma} = \frac{(1 - t_F)\Delta\pi_F}{(1 - t_F)\Delta_F - \Delta W_F} = \frac{2(1 - t_F)(x_F^{AD} + x_F)}{(1 - 2t_F)(x_F^{AD} + x_F) + (1 + 4t_F)(x_{MF}^{AD} + x_{MF})} = \frac{2(1 - t_F)}{1 - 2t_F + (1 + 4t_F)X}$$

where  $X \equiv \frac{x_{MF}^{AD} + x_{MF}}{x_F^{AD} + x_F}$ .

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

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

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

Likewise, we have

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

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 2.  $\square$

### A.3 Welfare Effect of transfer pricing regulation with AD protection

In the presence of AD protection, the first derivative of  $W_H^{AD}$  with respect to  $\delta$  is,

$$\frac{\partial W_H^{AD}}{\partial\delta} = \frac{\omega_0^{AD}\{9\omega_1^{AD}\delta + \omega_2^{AD}\}}{9\delta + 8\{2(1 - t_H) - (1 - t_F)\}^3}$$

where  $\omega_0^{AD} = (1 + t_H - 2t_F)(a + c - 2c_M - 2\tau) + (1 - t_H)\tau > 0$ ,  $\omega_1^{AD} = t_H(a + c - 2c_M - 3\tau) + 2t_F(a + c - 2c_M - 2\tau) - (a + 4c - 5c_M - \tau)$ , and  $\omega_2^{AD} = 8(a + c - 2c_M - 3\tau)t_H^2 + \{(25a + 29c - 74c_M - 27\tau) - (44a + 44c - 88c_M - 84\tau)t_F\}t_H - \{(7a + 19c - 26c_M - 7\tau) - 2(5a - c - 4c_M - 12\tau) - 8(a + c - 2c_M)t_F^2\}$ .

Similar to the case without AD dumping,  $\omega_1^{AD}$  is positive when  $\frac{1-4t_F}{3} + \frac{2(1-t_F)(a+2c-c_M)+9(c-c_M)}{3(a+c-2c_M-3\tau)} < t_H$  holds. Note that  $\omega_1^N = 0$  holds when  $t_F = 0 < \frac{1}{3} = t_H$  or  $t_F = t_H = \frac{1}{7}$  holds. At  $t_F = 0 < \frac{1}{3} = t_H$ , we have  $\omega_1^{AD} = -(2a + 11c - 13c_M) < 0$  whereas  $t_F = t_H = \frac{1}{7}$  leads to  $\omega_1^{AD} = \frac{-(4a+25c-29c_M)}{7} < 0$ . This indicates that the line capturing  $\omega_1^{AD}$  is above  $\omega_1^N$ . This is depicted with the solid and dot-dashed downward lines in Figure 6. Note that the dotted areas in top-left and bottom-right of the  $(t_H, t_F)$  plane. The left-top area can violate the second order condition for transfer prices while the bottom-right area violates the assumption  $t_H \geq t_F$ .  $\omega_1^s$  where  $s = \{N, AD\}$  is positive above the lines.

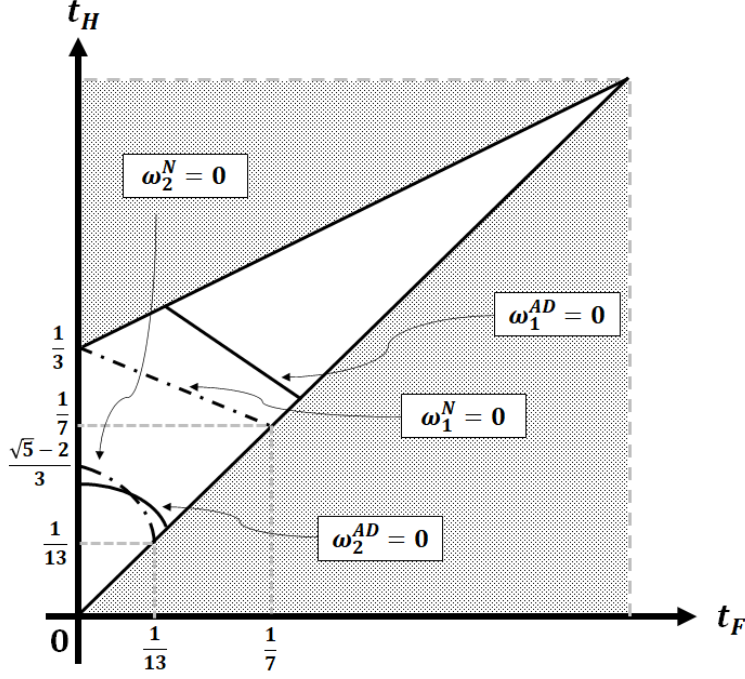


Figure 6: Welfare effects and corporate taxes

Moreover, we can confirm that  $\omega_2^N = 0$  holds at  $t_F = 0 < \frac{\sqrt{5}-2}{3} = t_H$  or  $t_F = t_H = \frac{1}{13}$  holds. On the one hand,  $t_F = 0 < \frac{\sqrt{5}-2}{3} = t_H$  yields  $\omega_2^{AD} = \frac{53a+65c-118c_M-105\tau}{3} + \frac{\sqrt{5}(50a+131c-190c_M-33\tau)}{9} > \frac{a+25c-26c_M}{6} + \frac{\sqrt{5}(85a+229c-314c_M)}{18} > 0$ . On the other hand, at  $t_F = t_H = \frac{1}{13}$ , we have  $-\frac{12}{169}(63a+219c-282c_M-47\tau) < 0$ . The two computations means that, in Figure 6, the locus of  $\omega_2^{AD} = 0$  locates below  $\omega_2^N$  around  $t_F = 0$  but above it around  $t_F = t_H = \frac{1}{13}$ .  $\omega_s^s$  where  $s \in \{N, AD\}$  is negative below the dot-dashed and solid curves.

Likewise the case without AD protection, the sign of  $\frac{\partial W_H^{AD}}{\partial \delta}$  depends on the size of  $\delta$ . Specifically, we can derive  $\frac{\partial W_H^{AD}}{\partial \delta} \gtrless 0$  if and only if  $\delta \lesseqgtr -\frac{\omega_2^{AD}}{9\omega_1^{AD}}$ . In Figure 6, this corresponds with the area in-between  $\omega_2^{AD}$  and  $\omega_1^{AD}$ .

Hence, introduction of AD protection can change the welfare effect of transfer pricing regulation as argued in the main text.

#### A.4 Quantity-dependent concealment costs

Let us modify the MNE's post-tax profits as

$$\Pi_M^Q = (1-t_H)[(r_H-c_M)x_{MH} + (r_F-c_M-\tau)x_{MF} + \pi_{MH}] + (1-t_F)\pi_{MF} - \frac{\delta(r_F-c_M-\tau)^2x_{MF}}{2}.$$

Evaluating the first derivative of  $\Pi_M^Q$  with respect transfer price at the optimal level in the main analysis ( $r_F = r_F^N$  defined by (7)), we can identify the modification of the model increase or decrease the optimal transfer price. Specifically, we have,

$$\begin{aligned}
\left. \frac{\partial \Pi_M^Q}{\partial r_F} \right|_{r_F=r_F^N} &= \underbrace{(1-t_H) \left[ x_{MF}^N + (r_F^N - c_M - \tau) \left( \frac{\partial x_{MF}}{\partial r_F} \right) \right]}_{=\delta(r_F^N - c_M - \tau)} + 2(1-t_F)x_{MF}^N \left( \frac{\partial x_{MF}}{\partial r_F} \right) \\
&\quad - \delta(r_F^N - c_M - \tau)x_{MF}^N - \frac{\delta(r_F^N - c_M - \tau)^2}{2} \left( \frac{\partial x_{MF}}{\partial r_F} \right) \\
&= \delta(r_F^N - c_M - \tau) \left[ 1 - \left( x_{MF}^N - \frac{r_F^N - c_M - \tau}{3} \right) \right] \stackrel{\geq}{\leq} 0 \\
&\iff (a+c-2c_M-2\tau) \stackrel{\geq}{\leq} \frac{3\{9\delta+4(1+2t_F-3t_H)\}}{9\delta+7-3t_H-4t_F} \\
&\iff \underbrace{\frac{(a+c-2c_M-2\tau)}{3}}_{=x_{MF}^N|_{\delta=\infty}} \stackrel{\geq}{\leq} \frac{9\delta+4(1+2t_F-3t_H)}{9\delta+7-3t_H-4t_F} = 1 - \frac{3(1+3t_H-4t_F)}{9\delta+7-3t_H-4t_F}.
\end{aligned}$$

The above implies that the quantity-dependent concealment cost increases the transfer price compared to the one in the main analysis,  $r_F^{NQ} > r_F^N$ , when the volume of intrafirm trade is sufficiently large. This is simply because the concealment cost in the main analysis implicitly assume intrafirm trade is fixed and unity. Hence, if intrafirm trade is more than unity, the concealment cost is more in the modified model and thus transfer price is less aggressive one. On contrary, if the volume of intrafirm trade is small,  $r_F^{NQ} < r_F^N$  holds.

Recall that dumping margin is defined as  $d = r_H - (r_F - \tau)$ . As the importing country can initiate AD measures if the dumping margin is positive,  $r_F^{NQ} > r_F^N$  means a decrease in  $d$  and the dumping margin is less likely to be positive. Hence, AD initiation is less likely to happen and the threshold of  $\delta$  satisfying  $d = 0$ ,  $\delta_d$ , becomes also smaller. Similarly, if  $r_F^{NQ} < r_F^N$  holds,  $\delta_d$  becomes larger.

We can infer the change in  $\delta_\gamma$  in the following discussion. Suppose  $r_F^{NQ} > r_F^N$  holds. In this case, the MNE's profit shifting is hard to conduct due to less deviation from the marginal costs for export market. This implies the importing country receives less MNE's tax base and the relative importance to protect local firm increases. Thus, the policy maker tends to initiate AD measures more likely and thus  $\delta_\gamma$  declines. On contrary, if  $r_F^{NQ} < r_F^N$  holds and profit shifting is easy to conduct, the importing country's tax revenue increases and the policy maker hesitates to increase transfer price by initiating AD protection. Thus,  $\delta_\gamma$  increase in that case.

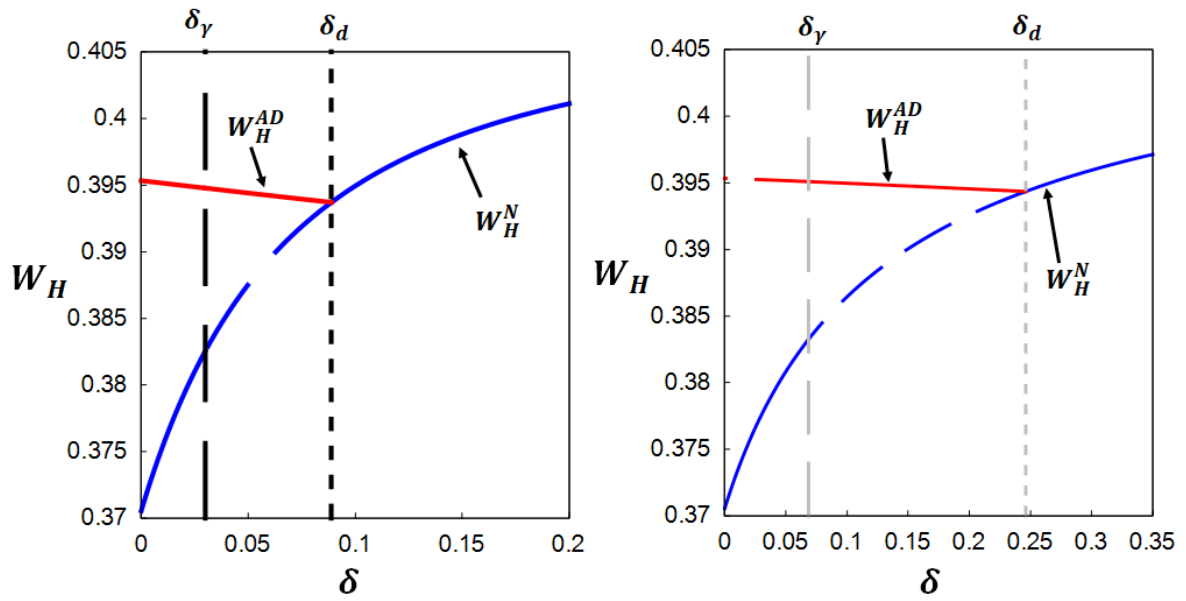


Figure 7: Quantity dependent concealment costs under  $r_F^{NQ} > r_F^M$

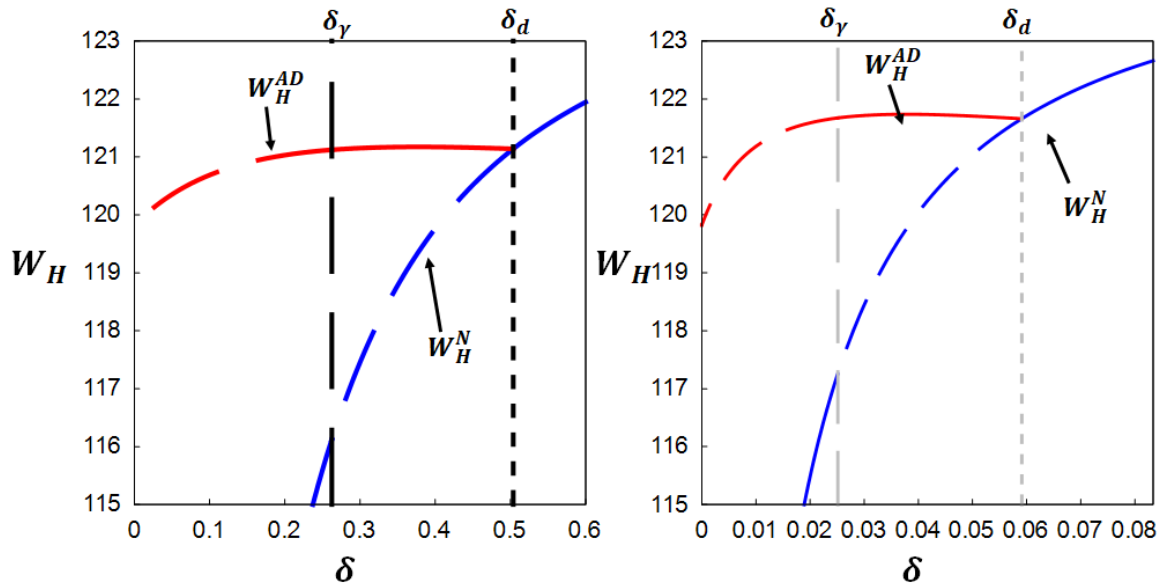


Figure 8: Quantity dependent concealment costs under  $r_F^{NQ} < r_F^M$

Figures 7 show a numerical example which we use the same parameter values as in Figure 4. The figures shows the case where  $\left. \frac{\partial \Pi_M^Q}{\partial r_F} \right|_{r_F=r_F^N} < 0$  holds. The left figure is the case in the main analysis whereas the right one depicts the case with quantity dependent concealment cost. Note that the scale of the horizontal axis is different in the two figures. As explained above, compared to the case in the main analysis, we can see an increase in  $\delta_\gamma$  and  $\delta_d$ .

On the other hand, the Figures 8 represents the case with  $a = 15$  and  $\left. \frac{\partial \Pi_M^Q}{\partial r_F} \right|_{r_F=r_F^N} > 0$  holds given  $\gamma = \frac{2}{5}$ . We use different level of  $\gamma$  from the case with  $a = 1$  because  $\gamma = \frac{3}{4}$  results in only the equilibrium without AD initiation. In this case, replacing concealment costs with a quantity dependent concealment costs leads to a decline in  $\delta_\gamma$  and  $\delta_d$ . Moreover, we also confirm the same pattern of welfare effect of stricter enforcement of transfer pricing regulation on the high-tax exporting country.



## References

- Al-Eryani, M.F., Alam, P., Akhter, S.H., 1990. Transfer pricing determinants of us multinationals. *Journal of International Business Studies* 21, 409–425.
- Anderson, S.P., Schmitt, N., Thisse, J.F., 1995. Who benefits from antidumping legislation? *Journal of International Economics* 38, 321–337.
- Baldwin, R., 1987. Politically realistic objective functions and trade policy profits and tariffs. *Economics Letters* 24, 287–290.
- Bauer, C.J., Langenmayr, D., 2013. Sorting into outsourcing: Are profits taxed at a gorilla's arm's length? *Journal of International Economics* 90, 326–336.
- Belderbos, R., Vandenbussche, H., Veugelers, R., 2004. Antidumping duties, undertakings, and foreign direct investment in the eu. *European Economic Review* 48, 429–453.
- Bernard, A.B., Jensen, J.B., Redding, S.J., Schott, P.K., 2010. Intra-firm trade and product contractibility (long version). NBER Working Paper, 15881.
- Bernard, A.B., Jensen, J.B., Schott, P.K., 2006. Transfer pricing by us-based multinational firms. NBER Working Paper, 12293.
- Blonigen, B.A., Prusa, T.J., 2016. Dumping and antidumping duties, in: *Handbook of Commercial Policy*. Elsevier. volume 1, pp. 107–159.
- Bown, C.P., Sykes, A.O., 2008. The zeroing issue: a critical analysis of softwood V. *World Trade Review* 7, 121–142.
- Choe, C., Matsushima, N., 2013. The arm's length principle and tacit collusion. *International Journal of Industrial Organization* 31, 119–130.
- Choi, J.P., Furusawa, T., Ishikawa, J., 2018. Transfer pricing and the arm's length principle under imperfect competition. CESifo Working Paper Series, 7303.
- Choi, J.P., Furusawa, T., Ishikawa, J., 2020. Transfer pricing regulation and tax competition. *Journal of International Economics* 127, 103367.
- Clausing, K.A., 2003. Tax-motivated transfer pricing and US intrafirm trade prices. *Journal of Public Economics* 87, 2207–2223.

- Copithorne, L.W., 1971. International corporate transfer prices and government policy. *The Canadian Journal of Economics/Revue canadienne d'Économique* 4, 324–341.
- Cristea, A.D., Nguyen, D.X., 2016. Transfer pricing by multinational firms: New evidence from foreign firm ownerships. *American Economic Journal: Economic Policy* 8, 170–202.
- Davies, R.B., Liebman, B.H., 2006. Self-protection? antidumping duties, collusion, and fdi. *Review of International Economics* 14, 741–757.
- Davies, R.B., Martin, J., Parenti, M., Toubal, F., 2018. Knocking on tax haven's door: Multinational firms and transfer pricing. *Review of Economics and Statistics* 100, 120–134.
- De Bièvre, D., Eckhardt, J., 2011. Interest groups and eu anti-dumping policy. *Journal of European Public Policy* 18, 339–360.
- Eckhardt, J., 2011. Firm lobbying and eu trade policymaking: Reflections on the anti-dumping case against chinese and vietnamese shoes (2005–2011). *Journal of World Trade* 45.
- Eckhardt, J., 2013. Eu unilateral trade policy-making: What role for import-dependent firms? *JCMS: Journal of Common Market Studies* 51, 989–1005.
- Feenstra, R.C., Lewis, T.R., 1991. Negotiated trade restrictions with private political pressure. *The Quarterly Journal of Economics* 106, 1287–1307.
- Gresik, T.A., 2010. Separate accounting vs. formula apportionment: A private information perspective. *European Economic Review* 54.
- Gresik, T.A., Osmundsen, P., 2008. Transfer pricing in vertically integrated industries. *International Tax and Public Finance* 15, 231–255.
- Haufler, A., Runkel, M., 2012. Firms' financial choices and thin capitalization rules under corporate tax competition. *European Economic Review* 56, 1087–1103.
- Horst, T., 1971. The theory of the multinational firm: Optimal behavior under different tariff and tax rates. *Journal of Political Economy* 79, 1059–1072.
- Ishikawa, J., Miyagiwa, K., 2008. Price undertakings, vers, and foreign direct investment: the case of foreign rivalry. *Canadian Journal of Economics/Revue canadienne d'économique* 41, 954–970.

- Jabbour, L., Tao, Z., Vanino, E., Zhang, Y., 2019. The good, the bad and the ugly: Chinese imports, European Union anti-dumping measures and firm performance. *Journal of International Economics* 117, 1–20.
- Janský, P., Palanský, M., 2019. Estimating the scale of profit shifting and tax revenue losses related to foreign direct investment. *International Tax and Public Finance* 26, 1048–1103.
- Juranek, S., Schindler, D., Schjelderup, G., 2018. Transfer pricing regulation and taxation of royalty payments. *Journal of Public Economic Theory* 20, 67–84.
- Kato, H., Okoshi, H., 2019. Production location of multinational firms under transfer pricing: The impact of the arm's length principle. *International Tax and Public Finance* 26, 835–871.
- Kind, H.J., Midelfart, K.H., Schjelderup, G., 2005. Corporate tax systems, multinational enterprises, and economic integration. *Journal of International Economics* 65, 507–521.
- Lanz, R., Miroudot, S., 2011. Intra-firm trade. *OECD Trade Policy Working Papers*, 114 Discussion Paper Series, DP2017-016.
- Mardan, M., 2017. Why countries differ in thin capitalization rules: The role of financial development. *European Economic Review* 91, 1–14.
- Mayer, W., 1984. Endogenous tariff formation. *The American Economic Review* 74, 970–985.
- Miyagiwa, K., Song, H., Vandebussche, H., 2016. Size matters! who is bashing whom in trade war? *International Review of Economics & Finance* 45, 33–45.
- Mukunoki, H., 2021. Trade liberalization and incentives to implement antidumping protection. *International Review of Economics & Finance* 72, 422–437.
- Mukunoki, H., Okoshi, H., 2021a. Tariff elimination versus tax avoidance: Free trade agreements and transfer pricing. *International Tax and Public Finance* 28, 1188–1210.
- Mukunoki, H., Okoshi, H., 2021b. Wake not a sleeping lion: Free trade agreements and decision rights in multinationals. *Research Institute of Economy, Trade and Industry (RIETI)*.
- Nelson, D., 2006. The political economy of antidumping: A survey. *European Journal of Political Economy* 22, 554–590.

- Nielsen, S.B., Raimondos-Møller, P., Schjelderup, G., 2003. Formula apportionment and transfer pricing under oligopolistic competition. *Journal of Public Economic Theory* 5, 419–437.
- Nielsen, S.B., Raimondos-Møller, P., Schjelderup, G., 2008. Taxes and decision rights in multinationals. *Journal of Public Economic Theory* 10, 245–258.
- OECD, 2022. *Oecd transfer pricing guidelines for multinational enterprises and tax administrations 2022*. Paris.
- Rosendorff, B.P., 1996. Voluntary export restraints, antidumping procedure, and domestic politics. *The American Economic Review* 86, 544–561.
- Schjelderup, G., Sørgard, L., 1997. Transfer pricing as a strategic device for decentralized multinationals. *International Tax and Public Finance* 4, 277–290.
- Swenson, D.L., 2001. Tax reforms and evidence of transfer pricing. *National Tax Journal* 54, 7–25.
- UNCTAD, 2016. *World investment report 2016 investor nationality: Policy challenge*. United Nations.
- WCO, 2018. *WCO guide to customs valuation and transfer pricing*, World Customs Organization.