REVIEW OF INTERNATIONAL ECONOMICS
Manuscript No: Q02, Acceptance Date: August 27, 2010
Commercial Policy and Foreign Ownership*
Jota Ishikawa
Yoichi Sugita
Laixun Zhao

Abstract

Foreign multinationals often not only export but also control local firms through FDI. This paper examines the various effects of trade and industrial policies when exports and FDI coexist. 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 locally-owned firms but benefit the foreign firm. Foreign ownership regulation benefits locally-owned firms. These results could have strong policy implications for developing countries that attract an increasing share of world FDI.

*Ishikawa: Faculty of Economics, Hitotsubashi University, Kunitachi, Tokyo 186-8601, Japan. Fax: +81-(0)42-580-8882; E-mail: jota@econ.hit-u.ac.jp. Sugita: Stockholm School of Economics, P.O. Box 6501, SE-113 83 Stockholm, Sweden. Tel: +46-8-736-9254; Email: yoichi.sugita@hhs.se. Zhao: RIEB, Kobe University, Kobe 657-8501, Japan. Fax/Tel: +81-78-803-7006; E-mail: zhao@rieb.kobe-u.ac.jp. We thank two anonymous referees, Taiji Furusawa, Hodaka Morita, Takanobu Nakajima, Peter Neary, Takao Ohkawa, Tony Venables, and participants of seminars at a number of universities and conferences for their helpful comments and suggestions on earlier versions of the paper. Ishikawa and Sugita acknowledge financial support from the Ministry of Education, Culture, Sports, Science and Technology of Japan under the Center of Excellence Projects. Any remaining errors are our own responsibility.

JEL Classification Numbers: F12, F13, F23
Abbreviations: CBO, FDI, JV, FOC, LHS
Number of Figures:0, Number of Tables:0
Date: September 2, 2010
Address of Contact Author: Laixun Zhao, RIEB, Kobe University, Kobe 657-8501, Japan; Fax/Tel: +81-78-803-7006; E-mail: zhao@rieb.kobe-u.ac.jp.

1 Introduction

Cross-border ownership (CBO) is wide spread in various forms in this age of globalization.[1] Often, multinationals undertake foreign direct investment (FDI) in order to control local firms, in addition to selling to the local market via exports. For instance, the French company Renault is a partial shareholder of Nissan in Japan, Renault Samsung in Korea and Dacia in Romania, and also forms a joint venture (JV) in China, in addition to exporting to all those countries; 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 local 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. According to the corporate laws in most countries, financial interests and corporate control are not in a one-to-one relationship. A principal shareholder who owns (at least) more than 50 percent of the financial interests may have 100 percent corporate control over the company. Although the manager who makes the decisions about the levels of prices, outputs, investments, where to pur-

chase inputs and locate plants, etc., is often different from the principal shareholder, the manager cannot ignore the interests and opinion of the latter. This tension also arises when exports and FDI coexist. When a foreign firm owns a partial but significant portion of the stocks of a local firm, the local firm may not have the freedom to maximize its own profit if it hurts the export profit of the parent firm.

Taking this into account, we specifically focus on the case in which the foreign firm has full control of a local firm through partial ownership.[4] [5] One may 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 the following counter-intuitive results. 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; Further, a tariff could lower prices, i.e., the so-called "Metzler paradox" could arise.[6] These counter-intuitive effects are the consequences of "horizontal" market-linkages generated by CBO on the basis of both financial interests and corporate control.[7]

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. Using a vertical production structure, Markusen and Venables (1999) establish circumstances under which FDI is complementary to local industries. 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 lose 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.

Partial ownership arises due to various reasons such as government regulation, information acquisition, risk aversion, and technology transfer.[8] There has been extensive discussion about what affects ownership structures in the field of organizational economics.[9] 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.

There are a number of studies that analyze commercial policies under CBO in the framework of international oligopoly (see, Lee 1990; Weltzel 1995; and Long and Soubeyran 2001, among others).[10] However, all these studies abstract from issues of corporate control. Subsidiaries only maximize their own profits and ignore what the headquarters is doing and how the headquarter interest is related to those of the subsidiaries. One may regard this as complete delegation to the subsidiary. However, it seems hard to justify that a parent firm would commit itself to complete delegation in the presence of rival firms.[11] In this paper, therefore, we explore the other extreme case, i.e., no delegation to the subsidiary. We should mention that 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.

Broadly speaking, the paper is also related to a growing literature that highlights how the presence of cross-border arrangements affect trade and FDI policies. A common theme is that there are at least two sources of rents, one is from product market competition, and the other can be from technology transfer (Ghosh and Saha, 2008) or ownership arrangements (Qiu and Spencer, 2002), etc. Policies typically affect these two sources in opposite directions.

The rest of the paper is organized as follows. Section 2 sets up the basic model with foreign

ownership and control. Section 3 investigates the effects of import tariffs and production subsidies. Section 4 examines foreign ownership regulation. Section 5 explores the impact on national welfare. And section 6 concludes.

2 Model setup

Consider two imperfectly substitutable goods X and Y that are sold in the domestic market. Good X is made by a foreign firm, 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.[12] Firm f holds firm d's stocks, by a share k ($0 < k \leq 1$) which is exogenously given.[13] The cost of acquiring the share k is treated as a past sunk cost. This enables us to concentrate on the analysis given that firm f has already invested. Firm i has constant marginal costs $c^i (i = f, d \text{ and } h)$.[14]

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.[15] 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.[16]

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

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

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, a and b are parameters, and x, y^d and y^h are respectively the outputs of firms f, d and h.

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

$$\pi^f \equiv (p_x - c^f - t)x + k\pi^d, \pi^d \equiv (p_y - c^d + s)y^d, \text{and } \pi^h \equiv (p_y - c^h + s)y^h. \tag{2}$$

Define π^x as 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 $k^* \leq k \leq 1$, *where* k^* *denotes the minimum share under which firm* f *can fully control firm d.*

Firm d maximizes π^f under full control by firm f, and firms f and h maximize their own profits simultaneously and independently, giving rise to the following set of first order conditions (FOCs):

$$\frac{d\pi^f}{dx} = -x + p_x - c^f - t - k\gamma y^d = 0, \tag{3}$$

$$\frac{d\pi^f}{dy^d} = k\left(-y^d + p_y - c^d + s - \eta\gamma x\right) = 0, \tag{4}$$

$$\frac{d\pi^h}{dy^h} = -y^h + p_y - c^h + s = 0, \tag{5}$$

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 $\eta = 0$, condition (4) coincides with the FOC for firm d that maximizes its own profit. The second order condition requires

$$\gamma < \frac{2\sqrt{k^*}}{1 + k^*}. \tag{6}$$

That is, the two products must be sufficiently differentiated and firm f cannot control firm d with a tiny share of ownership. If the two goods are homogenous, then firm f will stop either exports or FDI; and if firm f can control firm d with a very tiny share, it will force firm d to exit the market.

In the following, we focus on the case of interior solutions, i.e., the coexistence of exports and FDI. It requires the difference in marginal costs across firms not to be too large. The exact conditions for the interior solustions 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* $d\pi^d = y^d dY + \gamma x \eta dy^d$; $d\pi^x = k\gamma y^d dx - x(\gamma dY + dt)$; $d\pi^f = -(\gamma x + ky^d)dy^h + ky^d ds - xdt$.

The following sections conduct the comparative statistics with respect to tariffs, subsidies, and ownership regulation. Differentiating the FOCs (3), (4) and (5) and using $d\eta/dk = -\eta^2$, we obtain:

$$\begin{pmatrix} 2 & \gamma(1+k) & \gamma \\ \gamma(1+\eta) & 2 & 1 \\ \gamma & 1 & 2 \end{pmatrix} \begin{pmatrix} dx \\ dy^d \\ dy^h \end{pmatrix} = \begin{pmatrix} -1 \\ 0 \\ 0 \end{pmatrix} dt + \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} ds + \begin{pmatrix} -\gamma y^d \\ \eta^2 \gamma x \\ 0 \end{pmatrix} dk \tag{7}$$

where the determinant of the above matrix $\Delta \equiv 6 - (2+k)\gamma^2 - \eta\gamma^2(1+2k)$ is positive from (6).

3 Tariffs and subsidies under foreign ownership and control

In this section, we analyze the effects of a tariff imposed on the imported good X and a production subsidy to domestic good Y, and find that these policies may harm the locally-owned firm h, but benefit the foreign firm f, contrary to the original intentions of these policies.

Import tariffs

A tariff has the following effects on outputs:

$$\frac{dx}{dt} = -\frac{3}{\Delta} < 0, \frac{dy^d}{dt} = \frac{\gamma(2\eta+1)}{\Delta} > 0, \frac{dy^h}{dt} = -\frac{\gamma(\eta-1)}{\Delta} \leq 0, \text{ and } \frac{dY}{dt} = \frac{\gamma(2+\eta)}{\Delta} > 0. \quad (8)$$

We defined $Y \equiv y^d + y^h$. Equations (8) say that an increase in the tariff reduces the output of firm f but increases that of firm d, which are as expected. However, noting $k^* \leq k \leq 1$, we find a surprising result:

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

While the original purpose of a tariff is to help domestic firms, Proposition 1 says surprisingly 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. This counter-intuitive result stems from the production shifting between exports and FDI even though they are not perfect substitutes. 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. Whether or not y^h increases depends on the scale of the production shifting. If the increase in y^d is sufficiently larger than the decrease in x, firm h reduces its output. Since there is no information asymmetry or uncertainty, the result can be understood as a credible threat to firm h in a plain Cournot duopoly model.

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. When firm f holds control over firm d, 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. Furthermore, from (4), this effect is increasing in the control index η, i.e., decreasing in k. 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 a tariff on prices:

$$\frac{dp_x}{dt} = \frac{3 - \eta\gamma^2 - 2\gamma^2}{\Delta} \text{ and } \frac{dp_y}{dt} = -\frac{\gamma(\eta - 1)}{\Delta} \leq 0. \tag{9}$$

From $\eta = 1/k \geq 1$, dp_x/dt is negative if and only if $k^* \leq k < \gamma^2/(3 - 2\gamma^2)$. In addition, (9) 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* $k^* \leq k < 1$*; and (ii) also reduces the price of good X if and only if* $k^* \leq k < \gamma^2/(3 - 2\gamma^2)$.[17]

Proposition 2 is again surprising. Normally when the tariff rises, the imports decrease while the import prices rise, and the prices of substitutes also rise. However, Proposition 2 implies that both prices could 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 (8) 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 (1), 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 a tariff on profits. Using Lemma 1, we can derive:

$$\frac{d\pi^h}{dt} = 2y^h\frac{dy^h}{dt} \leq 0, \frac{d\pi^d}{dt} = y^d\frac{dY}{dt} + \gamma x\eta\frac{dy^d}{dt} > 0, \text{ and } \frac{d\pi^x}{dt} = k\gamma y^d\frac{dx}{dt} - \gamma x\frac{dY}{dt} - x < 0. \quad (10)$$

Firm h's profit increases as its output rises. Invoking Proposition 1, the effect of a tariff on firm h's profit is obvious. Since a 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. A tariff may benefit the foreign firm f, because the output of the locally-owned firm h is reduced.

Summarizing the above, we 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* $k^* \leq k < 1$, *but is indifferent if* $k = 1$. *Firm* f *gains if* $k^* \leq k \leq k_1$, *where* k_1 *is defined by* $\gamma^2(k_1+1)(k_1+2) - 6k_1 = 0$, *but loses if* $k = 1$.

Production subsidies

Let us now turn to the impact of a production subsidy. First, we obtain:

$$\frac{dx}{ds} = -\frac{\gamma(2+k)}{\Delta} < 0, \frac{dy^d}{ds} = \frac{2+\eta\gamma^2}{\Delta} > 0, \frac{dy^h}{ds} = \frac{2-\eta\gamma^2(1+k)}{\Delta} \text{ and } \frac{dY}{ds} = \frac{4-k\eta\gamma^2}{\Delta} > 0. \quad (11)$$

A surprising result is that dy^h/ds in (11) is negative if $k^* \leq k < \gamma^2/(2-\gamma^2)$.

Therefore, the following proposition is established.

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

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 a subsidy, the range of k in which firm h reduces its output becomes smaller than in the tariff case. This is because subsidies affect domestic production directly, while tariffs do it indirectly by first reducing imports.

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

$$\frac{dp_x}{ds} = -\frac{\gamma\left(2-k-k\eta\gamma^2\right)}{\Delta} < 0 \text{ and } \frac{dp_y}{ds} = -\frac{4-\gamma^2(2+k+k\eta)}{\Delta} < 0. \tag{12}$$

The inequalities follow from $k\eta = 1$. These arise because a subsidy gives domestic firms incentives to increase their outputs. As for the profit of firm h, substitutions yield

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

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

$$\frac{d\pi^d}{ds} = y^d\frac{dY}{ds} + \gamma x\eta\frac{dy^d}{ds} > 0 \text{ and } \frac{d\pi^x}{ds} = k\gamma y^d\frac{dx}{ds} - \gamma x\frac{dY}{ds} < 0.$$

The change in firm f's total profits is then generally ambiguous. However, we can specifically state the following proposition, the detailed proof of which is given in the Appendix:

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

The intuition is, a 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.

4 Foreign ownership regulation

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

Effects on the outside agents

First, we look into firm *h*. From the FOCs, foreign ownership changes firm *h*'s profit only through the change in its output:

$$\frac{d\pi^h}{dk} = 2y^h \frac{dy^h}{dk} \text{ and } \frac{dy^h}{dk} = -\frac{\gamma^2 y^d(\eta-1) + \eta^2\gamma x\left(2-\gamma^2-k\gamma^2\right)}{\Delta} < 0. \tag{13}$$

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 especially 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 (13) is reversed.

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

$$\frac{dp_y}{dk} = \frac{dy^h}{dk} \text{ and } \frac{dp_x}{dk} = \frac{\gamma y^d \left(3 - 2\gamma^2 - \eta\gamma^2\right) - \eta\gamma^2 x\left(1 - k(2 - \gamma^2)\right)}{\Delta}.$$

Using Proposition 6, the price of good Y always falls. From $\eta = 1/k$, the change in the price of good X 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:

Proposition 7 *Suppose that firm f's ownership share rises. (1) The price of good Y falls. (2) The price of good X rises if* $1/(2 - \gamma^2) \leq k \leq 1$, *but falls if* $k \leq \gamma^2/(3 - 2\gamma^2)$. *(3) The price of both goods fall if* $k^* \leq k \leq \gamma^2/(3 - 2\gamma^2)$.

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 $\partial U/\partial Y = p_y$.

Tariffs and production subsidies

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* $\{k - \gamma^2/\left(2 - \gamma^2\right)\}(c^h - c^d) \leq 0$ *holds.*

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. A tariff raises firm d's but not firm h's output when $k \leq 1$ (Proposition 1).

A subsidy does so if $k \leq \gamma^2/\left(2-\gamma^2\right)$ (Proposition 4). In these cases, if firm d is more efficient than firm h (i.e., $c^h > c^d$), then a tariff and a subsidy improve welfare. On the other hand, if $k > \gamma^2/\left(2-\gamma^2\right)$, a subsidy raises firm h's but reduces firm d's output. Then domestic welfare increases when firm h is more efficient than firm d. As in the usual arguments on the optimal commercial policies, only sufficiently low tariffs and subsidies can raise the welfare, because the dead weight loss eventually dominates the welfare gains discussed above as tariffs and subsidies increase to above certain levels.

Foreign ownership regulation

We next examine the effect of the foreign ownership regulation on domestic 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* $\rho = \pi^d$. *An increase in foreign ownership improves domestic welfare if both* $k^* \leq k \leq \gamma^2/(3-2\gamma^2)$ *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 the 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 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 model, one may think that technology transfer is reflected implicitly in the marginal costs,which should be lower for the firm under foreign ownership than the independent locally-owned firm.[18]

Since our main interest is in the effects of trade and industrial policies under 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. It would be interesting to analyze how such ownership structure is formed and how commercial policies affect them when they are endogenously determined. If commercial policies facilitate foreign ownership as in the argument for tariff-jumping FDI, then Proposition 6 implies that the increase in foreign ownership will enhance the backfiring effects of tariffs and subsidies on independent domestic firms.

We have specifically focused on the case in which the foreign firm has full control of a local firm through partial ownership without delegation, and showed that results differ from those under full ownership. It would be interesting to explore the case with partial control and/or partial delegation. Depending on how control rights are modeled, the objective function of the local firm

may not coincide with that of the foreign firm.

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, even under Bertrand competition with differentiated goods instead of Cournot competition as adopted here, FDI could generate horizontal market-linkages through which tariffs and production subsidies may not benefit locally-owned firms.

Finally, the present paper examined 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. Here we provide conditions for the three firms to produce positive outputs. First, the FOCs and the demand functions yield the equilibrium outputs of firms f and d as $x = [3(A-\gamma\delta) - \gamma(B-\delta)(2+k)]/\Delta$ and $y^d = \left[(B-\delta)\left(2+\eta\gamma^2\right) - \gamma(2\eta+1)(A-\gamma\delta)\right]/\Delta$, 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 (7).For a given k, $x > 0$ and $y^d > 0$ if and only if $A \geq \gamma\delta$ and $\gamma(B-\delta)/(A-\gamma\delta) \in (l(k), u(k))$, where $u(k) \equiv 3/(k+2)$ and $l(k) \equiv \gamma^2(2\eta+1)/\left(2+\gamma^2\eta\right)$. Because $u(k) - l(k) = \Delta/\left(2+\eta\gamma^2\right)(k+2) > 0$ from (4), there exist parameters (A, B, δ) for an interior solution when k is given.[19] Second, from the FOCs the output of firm h can be written as $y^h = p_y - c^h + s = \gamma\eta x + y^d + \delta$. Therefore, $y^h > 0$ as long as both x and y^d are positive and δ is not too negative. If δ takes a large negative value, then firm h exits as

in the standard Cournot competition model. ■

Proof of Lemma 1. Totally differentiating π^d, π^x and π^f and combining them with the FOCs above, we obtain: $d\pi^d = y^d(dp_y + ds) + (y^d + \gamma x\eta)dy^d$, $d\pi^x = x(dp_x - dt) + (x + k\gamma y^d)dx$, and $d\pi^f = d\pi^x + kd\pi^d$. Differentiating firm h's FOC and the demand functions gives $dp_y + ds = dy^h$, $dp_x = -dx - \gamma dY$, and $dp_y = -dY - \gamma dx$. Then we obtain the expressions in the Lemma. ■

Proof of Proposition 3 . From (9), the change in firm f's profit is $d\pi^f/dt = -ky^d\left(dy^h/dt\right) - x\left(1 + \gamma dy^h/dt\right)$. Proposition 1 states that $\left(dy^h/dt\right)$ is non-positive. Using (8), $\left(1 + \gamma dy^h/dt\right)$ becomes negative if and only if $k\Delta\left(1 + \gamma dy^h/dt\right) = -\left[\gamma^2(k+1)(k+2) - 6k\right]$ is negative. The expression $\left[\gamma^2(k+1)(k+2) - 6k\right]$ is decreasing in k and is negative at $k = 1$. ■

Proof of Proposition 5. Using firm h's FOC, $dp_y = dy^h - ds$, Lemma 1 leads to $d\pi^f/ds = -\left[\gamma x\left(dy^h/ds\right) + ky^d\left(dp_y/ds\right)\right]$. The term dp_y/ds is always negative. Proposition 4 implies that $dy^h/ds > 0$ if and only if $k^* \leq k \leq \gamma^2/(2-\gamma^2)$. ■

Proof of Proposition 8. Totally differentiating W at $t = s = 0$ yields $dW = x(dt - dp_x) + d\omega$,where $d\omega \equiv -ky^d(dp_y + ds) + (p_y - c^h)dy^h + (1-k)(p_y - c^d)dy^d$.The following will show that $(dt - dp_x)$ and $d\omega$ are both positive. First, recall that $dp_x/ds < 0$ from (12). In addition, from (9) we have $1 - (dp_x/dt) = [(3 - k\gamma^2) + 2\eta\gamma^2(1+k)]/\Delta > 0$. Therefore, $(dt - dp_x) > 0$; that is, the increase in the producer price of good X caused by a tariff is less than the tariff itself. Second, from the FOC for firm h, we derive $dp_y + ds - dy^h = 0$, and from the FOC for firm d, we have $p_y - c^d = y^d + \eta\gamma x$. Thus, $d\omega$ can be simplified as

$$d\omega = (1-k)y^d dY + \eta\gamma x(dY - kdy^d) + (c^d - c^h)dy^h. \tag{14}$$

Because $dY/dt > 0$ in (8) and $dY/ds > 0$ in (11), the first term in (14) is positive. The second term

is also positive, because $dY/ds - k\left(dy^d/ds\right) = \left[4 - 2k - 2\gamma^2\right]/\Delta > 0$ and $dY/dt - k\left(dy^d/dt\right) = \gamma\left(\eta - k^2\right)/\Delta > 0$. 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 for 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 as $dW = -x(1 + 2\eta)dp_x + \gamma\eta x dk + (1-k)y^d dY - (c^h - c^d)dy^h$. In view of Proposition 7, $dp_x/dk < 0$ if $k^* \leq k \leq \gamma^2/(3 - 2\gamma^2)$. 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 $k^* \leq k \leq \gamma^2/(3 - 2\gamma^2)$ (recall Proposition 6). Therefore, we obtain $dW/dk > 0$ if both $k^* \leq k \leq \gamma^2/(3 - 2\gamma^2)$ and $c^h - c^d \geq 0$ hold. ■

Ad valorem tariffs and subsidies. They have similar effects as specific tariffs and subsidies do in the present paper. Suppose that the government imposes $t \times 100\%$ of ad valorem tariffs and $s \times 100\%$ of production subsidies. Define $T \equiv (1 + t)$ and $S \equiv (1 + s)$. The FOCs are

$$\begin{aligned}
\frac{d\pi^f}{dx} &= T^{-1}\left[-x + p_x - Tc^f - (kST)\gamma y^d\right] = 0, \\
\frac{d\pi^f}{dy^d} &= kS\left(-y^d + p_y - S^{-1}c^d - \eta(ST)^{-1}\gamma x\right) = 0, \\
\frac{d\pi^h}{dy^h} &= S\left(-y^h + p_y - S^{-1}c^h\right) = 0.
\end{aligned}$$

Differentiating the FOCs derives the comparative statics with respect to trade policies. The back-firing effect of tariffs on the output of firm h holds as long as S and T are not too large:

$$\frac{dy^h}{dT} = -\frac{\gamma((ST)^{-1}\eta - 1)}{\Lambda}\left(c^f + kS\gamma y^d\right) \leq 0 \text{ if } \eta > ST,$$

where the matrix $\Lambda \equiv 6 - (2 + STk)\gamma^2 - (ST)^{-1}\eta\gamma^2(1 + 2kST)$ is positive from the SOC. The

backfiring effect of subsidies also holds if the levels of tariffs and subsidies are sufficiently small and firm *d*'s marginal cost is not too much lower than firm *h*'s, for

$$\frac{dy^h}{dS} = \left[\frac{\left(2-\gamma^2\right)kST-\gamma^2}{k\Lambda ST}\right]c^f - \left(\delta+\eta T^{-1}\gamma x\right)\left(\frac{2-\gamma^2(1+k)}{\Lambda}\right)$$

becomes negative if $k < \gamma^2 / \left[ST\left(2-\gamma^2\right)\right]$ and $\delta \equiv c^d - c^h \geq 0$. ■

References

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

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

Flath, David, "When is It Rational for Firms to Acquire Silent Interest in Rivals?" *International Journal of Industrial Organization* 9 (1991): 573-83.

Ghosh, Arghya and Souresh Saha, "Trade Policy in the Presence of Technology Licensing," *Review of International Economics* 16 (2008): 45-68.

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

Helpman, Elhanan, "Trade, FDI, and the Organization of Firms," *Journal of Economic Literature* 44 (2006): 589-630.

Huizinga, Harry and Soren Bo Nielsen, ”Capital Income and Profit Taxation with Foreign Ownership of Firms,” *Journal of International Economics* 42 (1997): 149-65.

Ishikawa, Jota, “Who Benefits from Voluntary Export Restraints?” *Review of International Economics* 6 (1998): 129-141.

Ishikawa, Jota and Mukunoki, Hiroshi,“Effects of Multilateral Trade Liberalization on Prices,” *Review of International Economics* 16 (2008): 37-44.

Ishikawa, Jota, Yoichi Sugita and Laixun Zhao, “Commercial Policy under Cross-Boarder Ownership and Control,” COE/RES Discussion Paper Series, No. 85, Hitotsubashi University, 2004.

Ishikawa, Jota, Yoichi Sugita and Laixun Zhao, “Corporate Control, Foreign Ownership Regulation and Technology Transfer,” *Economic Record* 85(2009): 197-209.

Kang, Nam-Hoon and Kentaro Sakai, “International Strategic Alliances: Their Role in Industrial Globalization,” STI Working Paper 2000/5, OECD, 2000.

Krugman, Paul R. and Maurice Obstfeld, *International Economics: Theory & Policy*, 8th Edition, Person, Boston, 2009.

Lahiri, Sajal and Yoshiyasu Ono, “Helping Minor Firms Reduces Welfare,” *Economic Journal* 98(1988): 1199-1202.

Lee, Sanghack, “International Equity Markets and Trade Policy,” *Journal of Industrial Economics* 29 (1990): 173-181.

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

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

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

Markusen, James R., Anthony J. Venables, Denise Eby Konan, Kevin H. Zhang"A Unified Treatment of Horizontal Direct Investment, Vertical Direct Investment, and the Pattern of Trade in Goods and Services," NBER Working Papers #5696, 1996.

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

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

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

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

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

Salant, Stephen W., Sheldon Switzer and Robert J. Reynolds, “Losses from Merger: The Effects of an Exogenous Change in Industry Structure on Cournot-Nash Equilibrium,” *Quarterly Journal of Economics* 98 (1983): 185-99.

Spencer, Barbara J., “International Outsourcing and Incomplete Contracts,” *Canadian Journal of Economics* 38 (2005): 1107-35.

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

Welzel, Peter, “Strategic Trade Policy with Internationally Owned Firms,” *Bulletin of Economic Research* 47 (1995): 221-32.

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

Notes

[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 JVs with local producers.

[3]Krugman and Obstfeld (2009, p.163) also state "The distinctive feature of FDI 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."

[4]In the automobile industry, for example, General Motors owns 70% of GM Daewoo, Daimler owns 85% of Mitsubishi Fuso, and Renault owns 70.1% of Renault Samsung and 99.4% of Dacia. Renault also owns 44.4% of Nissan and Renault's CEO currently serves as Nissan's CEO.

[5]The working paper version of the current paper, Ishikawa et al. (2004), also considers the foreign firm's *partial* control over a domestic firm.

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

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

[8]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 technologies while Toyota wanted to use GM's marketing network. However, NUMMI was closed down in 2010.

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

[10]Huizinga and Nielsen (1997) examine optimal rules for capital income and profit taxation in an open economy with or without foreign ownership of domestic firms.

[11]One way to make complete delegation credible is to own non-voting stocks of subsidiaries.

[12]We assume for simplicity that consumers consider domestic products (say, compact cars) to be homogeneous but they are differentiated from foreign product (say, full size cars). Even if domestic products are differentiated, the essence of our results would not change as long as the degree of substitutability between domestic products is not too small.

[13]As a referee points out, in a setting where one examines which firm the foreign multinational should choose as a partner, firm h could be picked instead. Here our focus is on how commercial policies intended to protect domestic firms may fail, instead of on the multinational's choices.

[14]Foreign owned plants are often more productive than independent local plants in developing countries, but the opposite could be true in developed countries. For instance, Toyota, could be more productive than Nissan, which is (partially) owned by Renault. Nevertheless, we have in mind the host country as a developing country in the present paper.

[15]The appendix shows our main results hold under ad valorem tariffs and subsidies.

[16]This is typically the case when a cap on foreign ownership is binding both before and after the change.

[17]Proposition 2 and the following propositions implicitly require k^* not to be too large compared with γ^2 (e.g. $k^* < \gamma^2/(3-2\gamma)^2$). These restrictions are compatible with another restriction by the second order condition (6), in the sense that there exits a range of (k^*, γ^2) that simultaneously satisfy all restrictions.

[18]We explicitly analyze the issue of technology transfer under partial foreign ownership elsewhere (Ishikawa et al., 2009).

[19]A little manipulation brings $x = 0$ if $u(k) < \gamma(B-\delta)/(A-\gamma\delta)$ and $y^d = 0$ if $l(k) > \gamma(B-\delta)/(A-\gamma\delta)$.