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Commercial Policy and Foreign Ownership

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Abstract

To serve the domestic market, foreign multinationals often not only export there but also control local firms through FDI. This paper examines the effects of trade and industrial policies on prices, outputs, profits, and welfare when exports and FDI coexist. Specifically, we focus on the case in which a foreign firm has full control of a local firm through partial ownership. Cross-border ownership on the basis of both financial interests and corporate control leads to horizontal market-linkages through which tariffs and production subsidies may harm a locally-owned firm but benefit a foreign firm. Foreign ownership regulation benefits a locally-owned firm.

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1 Introduction

Cross-border ownership (CBO) is wide spread in various forms in this age of globalization.[1] Often, foreign multinationals undertake foreign direct investment (FDI) in order to control local firms. It is also common for FDI to coexist with exports, through which foreign multinationals not only sell to the local market but also control local firms. A typical example is the automobile industry. For instance, General Motors (GM), which is the 100 percent shareholder of Opel in Germany and Saab in Sweden and a partial shareholder of Daewoo in Korea and Suzuki in Japan and forms a joint venture (JV) in China, also exports GM automobiles to those countries. In particular, all world leading auto makers have been investing in China and simultaneously exporting there.[2]

Given this background, the present paper examines the effects of trade and industrial policies when exports and FDI coexist, in an oligopoly model of three firms. Two domestic firms produce a homogeneous good and compete in the domestic market. A foreign firm (partially) owns one of the domestic firms and also exports a differentiated good to the domestic market. Incorporating control by the foreign firm over the domestic firm into the analysis, we explore how outputs, profits, consumer prices and welfare are affected when a certain policy is adopted, with particular emphasis on the impacts on the independent rival firm.

As in the industrial organization and the antitrust literature (e.g., O'brien and Salop, 2000), we specifically distinguish between financial interest and corporate control.[3] Financial interest refers to the right to receive the stream of profits generated by the firm from its operations and investments. Corporate control refers to the right to make the decisions that affect the firm. In a sole proprietorship, a single economic agent has the right to 100 percent of the profits of the firm. The same agent also has complete control over the company, making the decisions about levels of prices, outputs, investments, where to purchase inputs and locate plants, etc. In the case of partial ownership, no-

[1] From an index complied by Morgan Stanley Capital International, Wojcik (2002, table 1) documents that 711 companies had foreign ownership in 16 northern and western European countries. The share of foreign ownership varies with an average of 61 percent. The highest is Norway at 91 percent and the lowest is Switzerland at 23 percent.

[2] The Chinese government does not allow fully owned foreign automakers. World-leading automakers have been producing in China through joint ventures with local producers.

[3] Krugman and Obstfeld (2006, p.157) also state "The distinctive feature of direct foreign investment is that it involves not only a transfer of resources but also the acquisition of *control*. That is, the subsidiary does not simply have a financial obligation to the parent company; it is part of the same organizational structure."

body has 100 percent ownership. However, a principal shareholder may have 100 percent corporate control. This is the case if a principal shareholder owns more than 50 percent shares. As pointed out by O'brien and Salop (2000), however, it could arise even if the ownership is less than 50 percent.[4]

Taking this into account, we focus on the case in which the foreign firm has full control of a local firm through partial ownership.[5] [6] We find that CBO and corporate control together enable the foreign multinational to shift production so as to evade the burden or even take advantage of commercial policies such as import tariffs and local-production subsidies. As a consequence, such policies may not benefit firms that are 100% locally-owned, and a tariff could lower the prices, that is, the so-called "Metzler paradox" could arise.[7] However, regulating FDI may hurt locally-owned firms in terms of market share and profits under plausible conditions. These counter-intuitive effects are the results of "horizontal" market-linkages generated by CBO on the basis of both financial interests and corporate control.[8] One might think that partial ownership is an insignificant matter as long as the foreign multinational fully controls a local firm. However, we find that the ownership ratio plays a key role in generating such counter-intuitive results.

Our analysis and results lead to important policy implications for countries intending to develop local industries. Many developing countries adopt tariffs, tax holidays and special economic zones to attract FDI. Markusen and Venables (1999) establish circumstances under which FDI is complementary to local industries, using a vertical production structure. In the present paper, our structure is horizontal and we obtain contrasting results. Specifically, if foreign ownership and control are not properly taken into account, domestic firms could lose profits and the government loses revenue. The findings in the present paper complement the literature and we hope they can shed light and inspire more research on trade and industrial policies in the presence of CBO.

There are a number of papers which analyze commercial policies under CBO in

[4] Krugman and Obstfeld (2006, p.157) also say "In U.S. statistics, a U.S. company is considered foreign-controlled, ..., if 10 percent or more stock is held by a foreign company; the idea is that 10 is enough to convey effective control."

[5] In the automobile industry, for example, GM owns 50.9% of GM Daewoo, Daimler owns 85% of Mitsubishi Fuso, and Renault owns 70.1% of Renault Samsung. Renault also owns 44.4% of Nissan and Renault's CEO currently serves as Nissan's CEO.

[6] In Ishikawa et al. (2004), we consider the foreign firm's partial control over a domestic firm.

[7] Only a few studies explore the Metzler paradox under imperfect competition. See Panagariya (1982), Benson and Hartigan (1983), and Ishikawa and Mukunoki (2008).

[8] For partial ownership between vertically related firms (i.e., suppliers and manufacturers), see Morita (2001), for example.

the framework of international oligopoly (see, Lee 1990; Weltzel 1995; and Long and Soubeyran 2001). However, they abstract from issues of corporate control. Subsidiaries only maximize their own profits but ignore what the headquarters is doing and how the headquarter interest is related to those of the subsidiaries. On the other hand, studies such as Waltz (1991) and Ishikawa (1998) deal with full control under the coexistence of exports and FDI, but subsidiaries are 100%-owned by their parent firms, and the parent firm and its subsidiary produce a homogeneous good.[9]

Partial ownership arises due to various reasons such as government regulation, information acquisition, risk aversion, and technology transfer.[10] There has been extensive discussion about what affects ownership structures in the field of organizational economics.[11] It is certainly interesting to analyze why and how partial CBO is formed. However, our focus is rather on the effects of trade and industrial policies. In particular, we are concerned with horizontal market-linkages through these policies. Without the coexistence of exports and FDI, the linkages would not arise.

The rest of the paper is organized as follows. Section 2 sets up the basic model. Section 3 investigates the effects of import tariffs and production subsidies under foreign ownership and control. Section 4 examines foreign ownership regulation. Section 5 explores the impact on national welfare. And section 6 concludes the paper.

2 Model setup

Consider two goods X (say, large cars) and Y (say, small cars), which are imperfect substitutes. Good X is made by a foreign firm f, that exports to the domestic market. In the domestic country, there are two firms d and h, that produce and sell good Y locally. Let us denote the marginal cost of firm i as $c^i (i = f, d \text{ and } h)$, which is constant. Firm f holds firm d's stocks, by a share k $(0 < k \leq 1)$ which is exogenously given. The cost of acquiring the share k is treated as a past sunk cost. This enables us to concentrate

[9] Head and Ries (2008) propose a model of FDI in which headquarters bid to control overseas assets. They derive a gravity alike equation, which is used to estimate the model. They also use its parameters to construct benchmarks for evaluating multilateral inward and outward FDI.

[10] In China, the upper limit of foreign ownership in the auto industry is 50 percent. GM and Toyota established a joint venture, NUMMI, in California in 1984, because GM wanted to learn Toyota's minicar technology while Toyota wanted to establish its plant in the US using GM's marketing network.

[11] Recently, contract theory such as the transaction costs approach and the property rights approach is applied to examine the make-or-buy decisions of firms in "vertically" related markets. Spencer (2005) and Helpman (2006) survey this trade literature.

on the analysis given that firm f has already invested.

The domestic government imposes a specific tariff t on the imported good X and provides a specific subsidy s to the locally produced good Y. Based on the tariff and subsidy, the firms compete in the Cournot fashion. We assume for simplicity that a change in the tariff or subsidy does not affect the ownership ratio, k.[12]

The inverse demands for the imperfectly substitutable goods X and Y are given respectively as

$$p_x = a - x - \gamma(y^d + y^h), \tag{1a}$$

$$p_y = b - (y^d + y^h) - \gamma x, \tag{1b}$$

where p_x and p_y are the prices of goods X and Y, $0 < \gamma < 1$ is a parameter indicating the degree of substitutability between the two goods, a and b are parameters, and x, y^d and y^h are respectively the outputs of firms f, d and h.[13] We define $Y \equiv y^d + y^h$.

Given the above structure, the profit functions of firms f, d and h can be written respectively as

$$\pi^f = (p_x - c^f - t)x + k\pi^d = \pi^x + k\pi^d, \tag{2a}$$

$$\pi^d = (p_y - c^d + s)y^d, \tag{2b}$$

$$\pi^h = (p_y - c^h + s)y^h. \tag{2c}$$

where π^x is the profit earned by selling good X, i.e., $\pi^x \equiv (p_x - c^f - t)x$.

In the following analysis, we specifically focus on the case in which firm f has 100 percent control of firm d and hence the objective function of firm d coincides with that of firm f. That is, we assume

Assumption 1 $\bar{k} \leq k \leq 1$, *where* $\bar{k}$ *denotes the minimum share under which firm* f *can fully control firm* d.

Firm d maximizes (2a) under full control by firm f, and firms f and h maximize their own profits simultaneously and independently, giving rise to the following first

[12] This is typically the case when a cap on foreign ownership is binding both before and after the change. Even without the cap, the foreign ownership ratio does not usually change so often. For example, Renault has been holding 44.4% of Nissan's stock since 2002. Ford acquired 33.4% of Mazda in 1996 and the ratio has not changed since then.

[13] If $-1 < \gamma < 0$ (i.e., the goods are complements), then most of the results obtained below are simply reversed.

order conditions respectively:

$$\begin{aligned}
\frac{d\pi^f}{dx} &= -x + p_x - c^f - t - k\gamma y^d = 0, && \text{(3a)}\\
\frac{d\pi^f}{dy^d} &= k\left(-y^d + p_y - c^d + s - \eta\gamma x\right) = 0, && \text{(3b)}\\
\frac{d\pi^h}{dy^h} &= -y^h + p_y - c^h + s = 0, && \text{(3c)}
\end{aligned}$$

where $\eta \equiv 1/k \geq 1$ is an index of firm f's control over firm d per ownership. Our model nests the conventional framework without foreign control. By setting $\eta = 0$, the first order condition (3b) chooses y^d that maximizes firm d's own profit. The necessary and sufficient conditions for interior solutions are given in the appendix, which also proves lemma 1 below, that is useful for the analysis to follow.

Lemma 1 *The changes of firm profits can be decomposed as:*

$$\begin{aligned}
d\pi^d &= y^d dY + \gamma x \eta dy^d, && \text{(4a)}\\
d\pi^x &= k\gamma y^d dx - x(\gamma dY + dt), && \text{(4b)}\\
d\pi^f &= -(\gamma x + ky^d)dy^h + ky^d ds - xdt. && \text{(4c)}
\end{aligned}$$

3 Tariffs and subsidies under foreign ownership and control

In this section, we analyze the effects of the import tariff imposed on good X and the production subsidy to good Y. Differentiating the first order conditions (3a), (3b) and (3c) to derive:

$$\begin{pmatrix} 2 & \gamma(1+k) & \gamma \\ \gamma(1+\eta) & 2 & 1 \\ \gamma & 1 & 2 \end{pmatrix} \begin{pmatrix} dx \\ dy^d \\ dy^h \end{pmatrix} = \begin{pmatrix} -1 \\ 0 \\ 0 \end{pmatrix} dt + \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} ds, \tag{5}$$

where the determinant of the above matrix $\Delta \equiv 6 - (2+k)\gamma^2 - \eta\gamma^2(1+2k) > 0$ is required for stability.

3.1 Import tariffs

The tariff has the following effects on outputs.

$$\frac{dx}{dt} = -\frac{3}{\Delta} < 0, \tag{6a}$$

$$\frac{dy^d}{dt} = \frac{\gamma(2\eta+1)}{\Delta} > 0, \tag{6b}$$

$$\frac{dy^h}{dt} = -\frac{\gamma(\eta-1)}{\Delta} \leq 0, \tag{6c}$$

$$\frac{dY}{dt} = \frac{dy^d + dy^h}{dt} = \frac{\gamma(2+\eta)}{\Delta} > 0. \tag{6d}$$

Conditions (6a) and (6b) say respectively that an increase in the tariff reduces the output of the foreign firm f but increases that of domestic firm d, which are as expected. However, noting $\bar{k} \leq k \leq 1$, we find a surprising result:

Proposition 1 *An increase in the import tariff on good X reduces firm h's output if and only if $\bar{k} \leq k < 1$ but does not affect it if and only if $k = 1$.*

While the original purpose of the tariff is to help domestic firms, Proposition 1 says that if the foreign multinational is tied up with a domestic firm, the other independent domestic firm could lose market share due to the tariff, contrary to conventional wisdom. A tariff on good X decreases the output of firm f but increases that of firm d. If firms f and d are tied up by partial ownership, this effect will be magnified, because firm f tries to recover the loss through the ownership of firm d. In short, corporate control enables the foreign multinational to shift production to evade the burden of the import tariff.

Now, whether or not y^h increases depends on the scale of the production shifting from x to y^d. Proposition 1 implies that the increase in y^d dominates the decrease in x if $k < 1$. This is because the production shifting is larger under partial ownership than under full ownership. To see this, notice that under partial ownership, y^d is chosen smaller than the level maximizing the profit of firm d. In other words, an increase in y^d has a first order positive effect on the profit of firm d for given outputs of the other firms. Therefore, when firm f recovers its loss by raising the profit of firm d, firm f expands y^d more under partial ownership than under full ownership. As a consequence, firm h's production, y^h, is reduced under partial ownership. Note that if $k = 1$, y^h is unaffected because the two effects from the changes in y^d and x are canceled.

Next, we investigate the effects of the tariff on prices.

$$\frac{dp_x}{dt} = \frac{3-\eta\gamma^2-2\gamma^2}{\Delta} = \frac{\left(3-2\gamma^2\right)k-\gamma^2}{\Delta}, \tag{7a}$$

$$\frac{dp_y}{dt} = -\frac{\gamma(\eta-1)}{\Delta} \leq 0. \tag{7b}$$

From (7a), dp_x/dt is negative if and only if $\bar{k} \leq k < \gamma^2/(3-2\gamma^2)$. In addition, (7b) says that dp_y/dt is always non-positive. Thus, we have

Proposition 2 *An increase in the tariff (i) reduces the price of good Y if and only if $\bar{k} \leq k < 1$; and (ii) also reduces the price of good X if and only if $\bar{k} \leq k < \gamma^2/(3-2\gamma^2)$.*

Proposition 2 is again surprising. Normally when the tariff rises, imports decrease while import prices rise, and the prices of substitutes also rise. However, Proposition 2 implies that both prices can fall following an increase in the import tariff; that is, the Metzler paradox may arise. The intuition can be understood as follows. For (i), conditions (6a) and (6d) state that $dx/dt < 0$ and $dY/dt > 0$. But due to the production shifting of firm f, if k is within the satisfied range, the effect of dY/dt dominates dx/dt in affecting the price of good Y through equation (1b), lowering p_y. For (ii), since the two goods are substitutes, a large decrease in p_y also lowers p_x.

Finally, we turn to the effects of the tariff on profits. Using Lemma 1, we can derive

$$\begin{aligned}
\frac{d\pi^h}{dt} &= 2y^h\frac{dy^h}{dt} \leq 0, \\
\frac{d\pi^d}{dt} &= y^d\frac{dY}{dt} + \gamma x\eta\frac{dy^d}{dt} > 0, \\
\frac{d\pi^x}{dt} &= k\gamma y^d\frac{dx}{dt} - \gamma x\frac{dY}{dt} - x < 0.
\end{aligned}$$

Firm h's profit increases as its output rises. Invoking Proposition 1, the effect of the tariff on firm h's profit is obvious. Since the tariff increases firm d's profit but reduces the profit from selling good X, the change in firm f's total profits is generally ambiguous. The tariff may benefit the foreign firm f, because the output of the locally-owned firm h is reduced. Summarizing the above, we can obtain the following proposition, the mathematical proof of which is contained in the appendix:

Proposition 3 *Suppose that the import tariff increases. Then firm h loses if and only if $\bar{k} \leq k < 1$, but is indifferent if and only if $k = 1$. Firm f gains if $\bar{k} \leq k \leq k_1$, where k_1 is defined by $\gamma^2(k_1+1)(k_1+2) - 6k_1 = 0$, but loses if $k = 1$.*

3.2 Production subsidy

Let us now turn to the impact of the production subsidy. First, on outputs we obtain

$$
\begin{aligned}
\frac{dx}{ds} &= -\frac{\gamma(2+k)}{\Delta} < 0, && \text{(8a)}\\
\frac{dy^d}{ds} &= \frac{2+\eta\gamma^2}{\Delta} > 0, && \text{(8b)}\\
\frac{dy^h}{ds} &= \frac{2-\eta\gamma^2(1+k)}{\Delta} = \frac{\left(2-\gamma^2\right)k-\gamma^2}{k\Delta}, && \text{(8c)}\\
\frac{dY}{ds} &= \frac{4-k\eta\gamma^2}{\Delta} = \frac{4-\gamma^2}{\Delta} > 0. && \text{(8d)}
\end{aligned}
$$

A surprising result is that dy^h/ds in (8c) is negative if and only if $\bar{k} \leq k < \gamma^2/(2-\gamma^2)$. Therefore, the following proposition can be established.

Proposition 4 *An increase in the production subsidy to good Y reduces the output of firm h if and only if $\bar{k} \leq k < \gamma^2/(2-\gamma^2)$.*

This interesting result again stems from the production shifting from x to y^d due to the multinational's control power. Firm f tries to reap more benefits from the production subsidy by decreasing x and increasing y^d.

It should be noted that with the subsidy, the range of k in which firm h reduces its output becomes smaller than in the tariff case. This is because the subsidy affects domestic production directly, while the tariff does it indirectly by first reducing imports.

As expected, the subsidy lowers the prices of both goods as follows:

$$
\begin{aligned}
\frac{dp_x}{ds} &= -\frac{\gamma\left(2-k-k\eta\gamma^2\right)}{\Delta} = -\frac{\gamma\left(2-k-\gamma^2\right)}{\Delta} < 0, && \text{(9a)}\\
\frac{dp_y}{ds} &= -\frac{4-\gamma^2(2+k+k\eta)}{\Delta} = -\frac{4-\gamma^2(3+k)}{\Delta} < 0. && \text{(9b)}
\end{aligned}
$$

These arise because the subsidy gives domestic firms incentives to increase outputs.

As to the profit of firm h, substitutions yield

$$\frac{d\pi^h}{ds} = 2y^h \frac{dy^h}{ds}.$$

That is, the output of firm h decreases if and only if its profit falls. From Lemma 1, the production subsidy increases the profit of firm d, but decreases the profit from selling good X as follows:

$$\begin{aligned}\frac{d\pi^d}{ds} &= y^d\frac{dY}{ds}+\gamma x\eta\frac{dy^d}{ds}>0,\\ \frac{d\pi^x}{ds} &= k\gamma y^d\frac{dx}{ds}-\gamma x\frac{dY}{ds}<0.\end{aligned}$$

The change in firm f's total profits is then generally ambiguous. However, the production subsidy may benefit the foreign firm through two channels. One is firm f's financial interest in firm d and the other is the reduction of firm h's output. Specifically, we can state the following proposition, the detailed proof of which is given in the appendix:

Proposition 5 *If $\bar{k}\le k<\gamma^2/(2-\gamma^2)$ is satisfied, an increase in the production subsidy to good Y reduces the profit of firm h but raises that of firm f.*

4 Regulated foreign ownership

In many developing countries, there exist legal limits on foreign ownership. Our model can be used to analyze such a policy. We focus on the effects on the outside agents, who are not directly involved in the ownership, i.e., the consumer prices and the profit of firm h.

Differentiating the first order conditions (3a), (3b) and (3c) and using $d\eta/dk=-\eta^2$, we obtain

$$\begin{pmatrix} 2 & \gamma(1+k) & \gamma \\ \gamma(\eta+1) & 2 & 1 \\ \gamma & 1 & 2 \end{pmatrix}\begin{pmatrix} dx \\ dy^d \\ dy^h \end{pmatrix}=\begin{pmatrix} -\gamma y^d \\ \eta^2\gamma x \\ 0 \end{pmatrix}dk. \tag{10}$$

4.1 Effects on the outside agents

First, we look into firm h. From the FOCs, foreign ownership changes firm h's profit as follows

$$\frac{d\pi^h}{dk}=2y^h\frac{dy^h}{dk},$$

which depends on the change of firm h's output

$$\frac{dy^h}{dk}=-\frac{\gamma^2y^d(\eta-1)+\eta^2\gamma x\left(2-\gamma^2-k\gamma^2\right)}{\Delta}<0. \tag{11}$$

Thus, we can state:

Proposition 6 *An increase in firm f's ownership share reduces the output and profit of firm h.*

When firm f has full control of firm d, an increase in foreign ownership enables the two to become closer into one entity, thus hurting the rival firm h. Proposition 6 provides interesting policy implications. If firm f has full control of firm d, then regulating foreign ownership helps the locally-owned firm in terms of market share and profits. Notice that this protectionist role of foreign ownership regulation disappears without foreign control. If firm d maximizes its own profit, i.e., $\eta = 0$, then the sign of (11) is reversed.

Next we investigate the consumer prices. From the FOC for firm h, we derive

$$\frac{dp_y}{dk} = \frac{dy^h}{dk}.$$

Using Proposition 6, we obtain:

Lemma 2 *An increase in firm f's ownership share lowers the price of good Y.*

The price of good X changes as follows:

$$\begin{aligned} \frac{dp_x}{dk} &= \frac{\gamma y^d \left(3 - 2\gamma^2 - \eta\gamma^2\right) - \eta\gamma^2 x \left(1 - k(2 - \gamma^2)\right)}{\Delta} \\ &= \frac{\gamma y^d \{\left(3 - 2\gamma^2\right) k - \gamma^2\} - \gamma^2 x \{1 - k(2 - \gamma^2)\}}{k\Delta}. \end{aligned}$$

The sign is ambiguous if $\gamma^2/(3 - 2\gamma^2) < k < 1/(2 - \gamma^2)$ holds. Since $\gamma^2/(3 - 2\gamma^2) < 1/(2 - \gamma^2)$, we have:

Lemma 3 *An increase in firm f's ownership share raises the price of good X if $1/(2 - \gamma^2) \leq k \leq 1$, but lowers it if $k \leq \gamma^2/(3 - 2\gamma^2)$.*

In view of Lemmas 2 and 3, the following Proposition is immediate:

Proposition 7 *Suppose that firm f's ownership share rises. Then the prices of both goods X and Y fall if $\bar{k} \leq k \leq \gamma^2/(3 - 2\gamma^2)$.*

The intuition for Proposition 7 follows from Proposition 6. An increase in foreign ownership strengthens the two firms as a single entity, enabling it to compete with firm h by expanding output, thus lowering the price.

5 Welfare

In this section, we explore the welfare effects of trade and industrial policies under FDI. For computational simplicity, we assume the following on the ownership of the domestic firms.

Assumption 2 *The residual share* $(1-k)$ *of firm d's stocks and all of firm h's stocks are owned by domestic residents.*

We define the domestic welfare W as the sum of the consumer surplus, the domestic firms' profits and the government revenue:

$$W \equiv U(x,Y) - p_x x - p_y Y + \pi^h + (1-k)\pi^d + tx - sY,$$

where $\partial U/\partial x = p_x$ and $\partial U/\partial Y = p_y$. Totally differentiating W yields:

$$\begin{aligned} dW &= -\{xdp_x + ky^d dp_y\} + \{(p_y - c^h)dy^h + (1-k)(p_y - c^d)dy^d\} \\ &\quad +\{tdx + xdt - k(sdy^d + y^d ds)\}. \end{aligned} \tag{12}$$

The three brackets respectively express the terms of trade effect, the resource allocation effect, and the revenue effect.

5.1 Tariff and production subsidy

We are now in a position to state the following proposition, the proof of which is given in the appendix:

Proposition 8 *Suppose that* $s = 0$ *and* $t = 0$ *hold initially. Then, (i) a small tariff on good* X *raises domestic welfare if* $(c^h - c^d) \geq 0$*; and (ii) a small production subsidy to good* Y *enhances domestic welfare if* $\{k - \gamma^2/(2-\gamma^2)\}(c^h - c^d) \leq 0$.

Even though foreign ownership and control cause distortions to outputs, prices and profits, a small tariff or a small production subsidy can shift rents and benefit the domestic country. If $c^d = c^h$, both the tariff and the production subsidy increase domestic welfare, a la Brander and Spencer (1984). If $c^d \neq c^h$, on the other hand, it is not a simple rent-shifting argument. Lahiri and Ono (1988) show in a closed economy that an increase in the output of the more efficient firm and a decrease in the output of the less efficient firm can enhance welfare, and vice versa. Also Neary (1994) demonstrates that when subsidies are justified, they should be given to the more efficient rather than less efficient firms. In our model, this effect also exists, in addition to the effect of rent-shifting. For example, the tariff raises firm d's output and does not increase firm h's output when $\bar{k} \leq k \leq 1$. In this case, if firm d is more efficient than firm h (i.e., $c^h > c^d$), then the tariff improves welfare.

5.2 Foreign ownership regulation

We next examine the effect of the foreign ownership regulation on the host country's welfare. To this end, we need to consider the stock market explicitly. Following Grossman and Hart (1980) and Flath (1991), however, we simply assume a competitive stock price, $\rho = \pi^d$ (where ρ is the price of firm d's stock), under which the domestic stockholders are indifferent to sell or buy the stock. Thus, the domestic surplus from the sales of firm d's stock to firm f (i.e., $(\rho - \pi^d)dk$) becomes zero.

Propositions 6 and 7 suggest that the welfare change is generally ambiguous because the consumers and the locally-owned firm are affected in opposite ways from an increase in foreign ownership. When the prices of both goods fall, however, we find that the gain in the consumer surplus dominates the loss in the profit of the local firm. Therefore, we establish the following proposition which is proved in the appendix:

Proposition 9 *Suppose that $s = t = 0$ and $\rho = \pi^d$ hold. An increase in foreign ownership improves the domestic welfare if both $\bar{k} \leq k \leq \gamma^2/(3 - 2\gamma^2)$ and $c^h \geq c^d$ hold.*

6 Concluding Remarks

In a model of cross-border partial ownership, we have investigated the effects of commercial policies (such as import tariffs, production subsidies and regulation on foreign ownership) when exports and FDI coexist. Cross-border ownership on the basis of both financial interests and corporate control leads to horizontal market-linkages, such that the commercial policies may not benefit independent domestic firms, because the foreign firm with corporate control is able to shift production and even take advantage of such policies.

As is conjectured in Salant et al. (1983), CBO may not arise without some synergy effects such as technology transfer. Although it is not explicitly dealt with in our analysis, one may think that technology transfer is reflected implicitly in the marginal costs in our model.[14] Also, since our main interest is in the effects of trade and industrial policies in the presence of partial CBO, we have treated the share of foreign ownership k as exogenously given. This captures the feature of foreign ownership regulation which gives rise to CBO. However, it would be interesting to analyze how such ownership structure is formed and how commercial policies affect them when they are endogenously determined.

[14] We explicitly analyze the issue of technology transfer under partial foreign ownership elsewhere (Ishikawa et al., 2006).

We have assumed that goods X and Y are produced in the two countries separately. One could allow either country to produce both goods, but the mechanism of production shifting under foreign ownership and control remains the same, and most of our qualitative results should carry through. Also, we have focused on Cournot competition. However, horizontal market-linkages are not unique to Cournot competition. Even under Bertrand competition with differentiated goods, FDI could generate horizontal market-linkages through which tariffs and production subsidies may not benefit locally-owned firms.

Finally, the present paper has focused only on horizontally related firms. In the tradition of Markusen (2002) and Qiu and Spencer (2002), it is also interesting to investigate vertically related firms. Our setup of cross-border ownership and control can be applied. These remain fruitful avenues for future research.

Appendix

Interior solution. We provide the necessary and sufficient conditions for x and y^d to have interior solutions. The FOCs and the demand functions yield the equilibrium outputs as

$$x = \frac{3(A-\gamma\delta) - \gamma(B-\delta)(2+k)}{\Delta}, \tag{A1}$$

$$y^d = \frac{(B-\delta)\left(2k+\gamma^2\right) - \gamma(2+k)(A-\gamma\delta)}{k\Delta}, \tag{A2}$$

where $A \equiv a - c^f - t$, $B \equiv b - c^d + s$, $\delta \equiv c^d - c^h$ and $\Delta (> 0)$ is defined in (5).

First, for a given k, (A1) and (A2) give rise to $x > 0$ and $y^d > 0$ if and only if $(A - \gamma\delta) \geq 0$ and

$$u(k) \equiv \frac{3}{(k+2)} > \frac{\gamma(B-\delta)}{(A-\gamma\delta)} > \frac{\gamma^2(2+k)}{(2k+\gamma^2)} \equiv l(k). \tag{A3}$$

Because $u(k) - l(k) = \Delta / \left(2k+\gamma^2\right)(k+2) > 0$, there exist parameters (A, B, δ) for an interior solution when k is given.[15] ■

Proof of Lemma 1. Totally differentiating π^d, π^x and π^f and combining them with

[15] A little manipulation brings $x = 0$ if $u(k) < \gamma(B-\delta)/(A-\gamma\delta)$ and $y^d = 0$ if $l(k) > \gamma(B-\delta)/(A-\gamma\delta)$. From the FOC for firm h, a non-negative δ assures $y^h > 0$ if $y^d > 0$.

the first order conditions above, we obtain

$$\begin{aligned} d\pi^d &= y^d(dp_y + ds) + (y^d + \gamma x\eta)dy^d, \\ d\pi^x &= x(dp_x - dt) + (x + k\gamma y^d)dx, \\ d\pi^f &= d\pi^x + kd\pi^d. \end{aligned}$$

Differentiating firm h's first order condition and the demand functions, we obtain $dp_y + ds = dy^h$, $dp_x = -dx - \gamma dY$, and $dp_y = -dY - \gamma dx$. Then we obtain (7a)-(7c). ■

Proof of Proposition 3 . From Lemma 2, the change of firm f's profit is

$$\begin{aligned} \frac{d\pi^f}{dt} &= -(\gamma x + ky^d)\frac{dy^h}{dt} - x \\ &= -ky^d\frac{dy^h}{dt} - x\left(\gamma\frac{dy^h}{dt} + 1\right). \end{aligned} \tag{A4}$$

Proposition 1 states that the first term in (A4) is non-negative. Using (6c), the second term becomes positive if and only if

$$-k\Delta\left(\gamma\frac{dy^h}{dt} + 1\right) = \gamma^2(k+1)(k+2) - 6k \tag{A5}$$

is positive. The right hand side of (A5) is decreasing in k and is negative at $k = 1$.

■

Proof of Proposition 5. Using firm h's first order condition, $dp_y = dy^h - ds$, equation (4c) in Lemma 1 can be rewritten as

$$\frac{d\pi^f}{ds} = -\gamma x\frac{dy^h}{ds} - ky^d\frac{dp_y}{ds}.$$

The second term is always positive for $k > 0$. Proposition 4 implies that the first term is non-negative if and only if $\bar{k} \leq k \leq \gamma^2/(2-\gamma^2)$.

■

Proof of Proposition 8. Expression (12) can be rewritten as

$$dW = x(dt - dp_x) + (tdx - ksdy^d) + d\omega,$$

where $d\omega \equiv -ky^d(dp_y + ds) + (p_y - c^h)dy^h + (1-k)(p_y - c^d)dy^d$. Given $s = 0$ and $t = 0$ initially, the second term becomes $(tdx - ksdy^d) = 0$. Thus, it is sufficient to show that $(dt - dp_x)$ and $d\omega$ are both positive.

First, recall that $dp_x/ds < 0$ from (9a). In addition, from (7a) we have

$$1 - \frac{dp_x}{dt} = \frac{(3 - k\gamma^2) + 2\eta\gamma^2(1+k)}{\Delta} > 0.$$

Therefore, $(dt - dp_x) > 0$; that is, an increase in the producer price of good X caused by a tariff is less than the tariff rate.

From the FOC for firm h, we derive $dp_y + ds - dy^h = 0$, and from that for firm d, we have $p_y - c^d = y^d + \eta\gamma x$. Thus $d\omega$ can be simplified as

$$\begin{aligned} d\omega &= -ky^d dy^h + (p_y - c^d)(dY - kdy^d) + (c^d - c^h)dy^h \\ &= (1-k)y^d dY + \eta\gamma x(dY - kdy^d) + (c^d - c^h)dy^h. \end{aligned} \quad \text{(A7)}$$

Because $dY/dt > 0$ in (6d) and $dY/ds > 0$ in (8d), the first term in (A7) is positive. The second term is also positive, because

$$\begin{aligned} \frac{dY}{ds} - k\frac{dy^d}{ds} &= \frac{4 - 2k - 2\gamma^2}{\Delta} > 0, \\ \frac{dY}{dt} - k\frac{dy^d}{dt} &= \frac{\gamma\left(\eta - k^2\right)}{\Delta} > 0. \end{aligned}$$

Using Proposition 4, $(c^d - c^h)(dy^h/ds) \geq 0$ if and only if $\{k - \gamma^2/(2-\gamma^2)\}(c^h - c^d) \leq 0$. Similarly, from Proposition 1, $(c^d - c^h)(dy^h/dt) \geq 0$ if and only if $(c^h - c^d) \geq 0$. ■

Proof of Proposition 9. The FOC of firm f, $dp_x = dx + \gamma k dy^d + \gamma y^d dk$, and the inverse demand, $dp_x = -dx - \gamma dY$, can be used to simplify the welfare decomposition (12) as

$$dW = -x(1+2\eta)dp_x + \gamma\eta x dk + (1-k)y^d dY - (c^h - c^d)dy^h. \quad \text{(A8)}$$

In view of Lemma 3, $dp_x/dk < 0$ if $\bar{k} \leq k \leq \gamma^2/(3-2\gamma^2)$. Comparative statics yields $dY/dk = [\gamma^2 y^d(2+\eta) + \eta^2\gamma x\left(2 + k\gamma^2\right)]/\Delta > 0$. Moreover, $dy^h/dk < 0$ if $\bar{k} \leq k \leq \gamma^2/(3-2\gamma^2)$ (recall Proposition 7). Therefore, we obtain $dW/dk > 0$ if both $\bar{k} \leq k \leq \gamma^2/(3-2\gamma^2)$ and $c^h - c^d \geq 0$ hold. ■

References

[1] Benson, Bruce L. and Hartigan, James C. (1983) "Tariffs which Lower Price in the Restricting Country: an Analysis of Spatial Markets," *Journal of International Economics* 15,117–33.

[2] Brander, James A. and Spencer, Barbara, J. (1984) "Tariff Protection and Imperfect Competition", in H. Kierzkowski (eds.) *Monopolistic Competition and International Trade*, Oxford: Clarendon Press, 194-206.

[3] Flath, David (1991) "When is It Rational for Firms to Acquire Silent Interest in Rivals?", *International Journal of Industrial Organization*, 9, pp.573-583.

[4] Grossman, Sanford J. and Hart, Oliver D. (1980) "Takeover Bids, The Free-Rider Problem, and the Theory of the Corporation," *Bell Journal of Economics*, Vo.11, 1, pp.42-64.

[5] Head, Keith and Ries, John (2008) "FDI as an Outcome of the Market for Corporate Control: Theory and Evidence," *Journal of International Economics* 74, 2-20.

[6] Helpman, Elhanan (2006) "Trade, FDI, and the Organization of Firms", *Journal of Economic Literature*, Vol. 44, No. 3, 589-630.

[7] Ishikawa, Jota (1998) "Who Benefits from Voluntary Export Restraints?" *Review of International Economics* 6, 129-141.

[8] Ishikawa, Jota and Mukunoki, Hiroshi (2008) "Effects of Multilateral Trade Liberalization on Prices," *Review of International Economics* 16, 37-44

[9] Ishikawa, Jota, Sugita, Yoichi and Zhao, Laixun (2004) "Commercial Policy under Cross-Boarder Ownership and Control", COE/RES Discussion Paper Series, No. 85, Hitotsubashi University.

[10] Ishikawa, Jota, Sugita, Yoichi and Zhao, Laixun (2006) "Corporate Control, Foreign Ownership Regulation and Technology Transfer," COE/RES Discussion Paper Series No. 193, Hitotsubashi University.

[11] Kang, N. and Sakai, K. (2000) "International Strategic Alliances: Their Role in Industrial Globalization", STI Working Paper 2000/5, OECD.

[12] Krugman, Paul R. and Obstfeld, Maurice (2006) *International Economics: Theory and Policy*, Person, Boston.

[13] Lahiri, Sajal and Ono, Yoshiyasu (1988) "Helping Minor Firms Reduces Welfare", *Economic Journal* 98, 1199-1202.

[14] Lee, Sanghack (1990) "International Equity Markets and Trade Policy", *Journal of Industrial Economics* 29, 173-181.

[15] Long, Ngo Van and Soubeyran, Antoine (2001) "International Cross-Ownership and Strategic Trade Policies", *Review of International Economics* 9, 1-15.

[16] Markusen, James R. (2002) *Multinational Firms and the Theory of International Trade*, Cambridge and London: MIT Press.

[17] Markusen, James R. and Venables, Anthony J. (1999) "Foreign Direct Investment as a Catalyst for Industrial Development", *European Economic Review* 43(2), 335-56.

[18] Markusen, J. R., Venables, A. J., Konan, D. E., and Zhang, K.H. (1996) "A Unified Treatment of Horizontal Direct Investment, Vertical Direct Investment, and the Pattern of Trade in Goods and Services", NBER Working Papers #5696.

[19] Morita, Hodaka (2001) "Partial Ownership Induces Customized Investments under Repeated Interaction: An Explanation of Japanese Manufacturer-Suppliers Relationships", *Scottish Journal of Political-Economy* 48(3), 345-59.

[20] Neary, J. Peter (1994) "Cost Asymmetries in International Subsidy Games: Should Governments Help Winners or Losers?," *Journal of International Economics* 37(3-4): 197-218.

[21] O'brien, Daniel P. and Salop, Steven C. (2000) "Competitive effects of partial ownership: financial interest and corporate control", *Antitrust Law Journal* 67, 559-614.

[22] Panagariya, Arvind (1982) "Tariff Policy under Monopoly in General Equilibrium," *International Economic Review* 23,143–56.

[23] Qiu, Larry D and Spencer, Barbara J.(2002) "Keiretsu and Relationship-Specific Investment: Implications for Market-Opening Trade Policy", *Journal of International Economics* 58, 49-79.

[24] Salant, S., Reynolds, R. and Switzer, S. (1983) "Losses from Merger: The Effects of an Exogenous Change in Industry Structure on Cournot-Nash Equilibrium," *Quarterly Journal of Economics* 98, 185-199.

[25] Spencer, Barbara J. (2005) "International Outsourcing and Incomplete Contracts," *Canadian Journal of Economics* 38, 1107-1135.

[26] Walz, Uwe (1991) "Tariff and Quota Policy for a Multinational Corporation in an Oligopolistic Setting," *Rivista Internazionale di Scienze Economiche e Commerciali* 38, 699-718.

[27] Welzel, P. (1995) "Strategic Trade Policy with Internationally Owned Firms", *Bulletin of Economic Research* 47, 221-232.

[28] Wojcik, Dariusz (2002) "Cross Border Corporate Ownership and Capital Market Integration in Europe: Evidence from Portfolio and Industrial Holdings", *Journal of Economic Geography* 2, 455-91.