Does preferential trade liberalization promote antidumping actions against nonmembers?

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Abstract

In a three-country oligopoly model, this paper analyzes two countries’ decisions concerning antidumping (AD) action against each other and the relationship between those decisions and the countries’ RTAs with the third-country. An RTA intensifies product-market competition in the domestic market and lowers product prices. This effect widens the dumping margin of the foreign firm and narrows the dumping margin of the domestic firm. If the government is more concerned with domestic firm profit in its AD decision, the RTA may invoke the member’s AD action against the nonmember. If the governments attach a sufficiently high value on social welfare, however, the RTA may promote the nonmember’s AD action against the member. If the governments’ weight on the domestic firm’s profit is neither high nor low, an RTA may block the AD actions of both countries. If both countries have RTAs with the third country, both countries become less willing to use AD action.
1 Introduction

Recently, the world economy has witnessed a rapid growth in regional trade agreements (RTAs). RTAs include trade agreements for goods such as free trade agreements, customs unions, and partial scope agreements. RTAs also include service trade agreements called economic integration agreements. RTAs preferentially liberalize trade among member countries. As of January 8, 2015, 398 RTAs were in force, counting trade agreements in goods, services and accession separately.1

Many theoretical and empirical studies address RTAs, and one strand examines the effect of RTAs on trade policies between member and nonmember countries. With respect to import tariffs, many theoretical papers found that member countries that eliminate tariffs imposed on other member countries, are willing to reduce tariffs against outside countries.2 This result is supported by some empirical studies3 and is valid even if governments are politically motivated and concerns more with domestic producers.

These studies indicate that a proliferation of RTAs prevents protectionist trade policies and contributes to multilateral trade liberalization. However, governments use other protectionist trade policies other than simple import tariffs.

A typical example of trade-restricting policies other than tariffs is antidumping (AD) policy. Under the GATT/WTO rule, countries are allowed to impose an AD duty on an imported good. After receiving a request of AD policy from a domestic industry, if the importing country’s administrator concludes that the foreign producer is “dumping” its exported product and the dumping causes a “material injury” to a domestic industry, the government can impose an AD duty at a level lower than the dumping margin. In the context of international trade, dumping

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1 If different agreements and accessions among the same countries are counted together, 259 RTAs were in force.
2 See Bagwell and Staiger (1999) and Ornelas, (2005a,b), for instance.
is identified if the free on board (fob) price of a product in the importing country is less than the “normal value.” Typically, the “normal value” is the price in the exporting country market. The dumping margin is defined as the price in the exporting country minus the fob price of the importing country.

Countries are frequently using AD actions to protect domestic industries. From 1995 to 2014, there were a total of 4,519 AD investigations. Among them, 2,901 actions were actually implemented. An intriguing question is whether and how the growing number of RTAs is associated with the frequent use of AD rules. If the formation of an RTA prevents AD actions, the trade promoting effect of RTAs will be more pronounced. If RTA formation promotes AD actions, the trade-creating effect of RTAs should be diminished or even reversed by the increased use of AD rules.

Particularly, if RTAs induce countries to apply AD rules more frequently against nonmember countries, RTAs can hurt nonmember countries even if (normal) tariffs are reduced. For instance, Bhagwati (1993) suggests that ‘...trade creation can degenerate rapidly into trade diversion, when AD actions ... are freely used.’ Hindley and Messerlin (1993) also show the evidence that internal liberalization in the European Community was accompanied by more vigorous anti-dumping action towards nonmember countries. Prusa and Teh (2010) have estimated that RTAs cause a ten to 30 percent increase in the number of AD filings against nonRTA members.

Despite these concerns, there are few theoretical analyses on this subject. This paper examines the relationship between preferential trade liberalization and AD policies against outside countries. I construct a three-country oligopoly model with markets in countries 1 and 2. Three firms (firms 1, 2, and 3) located in each country supply products to the two markets. Country 1 (country 2) may implement its AD policy against firm 2 (firm 1). Because there is no market

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4The free on board price is the price excluding transportation costs and tariffs. It is the producer price of a good that the producer recieves when exporting.
for these products in country 3, country 3 cannot use its AD policy. Additionally, firm 3 is not a target of foreign country AD action. If country \( j (j = 1, 2) \) has an RTA with country 3, the tariff against country 3 is eliminated while the tariff against country \( k (k = 1, 2, k \neq j) \) remains constant. The formation of an RTA changes the extent of firm dumping and the effect of countries’ AD actions.

The result shows that the formation of an RTA may either promote or prevent a member country’s AD use against a nonmember country, depending on the extent of the government’s political motivation to protect the domestic firm and the administrative cost of AD investigations. Specifically, if the government places sufficient weight on the domestic firm’s profit, and the administrative cost is neither low nor high, the RTA may trigger a member’s AD action against a non-member. If the government is less concerned with the domestic firm and more concerned with social welfare, the RTA may block the member’s AD activity that would have applied had the RTA been absent.

Conversely, the RTA may block the nonmember’s use of AD if the nonmember government weight on the domestic profit is high, whereas the RTA may promote the nonmember’s use of AD activity if the government sufficiently values social welfare. However, if both countries have an RTA with country 3, RTAs will always discourage AD actions by both countries.

The remainder of the paper is organized as follows. Section 2 sets up the basic model. Section 3 derives the equilibrium of the product-market competition given the two countries’ AD decisions. Section 4 analyzes the determination of countries’ AD use and explores the effect of preferential trade liberalization for country 3. Section 5 summarizes the paper and presents concluding remarks.

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\(^5\)Strictly speaking, firm 3 can be a target of the importing country’s AD policy if the firm sets the price in that country lower than the price in the other importing country. We rule out this possibility to focus on AD policies between countries outside RTAs.
2 The model

The basic model is based on Anderson, et al. (1995). The model includes three countries, and \( \Omega = \{1, 2, 3\} \) is a set of countries. Each country has a single firm that produces a differentiated product and sells that product in countries 1 and 2. Let \( t_{ij} (\geq 0) \) denote the import tariff imposed by country \( j \) \((j \in \{1, 2\})\) on imports from country \( i \) \((i \in \Omega)\). For expositional convenience, we set \( t_{ij} = 0 \) if \( i = j \).

If a firm requests an AD action from its domestic government, the firm incurs a fixed application cost: \( F \). The fixed cost includes the cost of documenting and reporting the damages caused by the targeted firm’s dumping.

The direct utility function of the representative consumer in country \( j \) is given by

\[
U_j = \sum_{h \in \Omega} \left( ax_{hj} - \frac{(x_{hj})^2}{2} - bx_{hj} \sum_{k \neq h} x_{kj} \right) + Y_j \tag{1}
\]

where \( x_{hj} \) is the consumption of product \( h \) \((h \in \Omega)\) and \( Y_j \) is the consumption of the numeraire good in country \( j \). By maximizing \( U_j \) with respect to \( x_{ij} \), subject to \( \sum_{h \in \Omega} p_{hj} x_{hj} + Y_j \leq M_j \) where \( M_j \) is the income in country \( j \), the inverse demand function of the product \( i \) in country \( j \) becomes

\[
p_{ij} = a - x_{ij} - b \sum_{k \neq i} x_{kj}, \tag{2}
\]

where \( b \in (0, 1) \) represents the substitutability of products. Because \( b = 0 \), the products are nonsubstitutable and as \( b \) approaches one, the products become more substitutable. Then, the demand function of good \( i \) in country \( j \) becomes

\[
 x_{ij}(p_j) = \frac{1}{(1-b)(1+2b)} \left[(1-b)a - (1+b)p_{hj} + b \sum_{k \neq i} p_{kj}\right] \tag{3}
\]

where \( p_j' = (p_{1j}, p_{2j}, p_{3j}) \) is the price vector in country \( i \). By substituting (3) into (1), we have
the representative consumer’s indirect utility function in country \( j \) as \( V_j(p_j, M_j) \). By summing up the demand from two countries, the total demand of good \( i \) becomes

\[
X_i(\overline{p}) = \sum_j x_{1j}(p_j) = \frac{2[(1 - b)a - (1 + b)\overline{p}_1 + b(\overline{p}_1 + \overline{p}_3)]}{(1 - b)(1 + 2b)}
\]

(4)

where \( \overline{p}_h = (p_{h1} + p_{h2})/2 \) is the average consumer price of good \( h \) (\( h \in \Omega \)) and \( \overline{p} = (\overline{p}_1, \overline{p}_2, \overline{p}_3) \) is the average price vector. The total demand for each good depends only on the average prices of goods and not on the price difference between the two markets.

Each firm’s unit cost of production is constant and normalized to zero. Let \( r_{ij} = p_{ij} - t_{ij} \) denote the producer price of the good exporting from country \( i \) to country \( j \). Then, firm \( i \)’s total profits (gross of the fixed cost of an AD application) becomes:

\[
\Pi_i = \sum_j r_{ij}x_{ij}(p_j) = \sum_j (p_{ij} - t_{ij}) x_{ij}(p_j).
\]

(5)

Country \( j \)’s social welfare (gross of the fixed cost) is given by

\[
W_j = V_j(p_j, M_j) - M_j + \sum_{i \in \Omega} t_{ij}x_{ij}(p_j) + \Pi_j,
\]

(6)

and country 3’s social welfare consists only of firm 3’s profits: \( W_3 = \Pi_3 \).

Country 3 is a potential partner of country \( j \)’s RTA. In the absence of RTAs, we assume that the tariffs that country \( j \) imposes on the imports from the two foreign countries are identical and exogenously given by \( \tau \) (> 0). If country \( j \) forms an RTA with country 3, the tariff on imports from country 3 is reduced from \( \tau \) to zero. Therefore, we have \( t_{21} = t_{12} = \tau, t_{31} = t_1 \in \{\tau, 0\} \), and \( t_{32} = t_2 \in \{\tau, 0\} \).

The governments of countries 1 and 2 choose whether to undertake an AD investigation. Government \( j \)’s \((j \in \{1, 2\})\) strategy space is \( S = \{N, AD\} \) where \( N \) represents the government
decision not to make an AD investigation, and $AD$ represents the government decision to undertake an AD investigation. Government $j$’s action is shown by $s_j \in S$. Government $j$’s payoff, gross of the fixed cost of AD application, is given by

$$G_j (s_j, s_{-j}) = \gamma W_i (s_j, s_{-j}) + (1 - \gamma) \Pi_j (s_i, s_{-i}), \quad (7)$$

where $\gamma$ is the government’s weight on social welfare relative to domestic firm profit. If $\gamma = 1$, the government maximizes social welfare and, if $\gamma = 0$, the government only concerned with the domestic firm’s profit.

The timing of the game is as follows. In Stage 1, the governments in countries 1 and 2 decide whether to engage in AD action against countries 2 and 1, respectively. The government in each country may place substantial weight on the domestic firm’s profits in AD decisions, which we will address later. In Stage 2, the three firms engage in Bertrand-type competition in the markets of countries 1 and 2.

3 Product market competition and firms’ dumpings

This section derives the subgame equilibrium in Stage 2. Depending on the two governments’ decisions on AD actions in Stage 1, there are four possible cases.

1. $(s_1, s_2) = (N, N)$: **No AD activity** where neither country undertakes AD activity.

2. $(s_1, s_2) = (AD, N)$: **Unilateral AD activity by Country 1** where only country 1 undertakes AD activity.

3. $(s_1, s_2) = (N, AD)$: **Unilateral AD activity by Country 3**.

4. $(s_1, s_2) = (AD, AD)$: **Bilateral AD activity** between countries 1 and 2.

We derive the product-market equilibrium for each case.
3.1 No AD activity

Let us first derive the subgame equilibrium under No AD activity. In this case, firms can freely set different prices in different markets. Firm $i$ maximizes (5) with respect to $p_{ij}$. The equilibrium consumer prices of products in country $j$ are given by

\[ p_{jj}(N,N) = \frac{a(1-b)}{2} + \frac{b(1+b)(\tau + t_j)}{4+6b}, \tag{8} \]

\[ p_{kj}(N,N) = \frac{a(1-b)}{2} + \frac{(1+b)(b\tau + (2+b)t_j)}{4+6b}, \text{ and} \tag{9} \]

\[ p_{3j}(N,N) = \frac{a(1-b)}{2} + \frac{(2+b)\tau + bt_j}{4+6b}. \tag{10} \]

where $k \in \{1,2\}, k \neq j$.

Accordingly, the producer prices are calculated as $r_{ij}(N,N) = p_{ij}(N,N) - t_{ij}$. An important property is that $p_{ij}(N,N)$ is increasing in $t_{ij}$ while $r_{ij}(N,N)$ is decreasing in $t_{ij}$.

Then, the dumping margin of good $j$ in country $k$ becomes

\[ d_j(N,N) = r_{jj}(N,N) - r_{jk}(N,N). \]

Specifically, the equilibrium dumping margins of goods 1 and 2 become:

\[ d_1(N,N) = \left( \frac{1+2b}{2+3b} \right) \tau + \frac{(1+b)b(t_1 - t_2)}{2(2+3b)} > 0, \tag{11} \]

\[ d_2(N,N) = \left( \frac{1+2b}{2+3b} \right) \tau + \frac{(1+b)b(t_2 - t_1)}{2(2+3b)} > 0. \tag{12} \]

The dumping margins depend on the tariff level between countries 1 and 2, $\tau$, but also on the difference between the two countries’ tariffs against country 3, $t_1$ and $t_2$. We have the following lemma.

**Lemma 1** Under no AD activity, firms 1 and 2 set export prices below their respective domestic
prices. The dumping margin of firm $j$ ($j \in \{1, 2\}$) decreases as country $j$’s tariff on country 3 decreases, and the dumping margin increases as country $k$’s ($k \in \{1, 2\}, k \neq j$) tariff on firm 3 increases.

Country 1’s RTA with country 3 (i.e., the reduction of $t_1$ from $\tau$ to zero) intensifies the competition in the product market of country 1, which decreases the prices in country 1. Therefore, the RTA reduces $d_1(N, N)$ and raises $d_2(N, N)$. Similarly, country 2’s RTA with country 3 reduces $d_2(N, N)$ and raises $d_1(N, N)$.

The equilibrium profit of firm $i$ ($i \in \Omega$) is given by

$$\Pi_i(N, N) = \frac{1 + b}{(1 - b)(1 + 2b)} \sum_j \{r_{ij}(N, N)\}^2.$$  
(13)

### 3.2 Unilateral AD activity

Next, we investigate the case in which country 1 unilaterally files an AD investigation with respect to firm 2. Firm 2, which is a target of the AD investigation, anticipates that if its dumping margin is positive ($d_2 = r_{22} - r_{21} = p_{22} - (p_{21} - \tau) > 0$), the government of country 1 will charge the antidumping duty equal to $d_2$. Then, firm 2’s optimal reaction is to offer a “price-undertaking” to the government of country 1, by which the firm eliminates the dumping margin and sets a uniform price across countries 1 and 2. This paper focuses on the case where the importing countries accept any offer of price undertaking.

Firm 2 maximizes (5) with respect to $p_{21}$ subject to $p_{22} = p_{21} - \tau$, while the other two firms continue to discriminate prices to maximize their respective profits. The equilibrium consumer price of good 2 becomes

$$p_{21}(AD, N) = p_{21}(N, N) + \frac{1}{2} d_2(N, N),$$  
(14)

$$p_{22}(AD, N) = p_{22}(N, N) - \frac{1}{2} d_2(N, N).$$  
(15)
Hence, the producer prices of good 2 are adjusted to a uniform price by increasing the consumer price in the foreign market and decreasing the consumer price in the domestic market. The degree of the price changes are equal to 50 percent of the dumping margin under No AD activity.

The equilibrium consumer prices of firm \( h \ (h \in \{1, 3\}) \) are given by

\[
p_{h1}(AD, N) = p_{h1}(N, N) + \frac{b}{2(2 + b)}d_2(N, N), \quad \text{(16)}
\]

\[
p_{h2}(AD, N) = p_{h2}(N, N) - \frac{b}{2(2 + b)}d_2(N, N). \quad \text{(17)}
\]

Compared to the No AD activity case, firm 2 increases the price in country 1 and decreases the price in country 2. Because a firms’ pricing is strategic complement, this increases the other firms’ equilibrium prices in country 1 and decreases the equilibrium prices in country 2.

Under country 1’s unilateral AD against firm 2, the dumping margin of good 1 becomes

\[
d_1(AD, N) = d_1(N, N) + \left( \frac{b}{2 + b} \right) d_2(N, N) > 0. \quad \text{(18)}
\]

Country 1’s unilateral AD increases Firm 1’s dumping margin. The equilibrium profit of firm 2 is given by

\[
\Pi_2(AD, N) = \frac{2(1 + b)}{(1 - b)(1 + 2b)} \{r_{21}(AD, N)\}^2 \quad \text{(19)}
\]

and the equilibrium profit of firm \( h \ (h \in 1, 3) \) becomes

\[
\Pi_h(AD, N) = \frac{1 + b}{(1 - b)(1 + 2b)} \sum_j \{r_{hj}(AD, N)\}^2. \quad \text{(20)}
\]

Similarly, if country 2 unilaterally files an AD investigation with respect to firm 1, the
equilibrium consumer price of good 2 becomes

\[ p_{12}(N, AD) = p_{12}(N, N) + \frac{1}{2} d_1(N, N), \]  
\[ p_{11}(N, AD) = p_{11}(N, N) - \frac{1}{2} d_1(N, N), \]

and the consumer prices of firm \( h \) (\( h = 2, 3 \)) are

\[ p_{h1}(N, AD) = p_{h1}(N, N) - \frac{b}{2(2 + b)} d_1(N, N), \]
\[ p_{h2}(N, AD) = p_{h2}(N, N) + \frac{b}{2(2 + b)} d_1(N, N). \]

The dumping margin of firm 2 under country 2’s unilateral AD action is given by

\[ d_2(N, AD) = d_2(N, N) + \left( \frac{b}{2 + b} \right) d_1(N, N) > 0. \]

The equilibrium profit of firm 1 is given by

\[ \Pi_1(N, AD) = \frac{2(1 + b)}{(1 - b)(1 + 2b)} \left[ p_{12}(AD, N) - \tau \right]^2 \]

and the equilibrium profit of firm \( h \) (\( h \in 2, 3 \)) is given by

\[ \Pi_h(N, AD) = \frac{1 + b}{(1 - b)(1 + 2b)} \sum_j \left( r_{hj}(AD, N) \right)^2. \]

### 3.3 Bilateral AD activity

Finally, if both country 1 and country 2 file AD investigations against firm 2 and firm 1, respectively, then both firm 1 and firm 2 set uniform prices across the two markets. The
equilibrium consumer prices are given by

\[
\begin{align*}
  p_{11}(AD, AD) &= p_{11}(N, AD), \\
  p_{12}(AD, AD) &= p_{12}(N, AD), \\
  p_{21}(AD, AD) &= p_{21}(AD, N), \\
  p_{22}(AD, AD) &= p_{22}(AD, N).
\end{align*}
\]

The equilibrium prices of good 1 and good 2 become the same as the equilibrium prices when an AD investigation is unilaterally undertaken on the goods. Alternatively, when a firm is subject to AD investigation and sets the uniform (producer) price between the two markets, the optimal uniform price is unaffected regardless of whether another firm is also subject to AD investigation.

The intuition behind this result is the following. Suppose country 1’s AD action has already forced firm 2 to set a uniform producer price across the two markets. Because the markets of good 2 have been “integrated” and firm 2 cannot make a different decision in each market, firm 2’s pricing changes if and only if the overall demand for good 2 increases. In this situation, although country 2’s counter AD action forces firm 1 to set a uniform price also, the price adjustment by firm 1 does not change the average price of good 1 and thereby does not affect the overall demand for each good. Therefore, the equilibrium prices of good 2 is unaffected by the country 2’s counter AD action.

However, the equilibrium consumer prices of firm 3 are affected because firm 3 still sets different prices in the two markets, and they are given by

\[
\begin{align*}
  p_{31}(AD, AD) &= p_{31}(AD, N) - \frac{b}{4(1 + b)} d_1(AD, N) = p_{31}(N, AD) + \frac{b}{4(1 + b)} d_2(N, AD), \quad (28) \\
  p_{32}(AD, AD) &= p_{32}(AD, N) + \frac{b}{4(1 + b)} d_1(AD, N) = p_{32}(N, AD) - \frac{b}{4(1 + b)} d_2(N, AD). \quad (29)
\end{align*}
\]
3.4 The effect of AD activity on firms’ profits

Here, we examine the effect of countries’ AD activity on firms’ profits. For the No AD activity case, we first investigate the effect of unilateral AD activity by country 1. The change in the operating profit (i.e., the profit gross of the fixed cost of an AD application) of firm 1 is given by

\[ \Pi_1 (AD, N) - \Pi_1 (N, N) = \left[ \frac{2 \tau}{(2 + 3b)} - \frac{(4 + b)}{2(1 + 2b)(2 + b)} d_2(N, N) \right] \frac{b(1 + b)d_2(N, N)}{(1 - b)(2 + b)} > 0. \] (30)

From the perspective of firm 1, the effective market size of the domestic market (country 1) is greater than the effective market size of the foreign market (country 2) because the tariff, \( \tau \), is imposed on good 2 when exporting to country 2. A government’s AD activity benefits the domestic firm, because it increases the equilibrium price of good 1 in the domestic market, which is more important for firm 1, and the AD activity decreases the equilibrium price of good 1 in the foreign market, which is less important.

The change in firm 2’s profit is

\[ \Pi_2 (AD, N) - \Pi_2 (N, N) = -\frac{(1 + b) \{d_2(N, N)\}^2}{2(1 - b)(1 + 2b)} < 0. \] (31)

Country 1’s AD filing decreases the profit of firm 2 because firm 2 no longer discriminates between prices in the two markets.

The change in firm 3’s profit is given by

\[ \Pi_3 (AD, N) - \Pi_3 (N, N) = \left[ \frac{2b(1 + 2b) \tau + (8 + 16b + 3b^2 - b^3)(t_2 - t_1)}{4(1 + 2b)(2 + b)(2 + 3b)} \right] \frac{b(1 + b)d_2(N, N)}{(1 - b)(2 + b)}, \]

which has an ambiguous sign. By (13) and (20), the total profit of firm 3 is the additive sum
of the profits in the two markets, each of which is increasing and convex in price. Therefore, given that the average price remains unchanged, an increase in the difference of producer prices between the two markets increases the profit of firm 3. Country 1’s AD action increases the producer price of good 3 and the consumer price in country 1 \((r_{31}(AD, N) > r_{31}(N, N))\), while it decreases the producer price in country 2 \((p_{32}(AD, N) < p_{32}(N, N))\) by the same degree, keeping the average producer price of good 3 unchanged. If \(t_2 \geq t_1, r_{31}(N, N) \geq r_{32}(N, N)\) holds and country 1’s unilateral AD always increases the price difference and the profit of firm 3. If \(t_2 < t_1\), however, \(r_{31}(N, N) < r_{32}(N, N)\) holds and country 1’s unilateral AD action may either increase or decrease the price difference and the profit of firm 3. Specifically, if only country 2 has an RTA with country 2 and \(t_2 = 0 < t_1 = \tau\) holds, we have \(\Pi_3 (AD, N) < \Pi_3 (N, N)\) and country 1’s unilateral AD action hurts firm 3.

**Proposition 1** Compared to the situation with no antidumping activity, unilateral antidumping action by country \(j\) \((j = 1, 2)\) against firm \(k\) \((k = 1, 2, k \neq j)\) increases the operating profit of firm \(j\) and decreases the profit of firm \(k\). Unilateral antidumping activity by country decreases the profit of firm 3 if only country 2 has an RTA with country 3. Otherwise, unilateral antidumping activity increases the profit of firm 3.

Next, for the case of unilateral AD action by country 1, we investigate the effect of country 2’s counter AD action on firms profits. We have

\[
\Pi_1 (AD, AD) - \Pi_1 (AD, N) = - \frac{(1 + b) \{d_1(AD, N)\}^2}{2((1 - b)(1 + 2b)} < 0,
\]

\[
\Pi_2 (AD, AD) - \Pi_2 (N, AD) = 0.
\]

Hence, given that country 1 engages in AD action, country 2’s AD action hurts firm 1 while it does not affect the operating profit of firm 2. Country 2’s AD action forces firm 1 to set a uniform price that decreases the profit of firm 1. However, country 2’s action does not affect the
average price of good 1. Because firm 2 has already set a uniform price, and the optimal level of the uniform price changes only if the average price of good 1 changes, country 2’s counter AD action does not affect the operating profit of firm 2.

For the profit of firm 3, we have

$$\Pi_3 (AD, AD) - \Pi_3 (AD, N) = -\frac{b(2b(1 + 2b)(1 + 16b^2 + 5b^2)(t_2 - t_1))d_1(AD, N)}{8(1 + 2b)(1 - b)(2 + b)(2 + 3b)}.$$ 

Therefore, if $t_2 \geq t_1$ holds, country 2’s counter AD action hurts firm 3 because it shrinks the equilibrium difference of the producer price of good 3. If $t_2 = 0 < t_1 = \tau$ holds, however, $\Pi_3 (AD, AD) > \Pi_3 (AD, N)$ holds, and country 2’s counter AD action benefits firm 3. This is because, if only country 2 has an RTA with country 3, country 2’s counter AD action increases the producer price in the market whereby firm 3 is granted tariff-free access and the producer price is higher.

**Proposition 2** Compared to the situation with unilateral antidumping action by country $j$ ($j \in \{1, 2\}$) against firm $k$ ($k \in \{1, 2\}, k \neq j$), counter antidumping action by country $k$ against firm $j$ decreases the profit of firm $j$ without affecting the operating profit of firm $k$. Such action increases the profit of firm 3 if only country 2 has an RTA with country 3. Otherwise, the action decreases the profit of firm 3.

Finally, if we compare the Bilateral AD activity case with the No AD activity case, we have

$$\Pi_j (AD, AD) - \Pi_j (N, N) = -\frac{(1 + b)(d_j(N, N))}{2(1 - b)(1 + 2b)} < 0$$

for firm $j$ ($j = 1, 2$). This implies that bilateral AD equilibrium is a ”prisoner’s dilemma” for firms 1 and 2 because the profits of both firms are decreased compared to the No AD activity case.
For the profit of firm 3, we have

$$\Pi_3 (AD, AD) - \Pi_3 (N, N) = \frac{b^2 (1 + b) (4 + 6b - b^2) (t_1 - t_2)^2}{8 (1 + 2b) (1 - b) (2 + 3b)^2} \geq 0.$$  (33)

As long as only one of two countries has an RTA with country 3 ($t_1 \neq t_2$), firm 3’s profit under bilateral AD action is greater than the profit under no AD activity. If $t_2 = 0 < t_1 = \tau$, for instance, the equilibrium consumer price of each good in country 2 is higher than the equilibrium consumer price in country 1 because firm 3 charges a lower consumer price in country 2. This implies that the dumping margin of good 2 under no AD activity is higher than that of good 1, $d_2(N, N) < d_1(N, N)$. In country $j$, bilateral AD activity decreases the consumer price of good $j$ by $b/(2(2+b)) \times d_j(N, N)$ and increases the consumer price of good $k$ by $b/(2(2+b)) \times d_k(N, N)$. Therefore, $d_2(N, N) < d_1(N, N)$ implies that the sum of the consumer prices of goods 1 and 2 is increased by bilateral AD action in country 2, and it is decreased by the same degree in country 1. This, in turn, increases the equilibrium price of good 3 in country 2 and decreases the equilibrium price of good 3 in country 1. Because country 2 is more important for firm 3, the change from no AD activity to bilateral AD activity increases the profit of firm 3. The same effect is applied if $t_2 = \tau > t_1 = 0$.

**Proposition 3** Compared to the situation with no antidumping activity, bilateral antidumping activity by countries 1 and 2 decreases the operating profits of firm 1 and firm 2. Bilateral antidumping by countries 1 and 2 increases the profit of firm 3 if only one of two countries has an RTA with country 3. Otherwise, the profit of firm 3 is unaffected.
4 Governments’ decisions on antidumping

This section investigate governments’ AD investigation decisions in Stage 1, and the effect of preferential trade liberalization on those decisions. Let

\[ \Delta G_j(s_{-j}; t_1, t_2) = G_j(AD, s_{-j}) - G_j(N, s_{-j}) \]  

be the changes in government \( i \)'s payoff from its own AD action, given the other government’s action, \( s_{-j} \), and countries’ import tariffs imposed on good 3, \( t_1 \) and \( t_2 \). Country \( j \) uses the AD measure if and only if \( \Delta G_j(s_{-j}; t_1, t_3) > F \) holds. The following lemma suggests an important property of \( \Delta G_j(s_{-j}; t_1, t_3) \).

**Lemma 2** \( \Delta G_i(AD; t_1, t_3) \leq 0 \) always holds with equality if \( \gamma = 0 \).

This lemma suggests that, if one government chooses to engage in AD action, the other government’s best response is not to engage in AD action. Therefore, the governments have no incentive to implement counter AD action. Proposition 2 suggests that, once the foreign government invokes an AD measure, counter AD activity has no effect on the domestic firm’s profit. Meanwhile, increases in consumer prices in the domestic market and the resulting reductions in imports volume reduces consumer surplus and tariff revenues. Therefore, irrespective of the level of \( \gamma \), counter AD activity always decreases the government’s payoff and \( (AD, AD) \) cannot be an equilibrium outcome.

As a benchmark, we start with the case where neither country 1 nor country 2 has an RTA with country 3 and, therefore, \( t_1 = t_2 = \tau \) holds. In this case, we have \( \Delta G_1(N; \tau, \tau) = \Delta G_2(N; \tau, \tau) \) and they are decreasing in \( \gamma \). As \( \gamma \) increases, the gains from unilateral AD action reduce because the government is more concerned with the negative effect of AD action on consumer surplus and tariff revenues than the positive effect on the domestic firm’s profit. We
can confirm that $\Delta G_1(N; \tau, \tau) = \Delta G_2(N; \tau, \tau) < 0$ holds at $\gamma = 1$. Let $\tilde{\gamma}(\tau, \tau) (< 1)$ be the level of $\gamma$ at which $\Delta G_1(N; \tau, \tau) = \Delta G_2(N; \tau, \tau) = 0$ holds.

**Proposition 4** If there are no RTAs, the equilibrium outcome becomes either $(AD, N)$ or $(N, AD)$ if $\gamma < \tilde{\gamma}(\tau, \tau)$ and $\Delta G_1(N; \tau, \tau) > F$ holds. Otherwise, the equilibrium outcome becomes $(N, N)$.

Figure 1 shows the possible equilibrium outcome in the $(\gamma, F)$ space.

Next, we address the case where there is an RTA between country 1 and country 3 (i.e., $t_1 = 0 < t_2 = \tau$). In this case, the dumping margin under no AD activity is greater for good 2 and smaller for good 1, $d_2(N, N) > d_1(N, N)$. This implies that the price changes from AD activity are greater if country 1 uses a unilateral AD measure rather than country 2. From the perspective of firm profit, a larger dumping margin of the rival firm increases the gains from AD action. Hence, $\Delta G_1(N; 0, \tau) > \Delta G_1(N; \tau, \tau) = \Delta G_2(N; \tau, \tau) > \Delta G_2(N; \tau, 0)$ at $\gamma = 0$.

From the perspective of consumer surplus and tariff revenues, a greater dumping margin increases the efficiency loss from implementing an AD measure. Hence,

$$\frac{\partial \{\Delta G_1(N; 0, \tau)\}}{\partial \gamma} < \frac{\partial \{\Delta G_2(N; 0, \tau)\}}{\partial \gamma} < 0 \quad (35)$$

holds. We calculate that $\Delta G_1(N; 0, \tau) < \Delta G_2(N; 0, \tau) < 0$ holds at $\gamma = 1$. Let $\tilde{\gamma}_j(0, \tau) (< 1)$ be the level of $\gamma$ at which $\Delta G_j(N; 0, \tau) = 0$ holds ($j = 1, 2$). Also, let $\gamma$ be the level of $\gamma$ at which we have $\Delta G_1(N; 0, \tau) = \Delta G_2(N; \tau, \tau)$. We confirm that $\gamma < \min[\tilde{\gamma}_1(0, \tau), \tilde{\gamma}_2(0, \tau)]$ holds, and we have $\Delta G_1(N; 0, \tau) = \Delta G_2(N; \tau, \tau) > 0$ at $\gamma = \gamma$.

This implies that, in the presence of an RTA between countries 1 and 3, the member country (country 1) gains more from its AD action when the government’s weight on the firm’s profit is
sufficiently large, and the nonmember country (country 2) gains more when the government’s weight on social welfare is sufficiently large.

**Proposition 5** If only country 1 has an RTA with country 3, the equilibrium outcome becomes:

(i) either \((AD, N)\) or \((N, AD)\) if \(\gamma < \overline{\gamma}\) and \(F < \Delta G_2(N; 0, \tau)\) or if \(\overline{\gamma} \leq \gamma < \tilde{\gamma}_1(0, \tau)\) and \(F < \Delta G_1(N; 0, \tau)\),

(ii) \((AD, N)\) if \(\gamma < \overline{\gamma}\) and \(\Delta G_2(N; 0, \tau) < F < \Delta G_1(N; 0, \tau)\),

(iii) \((N, AD)\) if \(\overline{\gamma} \leq \gamma < \tilde{\gamma}_2(0, \tau)\) and \(\Delta G_1(N; 0, \tau) < F < \Delta G_2(N; 0, \tau)\),

(iv) \((N, N)\) otherwise.

Figure 2 shows the possible equilibrium outcomes in the \((\gamma, F)\) space.

4.1 The effect of preferential trade liberalization

We elaborate on the effect of an RTA on the member and the nonmember AD actions. Preferential trade liberalization \((t_1 = 0)\) realized by an RTA increases the product market competition and thereby decreases the equilibrium prices of the goods in country 1. The decreased prices in country 1 have two effects on firm 1’s profit. First, a decrease in \(p_{21}(N, N)\) widens the dumping margin of firm 2. Therefore, the magnitude of an increase in \(p_{21}\) and the magnitude of a decrease in \(p_{22}\) by country 1’s AD action increase. The effect increases firm 1’s profit gains. We call this the **dumping-margin effect**. Because of the dumping-margin effect, \(\Delta G_1(N; 0, \tau) > \Delta G_1(N; \tau, \tau)\) always holds at \(\gamma = 0\).

From the perspective of the nonmember country (country 2), preferential trade liberalization \((t_1 = 0)\) decreases the dumping margin of the rival firm and decreases firm 3’s gains from its AD action against firm 1.
Lemma 3 The RTA of country 1 and country 3 increases the profit gains of firm 1 from country 1’s unilateral AD action against firm 2 and decreases the profit gains of firm 2 from country 2’s unilateral AD filing against firm 1.

Meanwhile, the increased dumping margin of good 2 induced by preferential liberalization also increases consumers’ and tariff-revenue loss of country 1 from its own AD action, while the decreased dumping-margin of good 1 decreases consumers’ and tariff-revenue loss of country 2 from its own AD filing.

Additionally, country 1’s AD action, and resulting increase in $p_{21}$, reduces country 1’s imports from country 2 and increases its imports from country 3. Because country 1 eliminates tariffs against country 3, this change reduces tariff revenues more than when country 1 sets the nondiscriminatory tariff. The effect enlarges the efficiency loss of country 1 from AD action. Instead, the elimination of $t_{31}$ increases firm 3 gains from country 1’s AD action against country 2. We call this the revenue-leakage effect.

Because of the revenue-leakage effect, the negative effect of an increase in $\gamma$ on the government’s gains from AD action becomes greater in country 1 and smaller in country 2:

$$\frac{\partial \{\Delta G_1(N;0,\tau)\}}{\partial \gamma} < \frac{\partial \{\Delta G_1(N;\tau,\tau)\}}{\partial \gamma} = \frac{\partial \{\Delta G_2(N;\tau,\tau)\}}{\partial \gamma} < \frac{\partial \{\Delta G_2(N;0,\tau)\}}{\partial \gamma} < 0. \quad (36)$$

We confirm that $\Delta G_1(N;0,\tau) < \Delta G_1(N;\tau,\tau) = \Delta G_2(N;\tau,\tau) < \Delta G_2(N;0,\tau) < 0$ always holds at $\gamma = 1$.

Proposition 6 If the government’s weight on the domestic firm’s profit is high (low), the formation of RTA promotes (discourages) the member’s unilateral AD action against the nonmember and discourages (promotes) the nonmember’s unilateral AD action against the member.
Figure 3 shows that an RTA between countries 1 and 3 changes the equilibrium outcomes in the \((\gamma, F)\) space.

If \(\gamma\) is small while \(F\) is less small, preferential trade liberalization increases the likelihood of member AD action against a nonmember, because the equilibrium outcome changes from no AD action to unilateral AD action by the member country (i.e., from \((N, N)\) to \((AD, N)\)), or the outcome changes from unilateral AD action by either the member or the nonmember country to unilateral AD action by the member country (i.e., from \((AD, N)\) or \((N, AD)\) to \((AD, N)\)).

However, the opposite case is also possible. If \(\gamma\) is large, preferential trade liberalization increases the likelihood of nonmember AD action against a member country, because the equilibrium outcome changes from no AD action to unilateral AD action by the nonmember country (i.e., from \((N, N)\) to \((N, AD)\)), or it changes the outcome from unilateral AD action by either the member or the nonmember country to unilateral AD action by the member country (i.e., from \((AD, N)\) or \((N, AD)\) to \((N, AD)\)).

Interestingly, if \(\gamma\) is in the middle range, preferential trade liberalization may block the AD actions of both countries because the equilibrium outcome changes from \((AD, N)\) or \((N, AD)\) to \((N, N)\). In the middle level for \(\gamma\), both member and nonmember gains from AD actions decrease, although the reason for the decline is the increased efficiency loss for the member and decreased profit gains for the nonmember.

Finally, if both countries have RTAs with country 3, firm 3 sets the same exporting price in the two markets and the dumping-margin effects of the two RTAs are canceled out. However, the revenue-leakage effect of each RTA remains and reduces each government’s gains from AD action. Specifically, \(\Delta G_1(N; 0, 0) = \Delta G_2(N; 0, 0) = \Delta G_1(N; \tau, \tau) = \Delta G_1(N; \tau, \tau)\) hold at \(\gamma = 0\).
and

$$\frac{\partial \{\Delta G_1(N;0,0)\}}{\partial \gamma} = \frac{\partial \{\Delta G_2(N;0,0)\}}{\partial \gamma} < \frac{\partial \{\Delta G_1(N;\tau,\tau)\}}{\partial \gamma} = \frac{\partial \{\Delta G_2(N;\tau,\tau)\}}{\partial \gamma} < 0$$

hold. Figure 4 shows changes in the equilibrium outcomes by the formation of the two RTAs in the \((\gamma,F)\) space, where \(\tilde{\gamma}(0,0) < 1\) is the level of \(\gamma\) at which \(\Delta G_1(N;0,0) = \Delta G_2(N;0,0) = 0\) holds.

[Figure 4 around here]

Preferential trade liberalization of both countries reduces the likelihood that both countries will file AD actions because the only possible change of the equilibrium outcome is from \((AD,N)\) or \((N,AD)\) to \((N,N)\).

**Proposition 7** The RTAs of both countries 1 and 2 with country 3 discourages all countries’ unilateral AD actions.

5 Conclusion

In a three-country oligopoly model, this paper analyzed two countries’ decisions concerning AD action against each other and the relationship between those decisions and the countries’ RTAs with the third-country. An RTA intensifies product-market competition in the domestic market and lowers product prices. This effect widens the dumping margin of the foreign firm and narrows the dumping margin of the domestic firm. If the government is more concerned with domestic firm profit in its AD decision, the RTA may invoke the member’s AD action against the nonmember. If the governments attach a sufficiently high value on social welfare, however,

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6 We also confirm that \(\frac{\partial \{\Delta G_1(N;\tau,0)\}}{\partial \gamma} = \frac{\partial \{\Delta G_2(N;\tau,0)\}}{\partial \gamma} < \frac{\partial \{\Delta G_1(N;0,0)\}}{\partial \gamma} = \frac{\partial \{\Delta G_2(N;0,0)\}}{\partial \gamma} < 0\).
the RTA may promote the nonmember’s AD action against the member. If the governments’ weight on the domestic firm’s profit is neither high nor low, an RTA may block the AD actions of both countries. If both countries have RTAs with the third country, both countries become less willing to use AD action.

My analysis can be extended in several directions. I suggest an analysis of the effects of nondiscriminatory, multilateral trade liberalization and a comparison with the effects of preferential trade liberalization. I also suggest an analysis of the effects of an RTA between countries 1 and 2. If we introduce the third country market, we can analyze whether and how an RTA changes each country’s incentive to undertake AD actions for both member and nonmember countries.

References


Figure 1: Possible equilibrium outcomes without RTAs

- \((N, N)\)
- \((AD, N)\) or \((N, AD)\)

\(F\)

\(\gamma\)

\(\tilde{\gamma}(\tau, \tau)\)

\(\Delta G_i(N; \tau, \tau)\)
Figure 2: Possible Equilibrium outcomes with country 1’s RTA

- \((\text{AD}, \text{N})\) or \((\text{N}, \text{AD})\)
- \((\text{N}, \text{N})\)
Figure 3: The effect of country 1’s RTA

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Figure 4: The effect of both countries RTAs

- $(N, N)$
- $(AD, N)$ or $(N, AD)$
- $(AD, N)$ or $(N, AD)$
- $	ilde{\gamma}(0, 0)$
- $	ilde{\gamma}(\tau, \tau)$
- $\Delta G_i(N; 0, 0)$
- $\Delta G_i(N; \tau, \tau)$