

早稲田大学現代政治経済研究所

Dumping in a Transition Economy and Anti-Dumping Policy

Chisato Shibayama • Yasunori Ishii

No. E1302

Working Paper Series

Institute for Research in
Contemporary Political and Economic Affairs

Waseda University

169-8050 Tokyo, Japan

Dumping in a Transition Economy and Anti-Dumping Policy¹

Chisato Shibayama²

Department of Economics, Otaru University of Commerce

Yasunori Ishii

Faculty of Political Science and Economics, Waseda University

April 12, 2013

No.E1302

Abstract

In this paper we try to analyze the relationships among privatization, dumping, and anti-dumping policies in an international mixed duopoly model. The domestic public firm is a monopolist in the domestic market, but a Cournot duopolist in the foreign market. We find that excess privatization occurs under dumping. We show that when the domestic firm engages in dumping under privatization, the foreign country has an incentive to impose an anti-dumping duty on the domestic firm. If it does so, the home firm might increase welfare in its country, thereby leading to an increase in welfare worldwide.

Keywords: privatization; mixed duopoly; dumping; anti-dumping; optimal tariff

JEL:F12,F13

¹ Thanks are due to Jota Ishikawa, Taiji Furusawa, Tomohiro Kuroda, Ryo Makioka, Toshihiro Matsumura, Hiroshi Mukunoki and Laixun Zhao for helpful suggestions and comments. Needless to say, we alone are responsible for any remaining errors.

² Corresponding Author: Department of Economics, Otaru University of Commerce, 3-5-21, Midori, Otaru, 047-8501, Japan. Phone & Fax: 81-134-27-5313 E-mail: chisato@res.otaru-uc.ac.jp

1. Introduction

(1) A study of economic rationales for anti-dumping

Many economists have been skeptical about the economic rationales for anti-dumping (AD).³ The definition of dumping adapted Article IV of the GATT is a situation in which the export price of a good is less than its normal value which is the domestic selling price in the ordinary course of trade. Ordinarily, dumping is considered a form of international price discrimination. An AD duty might increase an importing country's welfare, but it decreases the welfare of the exporting country and the world. If an exporting firm is prohibited from dumping, this sets a universal price on both domestic and foreign markets that worsens both the welfare of the importing country and that of the world, relative to the case under dumping.

The typical case where there is no ordinary course of trade is that of sales below cost. A universal price below cost is recognized as dumping; by definition, normal value is the value of the calculation (called constructed value) consisting of cost of production, reasonable administrative, selling, and any other costs, and for profits; when after subtracting the export price from the calculated normal value, one receives a positive value, that is dumping. This type of dumping may occur under price uncertainty, as analyzed by Ethier (1982) and Davies and McGuinness (1982) – for example, a firm's optimization of expected utility *ex ante* might occur by dumping *ex post*. Another case is where profits in the subsequent periods overwhelm loss incurred by prices below cost price in the first period, for example, Gruenspecht(1988) using a cost function that decreases marginal cost in subsequent periods by increasing production in the first period, and Tivig and Walz (2000), who found a firm considering consumer switching costs sets the price below cost in the first period to obtain more profits in the subsequent

³ Deardorff (1990), Niels (2000), for example.

period. The above-mentioned cases of dumping all have economic rationales and hence AD measures in these cases would worsen world welfare.

The only case for a harmful effect of dumping on efficiency is the presence of predation under incomplete and asymmetric information, such as in Hartigan (1994), where an inefficient firm sets a price below cost and causes its rival to exit the market by installing in the rival the incorrect belief that it (the inefficient firm) is a low-cost competitor. In this case, the rival is more efficient than the firm in predation, but only the inefficient firm runs. In terms of economic efficiency, it is to be desired that AD policy be used only to restrict international predatory pricing, which is similar to inhibiting predation in competition policy.⁴ AD policy as it exist is not appropriate because it prohibits so many kinds of dumping that have no relation with predation. Thus, we should develop a common competition policy internationally to keep surveillance over predation, instead of relying on anti-dumping law.

This opinion, however, supposes that firms in the different countries plays on a flat field, as in the domestic market, when in fact, trade is conducted among countries with various cultures and institutions that have effects on trade. Jackson, Davey and Sykes, Jr. (2002) present an "interface theory" of anti-dumping measures, saying that they are "an interface mechanism to mediate between the two" different systems.⁵ This approach may be supported by EU administration, which insists "the economic rationale for Anti-Dumping and Anti-Subsidy trade defence measures essentially follows from the fact that the international economy has no mechanism for correcting anti-competitive practice similar to the competition authorities that operate in almost all national economies".⁶ Ethier (1982) considers dumping from the perspective of institutional differences, between Japan and the U.S., focusing

⁴ Hartigan (1996) also investigates predatory dumping under capital market imperfection.

⁵ See Jackson, Davey and Sykes, Jr. (2002) p.679, l.6.

⁶ Commission of the European Communities (2006) p.2, ll.14-16.

on labor policies in the steel industry, but he does not analyze the effects of AD policy. In the 1980s, many AD measures were imposed on Japanese firms.

However, as can be seen in Figure 1, which depicts AD measures on exporting country as seen on the WTO antidumping gateway website,⁷ the number of AD measures taken in transitional economies, especially that of China, has been prominent recently; in fact, it has been increasing since the 1990s. Specifically, we suppose Chinese steel and chemical state-owned firms that have been frequently imposed AD measures—for example, Hebei Group (Hebei Province), Baosteel (Shanghai) and Yuhan Iron and Steel Group (Hubei Province) respectively the second-, third- and fifth-largest steel-producing companies in the world in 2011 according to data from the World Steel Association and Sinopec (China Petrochemical Corporation) which is the fifth in GLOBAL Fortune 500 as of 2012. These firms are monopolies or Gulliver oligopolies in their relevant jurisdictions and are controlled by the provincial authority. Thus we focus on firms that are state-owned firm and the jurisdiction in which they are located, other factors remaining constant. We will consider dumping in transitional economies, the effects of AD policy, and the economic rationale of interface theory from the perspective of privatization under a mixed duopoly model.

(2) A dumping model of privatization in a mixed duopoly

Various studies have been conducted on the effects of privatization on trade and trade policies in the globalized world. However, all of them focus on the domestic markets; and the case where a privatizing firm supplies both domestic and international markets has not been considered.

We assume a situation where a public firm supplies both domestic and foreign markets; we analyze dumping, the effects of domestic welfare, and whether a foreign government imposes anti-dumping duties on a privatized

⁷ WTO anti-dumping website URL:
http://www.wto.org/english/tratop_e/adp_e/adp_e.htm

firm. We also assume that a public firm intends to maximize social welfare, a private firm's purpose is profit maximization, and privatization is the shift in intention from welfare maximization to profit maximization according to Matsumura (1998).

We assume that dumping occurs in a situation of perfect privatization, that is, one in which a home country's price elasticity of demand is smaller than that in foreign markets. Then dumping does not occur and reverse dumping exists until some level of privatization is reached. Progress in privatization induces dumping. We inquire into the relationship between dumping and optimal privatization, requirements that the importing countries impose anti-dumping duties, and the effects of tariffs on the home country.

Our model relies deeply on Matsumura's (1998) quantity-setting mixed duopoly model. Matsumura concluded that if a public firm is as efficient as a private firm and is not monopolist, neither full nationalization nor full privatization is optimal. As previously mentioned, in the context of a mixed duopoly/oligopoly model that includes international trade, previous studies analyze competition among a domestic privatizing firm, domestic private firms, and foreign rivals in the domestic market. According to Pal and White(1998), for example, privatization increases social welfare by subsidizing it, but they do not make obvious observations about optimal tariffs. Chao and Yu (2006) state that foreign competition lowers optimal tariffs and raises the level of partial privatization, and that a free trade policy is not desirable under perfect or partial privatization of a public firm. Chang (2005) insists that partial privatization is optimal when a domestic public firm engages in Cournot competition with a more efficient foreign firm, but full nationalization is optimal when the home firm is a Stackelberg leader. Wang, Wang, and Zhao(2009) develop Chang's model to incorporate endogenous timing analysis. They find that differences in the timing in decision-making influence the optimal degree of privatization and the optimal tariff.

A key distinguishing feature of our model is that the privatizing public

firm is also an exporter. A public firm decides on a production plan taking into account domestic social welfare and export profits. Until the development of our model, it has not been supposed important to consider an exporting public firm in privatization analysis, because both public and private firms choose the same strategy to maximize export profit; then, privatization does not influence the decision of a privatizing firm. Therefore, we introduce a joint cost structure across markets for a public firm. We obtain an outcome that is an extension of that reached by the Matsumura (1998) model, finding that mixed privatization is optimal even if the public firm is a monopolist in the domestic market.

AD procedures begin with a suit to the government from some industry in the importing country; then, the government investigates and ascertains that there is (i) a positive dumping margin and (ii) injury, such as decreased profits, decreased share, etc., among domestic competitors because of the dumped imports. If both (i) and (ii) are affirmative, the government can impose anti-dumping duties on these dumped imports. Privatization of a public firm decreases domestic output and increases exports, and the rivals in the importing country see lower shares, market price, and profits. The importing industry always has the option to file an anti-dumping suit to protect its profits, but anti-dumping duties will practically speaking be imposed when anti-dumping occurs and the importing country's welfare increases if an anti-dumping tariff is imposed. We will see how the home country's social welfare can increase by means of an AD tariff.

Below, in section 2, we present the dumping model of a privatizing public home firm as a monopolist in the home market that engages in mixed duopoly in the foreign market. In section 3, we inquire into the relationship between degree of privatization and dumping. In section 4, we investigate the relationship between the optimal degree of privatization and dumping, and in section 5 we analyze the effects of an AD duty. Section 6 concludes the paper.

2. The model

We consider a partial equilibrium model with two countries. The home firm is a monopolist in the home market and engages in Cournot duopolistic competition with the foreign firm in the foreign market. Domestic output of the home firm is denoted as x and export output as X . The output of the foreign firm is X^* . The inverse home market demand is given by $p(x)$ and the inverse foreign demand is given by $q(X + X^*)$. We assume $p' < 0$ and $q' < 0$.

We present a two-stage game where the home government decide the degree of privatization $\lambda(\in [0,1])$ in the first stage, and then the home and foreign firms decide their production in the second stage. An increase in λ indicates that the home firm is more privatized; $\lambda = 0$ is equivalent to full nationalization, and $\lambda = 1$ means full privatization. The foreign firm is fully privatized and is supposed to maximize profit as shown in (2).

The profit functions for the home and foreign firms are defined as

$$\pi = p(x)x + q(X + X^*)X - c(x, X), \quad (1)$$

$$\pi^* = q(X + X^*)X^* - c^*(X^*), \quad (2)$$

where $c(x, X)$ is the home firm's total cost function and $c^*(X^*)$ is the foreign one. We assume that $c' > 0$, $c'' > 0$, $c''' > 0$, and $c^{*''} > 0$.

The home country's social welfare W is the sum of consumer welfare and home firm profit, and is given by

$$W = \int_0^x p(s)ds + q(X + X^*)X - c(x, X). \quad (3)$$

The home firm is supposed to maximize the weighted sum of profit and social welfare defined as

$$Z = \lambda\pi + (1 - \lambda)W, \quad (4)$$

where $\lambda(\in [0,1])$. An increase in λ indicates that the home firm is more

privatized; $\lambda = 0$ is equivalent to full nationalization, and $\lambda = 1$ means full privatization. Thus the foreign firm is fully privatized and supposed to maximize profit as shown in (2).

We assume first- and second-order conditions to maximize (2) and (4) respectively and a stability condition represented as follows:

$$Z_x = p + \lambda p'x - c' = 0, \quad (5)$$

$$Z_X = q + q'X - c' = 0, \quad (6)$$

$$Z_{xx} = (1 + \lambda)p'' + \lambda p''x - c'' < 0, \quad (7)$$

$$Z_{XX} = 2q' + q''X - c'' < 0, \quad (8)$$

$$\pi_{X^*}^* = q + q'X^* - c^{*'} = 0, \quad (9)$$

$$\pi_{X^*X^*}^* = 2q' + q''X^* - c^{*''} < 0, \quad (10)$$

$$A \equiv Z_{xx}Z_{XX}\pi_{X^*X^*}^* + Z_{Xx}Z_{xX^*}\pi_{X^*X}^* + Z_{xX}Z_{XX^*}\pi_{X^*x}^* - Z_{xX^*}Z_{XX}\pi_{X^*x}^* - Z_{xX}Z_{Xx}\pi_{X^*X^*}^* - Z_{xx}Z_{XX^*}\pi_{X^*X}^* < 0, \quad (11)$$

where $Z_{xX^*} = 0$.

We substitute price elasticity of demand for the home market ($\varepsilon = -p/xp'$) into (5) and that for the foreign market ($\eta = -q/(X + X^*)q'$) into (6), obtaining

$$p = c'\varepsilon/(\varepsilon - \lambda), \quad (12)$$

$$q = c'\eta/(\eta - \theta), \quad (13)$$

where $\theta = X/(X + X^*)$.

First, we consider a dumping condition under full privatization ($\lambda = 1$). In this case, the home market price is $p = c'\varepsilon/(\varepsilon - 1)$. From the condition for positive dumping margin $M = p - q > 0$, we obtain $\eta > \varepsilon\theta$. If the home firm is a monopoly in the foreign market ($\theta = 1$), the necessary and sufficient condition for occurrence of dumping is $\eta > \varepsilon > 1$, so we assume that the case. We will inquire into the relationship between dumping and privatization in the next section.

3. Privatization and occurrence of dumping

The home firm carries out dumping if $\lambda = 1$. Here, we will investigate the occurrence of dumping when the home firm is fully nationalized ($\lambda = 0$) or privatized ($d\lambda > 0$).

Lemma 1:

Dumping occurs iff

$$\lambda > \varepsilon\theta/\eta. \quad (14)$$

Proof:

As dumping margin is equal to subtraction of the foreign price from the domestic price:

$$M = p - q = c'(\lambda\eta - \varepsilon\theta)/(\varepsilon - \lambda)(\eta - 1). \quad (15)$$

where $c' > 0$, $\eta > \varepsilon > 1$, $0 \leq \theta \leq 1$ and $0 \leq \lambda \leq 1$. As the denominator of the right hand side is positive, if the sign of the bracket of in the numerator is positive, dumping occurs. Then we obtain (14). Q.E.D.

As $\eta > \varepsilon > \varepsilon\theta$, the left hand of the inequality (14) is always less than one. If the home price elasticity of demand (ε) is small enough compared to the foreign price elasticity of demand (η), and the foreign market share of the home firm is small enough, then the value on the right-hand side of (14) is near to zero, and dumping will occur under low privatization. If ε is close to η and θ is very large, dumping occurs under a higher degree of privatization.

Notice that reverse dumping may occur under full nationalization, as the inequality shown in (14) is never satisfied. As a fully nationalized home firm considers consumer surplus when it decides on production, domestic price is lower than monopoly price under full privatization and may also be lower

than export price. This may occur when price elasticity of foreign demand η is not so large or when the home firm's share in the foreign market θ is large.

Privatization lets the home firm decrease domestic production, then raises domestic price. The larger the foreign price elasticity of demand (η), and the smaller the home firm's share of the foreign market (θ), the more we will see dumping occur at the lower rate of privatization (λ).

Next, we investigate production change in the process of privatization. Totally differentiating (5), (6), and (9), setting zero for each, and using Cramer's law, we have

$$x_\lambda = -p'x(Z_{XX}\pi_{X^*X^*}^* - Z_{XX^*}\pi_{X^*X}^*)/A < 0, \quad (16)$$

$$X_\lambda = p'xZ_{XX}\pi_{X^*X^*}^*/A > 0, \quad (17)$$

$$X_\lambda^* = -p'xZ_{XX}\pi_{X^*X}^*/A < 0. \quad (18)$$

As shown in (16), the home firm decreases domestic production in the process of privatization, where $Z_{XX}\pi_{X^*X^*}^* - Z_{XX^*}\pi_{X^*X}^* > 0$ from (8), (10), $Z_{XX^*} = q' + Xq'' < 0$, $\pi_{X^*X}^* = q' + X^*q'' < 0$, $Z_{XX} = -c'' < 0$ and assumptions $c'' > 0$, $p' < 0$ and $A < 0$ hold.

That is, the home firm that decreases its domestic output by means of privatization increases exports. As for foreign firm production change, $X_\lambda^* < 0$, where $\pi_{X^*X}^* = q' + q''X^* < 0$, $p' < 0$ and $A < 0$. Total output in the foreign market is given by (17) and (18).

$$X_\lambda + X_\lambda^* = p'xZ_{XX}(\pi_{X^*X^*}^* - \pi_{X^*X}^*)/A > 0 \quad (19)$$

As $p' < 0$, $\pi_{X^*X^*}^* - \pi_{X^*X}^* = q' - c^{*'} < 0$ and $A < 0$, the sign of (19) is positive.

Lemma 2:

Privatization of the home firm lets the foreign firm's profit decrease.

Proof:

Differentiating (2) by λ , we have

$$d\pi^*/d\lambda = q'X^*(X_\lambda + X_\lambda^*) + (q - c^*)X_\lambda^* < 0, \quad (20)$$

where $q' < 0$; also recall (18) and (19).

The first term on the right-hand side of (20) represents the price-down loss. The second term represents the loss from worsened production composition. Total profit of the foreign firm decreases. Q.E.D.

Proposition 1:

The home firm has AD duty imposed on it by the foreign government if $\lambda > \varepsilon\theta/\eta$ with privatization.

Proof:

As mentioned in the introduction, the prerequisites for imposing ant-dumping duties by a foreign government are (i) positive dumping margin and (ii) determination of injury such as decreased profit. As shown in Lemma 1, dumping emerges with privatization if $\lambda > \varepsilon\theta/\eta$, and in that case, the foreign firm's profit worsen, as shown in Lemma 2. Q.E.D.

4. Optimal degree of privatization and dumping

It has been established, in the quantity-setting mixed duopoly model of Matsumura (1998) that the optimal degree of privatization is not $\lambda = 1$. What, then, is the optimal degree of privatization in our model, and does dumping occur at that point?

First, we investigate welfare change for the home country. Differentiating (3) with respect to λ , we obtain

$$dW/d\lambda = (p - c')x_\lambda + (q - c')X_\lambda + q'X(X_\lambda + X_\lambda^*) = -p'\lambda xx_\lambda + q'XX_\lambda^*, \quad (21)$$

using (5) and (6). The first term on the right-hand side represents the consumer's loss because of the decrease of production in the home market in the process of privatization. The second term represents change of export profit. The sign of the second term is positive. Thus, no conclusion is apparent.

Then we inquire into the optimal degree of privatization for the home country (λ^0). Setting (21) at zero yields

$$\lambda^0 = \varepsilon \theta X_\lambda^* / \{(\eta - \theta)x_\lambda + \theta X_\lambda^*\}, \quad (22)$$

using (12) and (13).

Consequently,

Lemma 3:

When the public firm that is a monopolist in the home country engages in a Cournot duopolistic competition in the foreign country, the partial privatization is optimal for the home country.

Proof:

The sign of the value on the right of (22) is positive because, $0 \leq \theta \leq 1$, $\eta > \varepsilon < 1$, $X_\lambda^* < 0$ and $x_\lambda < 0$. Thus the optimal degree of privatization is positive. From the right hand of (22), iff $\theta = 0$, then $\lambda^0 = 0$. However, if $\theta > 0$, partial privatization is optimal where $x_\lambda < X_\lambda^* < 0$. Q.E.D.

Matsumura (1998) finds that full nationalization is optimal under a domestic monopoly. We extend Matsumura's model by assuming that the domestic monopolist also exports, where optimal privatization may have a positive value.

We will now describe the relationship between optimal privatization and

dumping.

Proposition 2:

Under an optimal degree of privatization for the home country, dumping never occurs.

Proof.

From Lemma 1, we have seen that dumping occurs $\lambda > \varepsilon\theta/\eta$. When we subtracting $\varepsilon\theta/\eta$ from optimal degree of privatization (λ^0), if we have positive value, the home firm always dumps under optimal privatization. Then we obtain

$$\varepsilon\theta(\eta - \theta)(X_\lambda^* - x_\lambda)/\eta\{x_\lambda(\eta - \theta) + \theta X_\lambda^*\} < 0, \quad (23)$$

where $\eta > \varepsilon > 1$, $0 \leq \theta \leq 1$ and $x_\lambda < X_\lambda^* < 0$. As the sign of (23) is negative, the optimal degree of privatization satisfies the dumping condition. Thus, under optimal privatization for the home country, dumping never occurs. Q.E.D.

This result suggests that optimal degree of privatization for the home country means that the home firm does not raise the domestic price until a situation of dumping is reached, because it considers the domestic consumer surplus.

Let us now consider the world-optimal degree of privatization. We define the foreign country's social welfare function as follows:

$$W^* = \int_{s^*=0}^{X+X^*} q(s^*) ds^* - q(X + X^*)X - c^*(X^*). \quad (24)$$

This includes the consumer surplus and the foreign firm's profit. Equation (3)

adds to (24) to yield world welfare.

$$W + W^* = \int_{s=0}^x p(s) ds - c(x, X) + \int_{s^*=0}^{X+X^*} q(s^*) ds^* - c^*(X^*). \quad (25)$$

Differentiating (25) with respect to λ and setting the derivative equal to zero, we obtain

$$d(W + W^*)/d\lambda = p\lambda x_\lambda/\varepsilon + qv/\eta = 0 \quad (26)$$

where $v = \theta X_\lambda + (1 - \theta)X_\lambda^*$. If θ is small enough $v \leq 0$; otherwise $v > 0$.

Substituting (12) and (13) into (26), we have

$$\lambda^{W^0} = -\varepsilon v / [(\eta - \theta)x_\lambda - v], \quad (27)$$

where $\eta > \varepsilon > 1$. The value of λ^{W^0} almost depends on θ , ε and η . Small θ induces $\theta X_\lambda + (1 - \theta)X_\lambda^* < 0$, then the sign of λ^{W^0} is negative. We obtain $\theta X_\lambda + (1 - \theta)X_\lambda^* > 0$ and $0 < \lambda^{W^0} < 1$ under some large θ . If $\theta = 1$, $\lambda^{W^0} = -\varepsilon X_\lambda / \{(\eta - 1)x_\lambda - X_\lambda\} < 1$. If η is very close to ε , large enough θ induces large $\lambda^{W^0} < 1$. Thus,

Lemma 4:

When a public firm that is a monopolist in the home country takes part in Cournot duopolistic competition in the foreign country, partial privatization is optimal for the world.

Let us now look at the relationship between the world-optimal degree of privatization and dumping. Remember that dumping occurs iff $\lambda > \varepsilon\theta/\eta$, if λ^{W^0} is larger than $\varepsilon\theta/\eta$, dumping occurs under world-optimal privatization. When we subtract $\varepsilon\theta/\eta$ from (27), we have

$$\lambda^{wo} - \varepsilon\theta/\eta = -\varepsilon(\eta - \theta)[\theta x_\lambda + \nu]/\eta[(\eta - \theta)x_\lambda - \nu] < 0 \quad (28)$$

Proposition 3:

Under a world-optimal degree of privatization, dumping never occurs.

Proof.

We will prove that (28) is always satisfied. The denominator of (28) is always negative, because the first term $(\eta - \theta)x_\lambda$ in the bracket is very large. The sign of the numerator depends on $[\theta x_\lambda + \nu]$. If θ is small enough, the sign of the bracket is negative where the first term in the bracket is negative and ν is negative. If θ is large enough, then ν is positive but the sign of the bracket is negative because the largest value of ν is X_λ when $\theta = 1$ is smaller than the absolute value of x_λ using (16) and (17). Thus, (28) is always negative. QED.

We now need to analyze the relationship between optimal degree of privatization for the home country and world-optimal privatization.

$$\lambda^{wo} - \lambda^o = -\varepsilon x_\lambda (\eta - \theta) (\theta X_\lambda + X_\lambda^*) / [(\eta - \theta)x_\lambda - \nu] [(\eta - \theta)x_\lambda + \theta X_\lambda^*] \quad (29)$$

As the denominator is always positive, the sign of (29) depends on the second bracket of the numerator. If θ is large enough, $\theta X_\lambda + X_\lambda^* > 0$, then (29) is positive; otherwise it is non-positive. This result means that λ^{wo} reflects improvement of the foreign consumer surplus when the foreign market share of the home firm (θ) is large, but when θ is small, λ^o is larger reflecting improvement of the export profit of the home firm.

We have seen that dumping never occur under optimal privatization for either the home country or the world. If dumping occurs, it may therefore be

evidence for excess privatization. Should this inefficiency be corrected by governmental intervention? Is it appropriate for a foreign government to impose an AD duty on the home country?

5. The effects of AD duties

Now we should mention the effects of AD duties. We suppose a three-stage game where the foreign government decides a tariff rate in the first stage, the home government decides λ in the second stage and the firms decide their quantity of production in the third stage. First, we investigate the condition in which the foreign government can impose AD duties under privatization of the home firm; second, we consider the effects of tariffs on the home country's welfare and under world welfare.

Proposition 4:

If $\lambda > \varepsilon\theta/\eta$ and θ is sufficiently small, the home firm might have AD duties imposed on it under privatization.

Proof:

For the foreign government to be able to impose AD duties, the following three requirements need to be fulfilled:

- (i) positive dumping margin,
- (ii) determination of negative effects because of dumped imports, such as decreased profits; and
- (iii) increase in the foreign country's welfare though the implementation of the tariff.

From Lemma 1, we know that dumping occurs when $\lambda > \varepsilon\theta/\eta$ with privatization, which fulfills requirement (i). From Proposition 1, we know (ii) is always satisfied.

To prove (iii), we define the foreign country's social welfare function as follows:

$$W^* = \int_{s^*=0}^{X+X^*} q(s^*) ds^* - q(X + X^*)X - c^*(X^*) + tX, \quad (30)$$

which includes the consumer surplus, the foreign firm's profit and tariff revenue. Differentiating (30) yields

$$dW^*/dt = -q'XX_t + (q - c^{*'})X_t^* + tX_t + X, \quad (31)$$

where $X_t < 0$, $X_t^* > 0$ and $c^{*' > 0$.⁸ The first term on the right hand of (31) represents worsened terms of trade, the second term is production mark-up gains and the third and fourth terms capture the tariff revenue effect. By substituting (9) into (25), we obtain

$$dW^*/dt = -q'XX_t - q'X^*X_t^* + tX_t + X = q[\theta X_t + (1 - \theta)X_t^*]/\eta + tX_t + X \quad (31')$$

Supposing a sufficiently small t close to zero, then the second term on the right of (31') is negligible to small. Then if the bracket of the first term is positive which occurs with a sufficiently small θ , government always has an incentive to impose a tariff on imports. Q.E.D.

In the AD procedure, the foreign country can impose an AD duty not greater than the dumping margin. This being the case how much duty should the foreign firm imposes on dumped imports? To see this, we will compare optimal tariff and dumping margin. To obtain optimal tariff t^0 , we set (31) equal to zero and rearrange the equation. Then we have

$$t^0 = -[(\eta - \theta)X + c'\{\theta X_t + (1 - \theta)X_t^*\}]/(\eta - \theta)X_t. \quad (32)$$

⁸ See Appendix.

If $t^0 \geq M$, the foreign country should impose a just dumping margin. If $t^0 < M$, however, the foreign country should impose an optimal tariff. Subtracting M from t^0 , we have

$$t^0 - M = [-X(\varepsilon - \lambda)(\eta - \theta) - c'\{\lambda(\eta - \theta)X_t + (\varepsilon - \lambda)(1 - \theta)X_t^*\}]/(\eta - \theta)X_t. \quad (33)$$

Considering the dumping condition of $\lambda > \varepsilon\theta/\eta$ and sufficiently small θ from Proposition 4, we see that (33) is positive because the denominator and first and second terms in the numerator are negative. Then,

Proposition 5:

The foreign country imposes an AD duty just equal to dumping margin.

Now we move on to investigation of the tariffs' effects on the home country's social welfare. The welfare function when the home firm has a tariff imposed is written as

$$W = \int_{s=0}^x p(s) ds + q(X + X^*)X - c(x, X) - tX. \quad (34)$$

Totally differentiating (34) and using the envelope theorem, we have

$$dW/dt = -p'xx_t + q'XX_t^*, \quad (35)$$

where $p' < 0, q' < 0, x_t < 0$ and $X_t^* > 0$.⁹ The second term on the right represents loss of export profit. The home firm increases domestic production and consumer welfare improves as shown in the first term. If the effects of

⁹ See Appendix.

improving consumer welfare are larger than the loss of export revenue, we can obtain the surprising outcome that the home country's welfare improves as a result of foreign tariffs on the home firm. This is because of our model, in which the home firm is a monopolist in the home market and the tariff imposition moderates the deadweight loss of monopoly with privatization. In this case, if the foreign country imposes an AD duty, world welfare may improve.

6. Conclusion

In this paper, we investigate the relationship between privatization, dumping and AD policy. A public firm that is a monopolist in the home market and engages in quantity-setting duopolistic competition in a foreign market may carry out dumping under privatization. In our model, dumping occurs under excess privatization both for the home country and for the world. Privatizing a home firm that dumps will harm the competitor in the foreign market. Imposition of anti-dumping duties on the home firm could improve both the foreign country's and the home country's welfare. Thus, in the limited case of our model, an interface theory involving the implementation of an AD policy on trade between countries with different cultures and institutions has economic rationales and makes sense. On the other hand, our results might suggest that policymakers should adopt privatization together with an open-door policy, because the domestic consumers will not face a higher domestic price under privatization owing to the open-door policy.

As we considered a mixed duopoly model with an exporting firm in a state of privatization, we find, as an extension of Matsumura (1998)'s result, that partial privatization is optimal even if the public firm is a monopolist in the domestic market. However, we should also consider whether this result holds when the home market is a mixed oligopoly, and the free entry case¹⁰

¹⁰ As shown in Matsumura and Kanda(2005).

needs to be examined as well.

Appendix.

We investigate output change by imposing specific tariff t on the home firm. The home firm's profit function is defined as

$$\pi = p(x)x + q(X + X^*)X - c(x, X) - tX. \quad (\text{A-1})$$

We assume that the home firm intends to maximize Z , as denoted in (4). The first- and second-order conditions with respect to x are the same as (5) and (7), respectively. The first-order condition with respect to X is

$$Z_X = q(X + X^*) + q'X + c' - t = 0, \quad (\text{A-2})$$

where the second-order condition can be satisfied in the same way as in (8). Totally differentiating (5), (A-2) and (9) and setting zero for each, we have

$$Z_{xx}x_t + Z_{xX}X_t + Z_{xX^*}X_t^* = 0, \quad (\text{A-3})$$

$$Z_{Xx}x_t + Z_{XX}X_t + Z_{XX^*}X_t^* = 1, \quad (\text{A-4})$$

$$\pi_{X^*x}^*x_t + \pi_{X^*X}^*X_t + \pi_{X^*X^*}^*X_t^* = 0. \quad (\text{A-5})$$

Using Cramer's law yields

$$x_t = -Z_{xX}\pi_{X^*X^*}^*/A, \quad (\text{A-6})$$

where $Z_{xX} = -c'' < 0$ and $\pi_{X^*X^*}^* < 0$ and also $A < 0$. Thus, $x_t > 0$. As in (A-6), we have

$$X_t = Z_{xx}\pi_{X^*X^*}^*/A < 0, \quad (\text{A-7})$$

$$X_t^* = -Z_{xx}\pi_{X^*X}^*/A > 0, \quad (\text{A-8})$$

where (7), (10), $\pi_{X^*X}^* = q' + q''X^* < 0$ and $Z_{XX^*} = 0$.

References

Chang, W. W. (2005) "Optimal Trade and Privatization Policies in an International Duopoly with Cost Asymmetry", *Journal of International Trade and Economic Development*, Vol.14, No.1, pp.19-24.

Commission of the European Communities (2006) *Communication from the Commission Global Europe: Europe's Trade Defence Instruments in a Changing Global Economy A Green Paper for Public Consultation*, Brussels, http://trade.ec.europa.eu/doclib/docs/2006/december/tradoc_131986.pdf.

Chao, C., Yu, E. S. H. (2006) "Partial Privatization, Foreign Competition, and Optimum Tariff", *Review of International Economics*, Vol.14, pp.87-92.

Davies, S., MucGuinness, A. (1982) "Dumping at Less than Marginal Cost", *Journal of International Economics*, Vol.12, pp.169-182.

Deardorff, A. V. (1990) "Economic Perspective on Antidumping Law", in Jackson, J. H., Vermulst, E. eds, *Antidumping: Law and Practice*, Harvester Wheatsheaf, pp.23-39.

Ethier, W. J. (1982) "Dumping", *Journal of Political Economy*, Vol.90, pp.487-506.

Gruenspecht, H. K. (1988) "Dumping and Dynamic Competition", *Journal of International Economics*, Vol.25, pp.225-248.

Hartigan, J. C. (1994) "Dumping and Signaling", *Journal of Economic Behavior and Organization*, Vol.23, pp.69-81.

Hartigan, J. C. (1996) "Predatory Dumping", *Canadian Journal of Economics*, Vol.29, pp.228-239.

Jackson, J. H., Davey, W. J., Sykes, Jr., A. O. (2002) *Legal Problems of International Economic Relation: Cases, Materials and Text on the National and International Regulation of International Economic Relations*, Fourth Edition, West Group.

Matsumura, T. (1998) "Partial Privatization in Mixed Duopoly", *Journal of Public Economics*, Vol.70, pp.473-483.

Matsumura, T. and Kanda, O. (2005) "Mixed Oligopoly at Free Entry Markets", *Journal of Economics*, Vol.84, pp.27-48.

Niels, G. (2000) "What is Antidumping Policy Really About?", *Journal of Economic Surveys*, Vol.14, pp.467-492.

Pal, D., White, M. (1998) "Mixed Oligopoly Privatization and Strategic Trade Policy", *Southern Economic Journal*, Vol.65, pp.264-282.

Tivig, T., Walz, U. (2000) "Market Share, Cost-Based Dumping and Anti-Dumping Policy", *Canadian Journal of Economics*, Vo..33,pp.69-86.

Wang, L. F. S., Wang, J., Zhao, L. (2009) "Privatization and Efficiency Gain in an International Mixed Oligopoly with Asymmetric Costs", *Japanese Economic Review*, Vol.60, pp.539-559.

Figure 1. Countries where anti-dumping measures were imposed

