External Trade Liberalization and Economic Growth

in a Free Trade Area:

Cases of Exogenous and Endogenous FDI Policy*

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Abstract

This paper is the first attempt to investigate whether preferential trade agreements promote or hinder multilateral trade liberalization by taking into consideration the determination of foreign direct investment (FDI) policy. In a static three-country model of free trade area (FTA), we investigate whether the optimal external tariff rate rises or declines by economic growth. Given FDI cost exogenously, the external tariff rate declines by an expansion of the FTA market but rises by an improvement of home and inside firms’ productivity. If FDI policy is endogenously determined, the results are almost opposite; the external tariff rate rises by an expansion of the FTA market and by an improvement of home firms’ productivity, but declines by an improvement of inside firms’ productivity. Economic growth in an FTA has complicated implications for external trade liberalization, depending on whether FDI policy is exogenous or endogenous.

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1. Introduction

The proliferation of preferential trade agreements (PTAs) has attracted considerable attention during the last 20 years because it can be either a “building block” or a “stumbling block” toward multilateral trade liberalization. The large theoretical literature has given ambiguous results, showing that regional agreements could provide incentives for and against unilateral trade liberalization toward nonmembers. Some studies find that countries are likely to reduce their external tariffs after forming a free trade area (FTA). This result has been derived both under the assumption that governments chooses tariffs to maximize economic welfare (Freund 2000; Bond, Riezman and Syropoulos 2004) and in political-economy settings (Richardson 1993; Ornelas 2005). However, Cabot, de Melo and Olarreaga (1999) pointed out that at least one member of an FTA could raise external tariffs if the general equilibrium effect on wage rate is sufficiently strong.

A natural way to go beyond this theoretical deadlock should be to empirically evaluate the consequences of PTA for external tariff liberalization. Although such empirical studies are still scarce, Estevadeordal, Freund and Ornelas (2008) find that preferential tariff reduction in a given sector leads to a reduction in the external tariff in that sector, using industry-level data of Latin American countries from 1990 to 2001. However, Limao (2006) provides the systematic evidence, based on detailed data of U.S. tariffs, that the direct effect of U.S. PTAs was to
generate a stumbling block to its own multilateral liberalization. Thus this is still an open question both theoretically and empirically.

This paper provides new theoretical insight about whether PTAs promote or hinder unilateral trade liberalization toward nonmembers from the two viewpoints that have never been taken in the previous literature. First, we investigate whether the external tariff rate set by home government will increase or decrease when economic factors within an FTA change. Indeed, when exploring whether FTAs promote or hinder external trade liberalization, it is of fundamental importance to compare the pro-FTA (most favored nation: MFN) tariff rate and post-FTA (external) tariff rate as in previous studies. However, for the last two decades, many FTAs have, not only been formed, but also been continued to exist. Then economic factors concerning these FTAs, such as a size of the market (demand) and productivities of inside and outside firms of the FTA, must have probably changed during these periods (At least, it would be strange to suppose that they remain unchanged at all over time). We thus consider whether these factors reflecting economic growth will raise or lower the optimal external tariff rate of an FTA.

Second, while previous theoretical literature has focused on the determination of trade policy only, we take into account an endogenous determination of foreign direct investment
Many previous studies assume that FDI cost is exogenous. Indeed some FDI costs cannot be controlled by governments, but others can. For example, information costs for gathering eligible workers in an FDI-recipient country can be reduced if the government of that country provides useful information to foreign firms. As another example, if the government simplifies the administrative procedures for getting permission for FDI, firms outside the FTA are more easily able to have production plants within the FTA. It would be rather natural to relax the assumption of exogenous FDI costs. In this paper, we assume that home government can choose a fixed cost, as an FDI policy, that an outside firm must incur to have production plants in the home country.

More specifically, this paper derives the optimal external tariff rates in a three-country model of an FTA, in which consumers are present only in the home country and each country has only one firm. An outside firm may supply, either by exporting or by FDI, homogeneous goods to the home market. We investigate how the optimal external tariffs may change when the FTA market expands and the marginal productivity of firms improves. First, we consider the case where the FDI cost is exogenous to home government which an outside firm must incur in order to have production plants in the FTA. Next, we proceed to the case where the home government can choose a fixed cost, as an FDI policy.

1 Recent research on FTAs focuses on tariff revenue competition among countries within an FTA (Ikema (1992), Richardson (1995), Furusawa and Jinji (2007) and on the effects of the rules of origin (Ishikawa et al. (2007))). However, they do not take into account the relation to FDI policy.
An interesting finding is that the properties of the optimal external tariff rate may change drastically when *endogenizing* FDI policy. First, when FDI cost is *exogenous*, if that cost is sufficiently low, the optimal external tariff rate is the critical rate at which an outside firm switches their supply mode from exporting to FDI. This tariff rate (i) *lowers* by economic growth in terms of an expansion of the home market. The optimal external tariff rate *rises* by economic growth in terms of an improvement of productivity (a reduction in marginal costs) of (ii) home and (iii) inside firms of an FTA. These results suggest that economic growth in an FTA may have opposite effects on the external trade liberalization, depending on what the growth means. (iv) A reduction in productivity of an outside firm (due to trade diversion) raises the optimal external tariff rate.

Second, when FDI policy is *endogenously* determined, the optimal external tariff rate is the tariff rate at which home welfare is maximized when outside firms choose to export. In contrast to the case of exogenous FDI policy, this tariff rate (i) rises by economic growth in terms of an expansion of in the home market demand. (ii) The optimal external tariff rate rises by an improvement of home firm’s productivity. These results suggest that economic growth of home country will hinder external trade liberalization. (iii) An improvement of inside firm’s productivity and (iv) a reduction in outside firm’s productivity reduce the optimal external tariff rate, i.e., promote external trade liberalization. We will explain that even if we incorporate
technological spillovers concerning outside firm’s FDI, these findings remain intact.

Let us mention that an endogenous determination of FDI policy in this paper is a new attempt in the strand of research on PTAs, even though the determination of trade and FDI policies has been extensively studied in the literature on strategic trade policy under imperfect competition (e.g., Brander and Spencer (1987)). In the context of FTAs, however, only a small number of studies have considered how external tariffs may be related to FDI. Heinrich and Konan (2000) examined how preferential trade agreements might affect outside firms’ incentive for FDI into the preferential trading area in a three-country partial equilibrium model. They showed that the amount of investment depends on the initial trade barriers. Because their model is of monopolistic competition with a zero-profit equilibrium, they ignore strategic interdependence among firms and the profit-shifting effect from the outside country. Taking strategic interdependence among firms into account, Donnenfeld (2003) analyzed a Cournot model with \( n \) countries. He showed that when two trading blocks are formed, if outside firms can supply goods not only by exporting but also by FDI, all interblock trade may cease (complete trade diversion) and be replaced by interblock FDI (investment creation), thus shrinking world output. He also showed that a tariff war among regional blocks would be avoided and world welfare could be improved. Montout and Zitouna (2005) considered how economic integration of north and south countries with wage differentials may affect the
behaviors of inside and outside firms of an FTA in a three-country model. They analyzed what factors would affect the tariff-jumping motive and the export-platform motive, and examined how the strategies of inside firms of an FTA might affect outsiders’ strategies, and vice versa. These three studies all assumed FDI costs are exogenous and cannot be controlled by government or firms. They did not consider the determination of FDI policy.

In contrast, Hoekman and Saggi (2003) introduced the possibility of endogenous determination of FDI policy and trade policy. Although they used a model not of FTA but of strategic trade policy in which home and foreign firms compete à la Cournot in the home market, they assumed that zero import tariffs were imposed by the WTO or by an FTA. They found that foreign firms would choose the efficient mode of supply (exports or FDI) even if the domestic government is constrained only in its ability to use trade (FDI) policy, and is free to set its FDI (trade) policy. The main focus of Hoekman and Saggi (2003) was on whether outside firms’ choice of supply mode could be inefficient. They did not consider what kind of trade policy would be implemented and combined with FDI policy.

2. The Model

We consider a three-country model, in which home country (H) and partner country (P) form an FTA and a firm in the rest of the world (country W) may supply homogeneous goods to the
home market either by exporting or by FDI. Consumers are present only in country H. The inverse demand function in the home market is assumed to be \( p = A - [Y_H + Y_P + Y_W] \), where \( p \) is a market price, \( A \) is a positive constant representing a size of market demand, \( Y_i \) is firm \( i \)'s output \((i = H, P, W)\). Each country has only one firm. The three firms compete \( \text{à la} \) Cournot in the home market. The marginal costs of firms are constant and represented by \( C_H \), \( C_P \) and \( C_W \), respectively.

**Assumption 1:** \( A > C_H > C_P > C_W \) and \( A - C_H > (C_H - C_P) + (C_H - C_W) \) hold.\(^3\)

We assume \( C_H > C_P > C_W \) in order to induce a triopoly equilibrium where firm W exports goods under external tariffs. The assumption \( A - C_H > (C_H - C_P) + (C_H - C_W) \) ensures that the home market demand \( A \) is large enough for firm H to produce a positive output in equilibrium. Appendix 1 shows that under this assumption the setting of our FTA model can be justified by explaining that Country H has an incentive to form an FTA with Country P, not with Country W, and that the FTA’s external tariff rate is lower than the pro-FTA tariff rate if home market demand \( A \) is large enough, given marginal costs of firms.

\(^2\) If we introduced consumers in Country P as well, we would have to consider tariff revenue competition as in Richardson (1995) and Furusawa and Jinji (2007). Because this would make the point of our analysis obscure, we make use of this assumption.

\(^3\) We obtain the latter inequality by rewriting the condition for \( Y_H^T > 0 \), because \( Y_W^T > 0 \) always holds when \( t = 0 \) (these values are derived later).
Firm W can either export to the home market by paying an external (specific) tariff rate $t$ set by the home government or supply goods from production plants in country H (or country P) by incurring a fixed cost $F$. Clearly, firm P does not engage in FDI in an FTA (because preferential tariff is zero in our model).\(^4\)

The model is a three-stage game. In the first stage, the home government can choose trade and FDI policies. We first consider the case of an exogenous FDI cost $F$ and then proceed to the case in which the home government determines $F$ endogenously as an FDI policy. In the former case, the home government chooses an external tariff rate $t$ only. In the latter case, it chooses the optimal combination of $t$ and $F$.\(^5\) In the second stage, after observing the home government’s choice in the first stage, firm W chooses exporting or FDI. In the third stage, firms H, P and W engage in Cournot competition. We derive the sub-game perfect Nash equilibrium.\(^6\)

Now let us derive the Cournot–Nash equilibrium in the third stage, separating the cases of exporting and FDI.

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\(^4\) In an FTA model with technological spillovers in section 5, firm H’s marginal cost decreases when firm P engage in FDI into country H. However, this only reduces firm P’s market share and profit. Thus firm P will not engage in FDI into country H.

\(^5\) It is assumed that the rules of origin apply strictly: firm W cannot be exempted from an external tariff through “detour trade” by which they export to country P and then supply to the home market.

\(^6\) When $t$ and/or $F$ are high, the duopoly equilibrium with firm H and P can exist in the home market. However, it is meaningless to consider FTAs in this equilibrium because outside firm W plays no role.
2.1. Exporting Equilibrium

We derive the Nash equilibrium when firm W exports to the home market. Firm $j$’s profit function is $\pi_j = \left\{ A - \left[ Y_H + Y_P + Y_W \right] - C_j \right\} Y_j$ ($j = H, P$), while that of firm W is $\pi_W = \left\{ A - \left[ Y_H + Y_P + Y_W \right] - (C_w + t) \right\} Y_W$. Thus the reaction functions of firm H, P and W are, respectively:

$$A - 2Y_H - Y_P - Y_W = C_H$$  \hspace{1cm} (1)

$$A - Y_H - 2Y_P - Y_W = C_P$$  \hspace{1cm} (2)

$$A - Y_H - Y_P - 2Y_W = C_W + t$$  \hspace{1cm} (3)

We obtain the exporting equilibrium values as follows ($T$ means “tariff” or “trade”).

$$Y^T_H = \frac{A - 3C_H + C_P + (C_W + t)}{4}$$

$$Y^T_P = \frac{A + C_H - 3C_P + (C_W + t)}{4}$$

$$Y^T_W = \frac{A + C_H + C_P - 3(C_W + t)}{4}$$

$$P^T = \frac{A + C_H + C_P + (C_W + t)}{4},$$

$$\pi^T_H = \left[ Y^T_H \right] ^2, \hspace{0.5cm} \pi^T_P = \left[ Y^T_P \right] ^2, \hspace{0.5cm} \pi^T_W = \left[ Y^T_W \right] ^2$$  \hspace{1cm} (4)

Under Assumption 1, the equilibrium outputs of firms P and W under free trade are positive. Let us derive the condition under which their equilibrium outputs are positive under a positive tariff $t$. By solving $Y^T_W > 0$ for $t$, we get:

$$t < \left( \frac{4a}{3} \right)$$  \hspace{1cm} (T)
where:

\[ a = A + C_H + C_P - 3C_W. \]

Note that a large value of \( a \) means that, other things being equal, the market demand \( A \) is large, the marginal costs of home firm H and inside firm P are large, or the marginal cost of outside firm W is small.

Under condition (T), home welfare \( V_H^T \) is the sum of consumers’ surplus, firm H’s profit and the tariff revenue from firm W:

\[
V_H^T = \frac{1}{2} \left[ \frac{3A - C_H - C_P + (C_W + t)}{4} \right]^2 + \left[ \frac{A - 3C_H + C_P + (C_W + t)}{4} \right]^2 + \left[ \frac{A + C_H + C_P - 3(C_W + t)}{4} \right] t. \tag{5}
\]

### 2.2. FDI Equilibrium

Next, we derive the Nash equilibrium when firm W engages in FDI. The profit function of firm W is

\[
\pi_W = \left\{ A - \left[ Y_H + Y_P + Y_W \right] - C_W \right\} Y_W - F. \tag{7}
\]

Firm W’s reaction function is

\[ A - Y_H - Y_P - 2Y_W = C_W. \]

We obtain the FDI equilibrium as follows (\( F \) means “FDI”):

\[ Y_W^F = \frac{A - 3C_H + C_P + C_W}{4}. \]

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7 In general, the marginal cost for exporting can be different from that for FDI. To concentrate on the effect of endogenous determination of FDI policy, we assume away this possibility in our model. However, we will incorporate the possibility of technology spillovers from an outside firm’s FDI.
\[ Y_p^F = \frac{A + C_H - 3C_p + C_W}{4} \]
\[ Y_w^F = \frac{A + C_H + C_p - 3C_W}{4} \]
\[ p^F = \frac{A + C_H + C_p + C_W}{4} \],
\[ \pi_H^F = \left[ Y_H^F \right]^2, \quad \pi_p^F = \left[ Y_p^F \right]^2, \quad \pi_w^F = \left[ Y_w^F \right]^2 - F. \] (6)

Because there are no tariff revenues, country H’s welfare \( V_H^F \) is the sum of consumers’ surplus \( S_H^F \) and the firm H’s profit:
\[ V_H^F = S_H^F + \pi_H^F = \frac{1}{2} \left[ \frac{3A - C_H - C_p - C_W}{4} \right]^2 + \left[ \frac{A - 3C_H + C_p + C_W}{4} \right]^2. \] (7)

The necessary and sufficient condition for firm W to produce positive outputs is:
\[ a^2 \geq F. \] (F)

Condition (F) means that firm W’s equilibrium profit of \( \pi_w^F = a^2 - F \) is nonnegative.

2.3. Outside Firm’s Choice between Exporting and FDI

Let us consider firm W’s choice between exporting and FDI in the second stage. Given the Cournot–Nash equilibrium in the third stage, we derive the necessary and sufficient condition for firm W’s profit under exporting to be larger than its profit under FDI. The difference in profit between the two cases is:
\[ \Delta \pi_w = \pi_w^F - \pi_w^E = \left( \frac{3}{4} \right)^2 \left[ t - \frac{4a}{3} \right]^2 - \left( a^2 - F \right). \]
The graph of $\Delta \pi_w$ as a function of $t$ is represented by a parabola in Figure 1, taking the minimum value $-(a^2 - F)$ at $t = \left(\frac{4a}{3}\right)$. By condition (F), this minimum value is negative.

This curve passes through point $F > 0$ on the vertical axis at $t = 0$.

Given condition (T), this choice is meaningful only in the area below $t = \left(\frac{4}{3}\right)a$. We denote by $t_w$ the critical tariff rate at which firm W switches from exporting to FDI. From $\pi_w^T = \pi_w^F$, we obtain:

$$t_w = \left(\frac{4}{3}\right)\left[a - \sqrt{a^2 - F}\right].$$  \hspace{1cm} (8)

Figure 1. Outside Firm Ws’ Choice between Exporting and FDI
**Proposition 1 (Outside Firm W’ Choice):** Suppose that conditions (T) and (F) are satisfied.

*Firm W chooses exporting when the external tariff rate* $t$ *satisfies* $0 < t < t_w$, *while it chooses FDI when the tariff rate* $t$ *satisfies* $t_w < t$, *where* $t_w$ *is given by* (8).

The higher the FDI cost $F$, the higher the critical tariff rate $t_w$. Intuitively, when investment cost $F$ is high, firm W’ gain from choosing exporting is high, because he can avoid incurring the heavy fixed cost. Thus the area $(0, t_w)$ in which firm W have more profit under exporting than under FDI is wider. (We discuss the relations to the other parameters later.)

3. **External Trade Liberalization under Exogenous FDI Cost**

Let us now proceed to home government’s choice of the optimal external tariff rate in the first stage. In this section, we assume that the FDI cost is *exogenous* for the government and derive the tariff rate at which home welfare is maximized. In the next section, we derive the optimal combination of the tariff rate and FDI cost.

3.1. **Optimal External Tariff Rate**

When firm W chooses exporting, the graph of home welfare $V_H^T$ represented by (5) is the parabola in Figures 2–4. The external tariff rate that maximizes $V_H^T$ is:
The maximized home welfare $V_{H}^{T^{*}}$ can be derived by substituting (9) into (5):

$$V_{H}^{T^{*}} = \frac{1}{32} \left[ \frac{(3A - C_{H} + 7C_{P} - 9C_{W})^{2}}{21} + (3A - C_{H} - C_{P} - C_{W})^{2} + 2(3A - 3C_{H} + C_{P} + C_{W})^{2} \right]$$

(10)

When firm W switches to FDI, the home welfare actually attained jumps to the horizontal level $V_{H}^{F}$ represented by (7). We denote by $t_{J}$ the critical external tariff rate at which home welfare is equal between the exporting and the FDI cases ($V_{H}^{T} = V_{H}^{F}$).

Let us derive the optimal external tariff rate, taking into account that the parabola of home welfare is effective only below $t_{W}$. We consider three cases. First, consider the case in Figure 2 when $F$ is large (thus $t_{W}$ is high), that is, $t_{J} \leq t_{W}$ holds. Home welfare moves along the bold parabola as far as $t$ lies below $t_{W}$. When $t$ exceeds $t_{W}$, firm W switches from exports to FDI and thus home welfare jumps to the horizontal line $V_{H}^{F}$. Therefore the optimal tariff rate is $t_{E}$ and the maximized welfare $V_{H}^{T^{*}}$ is actually attained.
Second, consider the case in Figure 3 when $F$ (thus $t_w$) lies in an intermediate range, that is, $t_E \leq t_w < t_f$ holds. Because $t_E \leq t_w$ holds, firm W keeps choosing exporing at $t_E$. Therefore, the optimal tariff rate is $t_E$. 

Figure 2. Case of $t_f \leq t_w$
Third, consider the case in Figure 4 when $F$ is so small (thus $t_w$ is so low) that $t_w \leq t_e < t_l$ holds. In this case, if the home government tries to set the welfare-maximizing tariff rate $t_e$, firm W switches to FDI. Thus $V_{H}^{T^*}$ cannot be attained. Therefore the optimal tariff rate is $t_w$.

We obtain the next proposition.
Proposition 2 (Optimal External Tariff Rate under Exogenous FDI cost): Suppose that the FDI cost $F$ is exogenous. (i) When $F$ is so small that $0 < t_w < t_E$ holds, the optimal external tariff rate for the home country is $t_w$, which corresponds to the value of $F$. (ii) When $F$ is so large that $t_E \leq t_w$ holds, the optimal external tariff rate is $t_E$, regardless of the value of $F$.

In the proceeding analysis, we focus on case (i) with a low FDI cost, where the optimal tariff rate is $t_w$. The reason is two folds. First, FDI costs in real world have been declining because of a dramatic reduction in transport and communication costs in recent years. Second, by comparing $t_w$ to the optimal tariff rate under endogenous FDI policy, we obtain results that
are in sharp contrast to each other.

3.2. Economic Growth and Optimal External Tariff

Now we discuss how the optimal external tariff rate $t_w$ may change by economic growth on the FTA. In order to investigate the effects of a change in the home market demand and in the marginal costs of firm H, P and W, we show that a larger value of parameter $a$ leads to a lower value of the optimal tariff rate $t_w$:

$$
\frac{\partial t_w}{\partial a} = \left(\frac{4}{3}\right)\left[1 - \frac{a}{\sqrt{a^2 - F}}\right] < 0. 
$$

(11)

The intuitive reason can be understood if we focus on the fact that firm W chooses a supply mode by comparing the burden of tariffs and the FDI cost. When the home market demand $A$ increases and/or marginal costs of firm H ($C_{H}$) and firm P ($C_{P}$) rises, firm W’s equilibrium output $Y_w$ increases. Thus firm W’s burden of tariff $tY_w$ increases. The tariff rate $t_w$ that balances the fixed cost $F$ should be lower. The same logic holds when the marginal cost ($C_{W}$) of outside firm W is low.

**Proposition 3 (Economic Growth and External Trade Liberalization under Exogenous FDI)**

**Cost):** Suppose that exogenous FDI cost is so small that the optimal external tariff rate is $t_w$.

*(i)* An expansion of the FTA market (an increase in $A$) leads to a reduction in $t_w$. 

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(ii) An improvement of home firm $H$'s productivity (a reduction in $C_H$) raises $t_w$.

(iii) An improvement of inside firm $P$'s productivity (a reduction in $C_P$) raises $t_w$.

(iv) A reduction in outside firm $W$'s productivity (a rise in $C_W$) raises $t_w$.

If we interpret a reduction in the optimal external tariff rate as a proxy for external (unilateral) trade liberalization, economic growth after a formation of an FTA has somewhat complicated implications for external trade liberalization. Result (i) implies that economic growth in terms of an expansion of the FTA market will promote external trade liberalization. However, result (ii) implies that economic growth in terms of an improvement of home firm’s productivity will hinder it. When $t_e < t_B$ holds, home firm H’s equilibrium output decreases by forming an FTA in our model (Appendix 2). Thus, if we take dynamic economies of scale into consideration, a rise in $C_H$ leads to a reduction in $t_w$. Therefore a reduction in home firm’s (marginal) productivity due to forming an FTA will promote external trade liberalization. From result (iii), economic growth in terms of an improvement of inside firm’s productivity because of trade creation (and dynamic economies of scale) will promote it. Finally, a reduction in outside firm’s productivity, which can happen by trade diversion (and by dynamic economies of scale) will hinder external trade liberalization.
4. Endogenous FDI Policy and External Tariffs

Let us consider the case where the home government can determine FDI policy endogenously.

The home government then chooses the optimal combination of external tariff rate \( t \) and FDI cost \( F \). Remember, from (8), that when the home government raises \( F \) the critical tariff rate \( t_w \) at which firm W switches from exporting to FDI increases.

If the home government increases \( F \) from zero, home welfare increases along the upward part of the parabola in Figures 2–4 by setting \( t_w \) for \( 0 < t_w < t_E \). After \( F \) gets into the range where \( t_E \leq t_w \) holds, the home government keeps choosing \( t_E \). Home welfare thus remains at a constant value \( V_H^{T^*} \), as shown in Figure 5. Therefore we obtain the next proposition.

Figure 5. Change in FDI Cost and Country H’s Welfare
Proposition 4 (Optimal Combination of External Tariff Rate and FDI Policy and Economic Growth): Suppose that the home government can control FDI cost $F$. The optimal combination of the external tariff rate and FDI cost is that of $t_E$ given by (9) and any value of $F$ above $F^*$, where the value of $F^*$ is defined by $t_E = t_w$.

Let us investigate how the optimal external tariff rate $t_E$ will change by an expansion of home market demand and a reduction in firms’ marginal costs. From (9), we obtain the next proposition.

Proposition 5 (Economic Growth and External Trade Liberalization under Endogenous FDI Policy): Consider the case where home government can choose FDI policy $F$ endogenously. Then the optimal external tariff rate is $t_E$.

(i) An expansion of the FTA market (an increase in $A$) leads to a rise $t_E$.

(ii) An improvement of home firm H’s productivity (a reduction in $C_H$) raises $t_E$.

(iii) An improvement of inside firm P’s productivity (a reduction in $C_P$) reduces $t_E$.

(iv) A reduction in outside firm W’s productivity (a rise in $C_W$) reduces $t_E$. 
The intuitive reason for an increase in the optimal tariff rate \( t_E \) is as follows. When the home market demand \( A \) and the marginal cost \( C_p \) of inside firm are large or the marginal cost \( C_w \) of outside firms is small, the outputs of firm W and thus their payment of the tariff is large in the initial equilibrium. This tends to enhance the welfare-improving effect of tariff revenues, and therefore the home government sets the tariff rate \( t \) at a higher level. When home firm H’s marginal cost is small, his output and profit are large in the initial equilibrium. In this situation, firm H’s profit plays a relatively important role in home welfare. Because a rise in external tariff rate increases firm H’s profit, home welfare will increase.

As in the previous section, we could derive implications of economic growth after a formation of an FTA for external trade liberalization. Result (i) implies, contrary to the case of exogenous FDI costs, that economic growth in terms of an expansion of the FTA market will hinder external trade liberalization. From result (ii), economic growth in terms of an improvement of home firm’s productivity will also hinder it (qualitatively the same result as in the case of exogenous FDI costs). When \( t_E < t_B \) holds, home firm H’s equilibrium output decreases by forming an FTA in our model. Thus we suppose that home firm’s marginal productivity declines by dynamic economies of scale. Therefore a rise in \( C_H \) after forming an FTA will promote external trade liberalization (\( t_E \) decreases). Result (iii) implies that economic growth in terms of an improvement of inside firm’s productivity because of trade
creation (and dynamic economies of scale) will promote external trade liberalization. Finally, a reduction in outside firm’s productivity which can happen by trade diversion (and by dynamic economies of scale) will promote external trade liberalization.

Finally, we explore the properties of the optimal FDI policy. The optimal FDI policy $F^*$ is positively correlated with $t_w$. Because the value of $t_w$ should be equal to the tariff rate $t_e$ that maximizes home welfare under firm $W'$ exporting ($t_e = t_w$), the value of $F^*$ should increase whenever $t_e$ increases. Therefore, the optimal FDI cost $F^*$ increases when the home market demand $A$ increases and home firm $W$’s marginal cost decreases. When inside firm $P$’s marginal cost decreases and when outside firm $W$’s marginal cost increases, the optimal FDI cost $F^*$ decreases.

5. FDI with Technology Spillovers and Optimal External Tariff

In this section, let us investigate how our analysis will change when introducing technological spillovers of outside firm $W$’s FDI on home or inside firm in an FTA. We assume that when firm $W$ supplies from country $H$ (resp. $P$), home (resp. inside) firm’s marginal cost $C_H$ (resp. $C_P$) decreases by a positive constant $s_H$ (resp. by $s_P$).\footnote{We implicitly assume that firm $W$ conveys a stock of knowledge on efficient production methods. If it produced new knowledge about efficient production, technology spillover effects would depend on output level.}

We obtain an FDI equilibrium with technological spillovers as follows. Although we should
consider the two cases above separately, we write them in a unified form:

\[
\tilde{Y}_H = \frac{A - 3(C_H - s_H) + (C_p - s_p) + C_W}{4},
\]

\[
\tilde{Y}_P = \frac{A + (C_H - s_H) - 3(C_p - s_p) + C_W}{4},
\]

\[
\tilde{Y}_W = \frac{A + (C_H - s_H) + (C_p - s_p) - 3C_W}{4},
\]

\[
\tilde{P}_F = \frac{A + (C_H - s_H) + (C_p - s_p) + C_W}{4},
\]

\[
\tilde{\pi}_H^F = \left(\tilde{Y}_H \right)^2, \quad \tilde{\pi}_P^F = \left(\tilde{Y}_P \right)^2, \quad \tilde{\pi}_W^F = \left(\tilde{Y}_W \right)^2 - F.
\]

(12)

The necessary and sufficient condition for firm W to produce a positive output is:

\[
[a - (s_H + s_p)]^2 \geq F.
\]

(F')

Country H’s welfare \(\tilde{\pi}_H^F\) is the sum of consumers’ surplus \(\tilde{S}_H^F\) and the firm H’s profit:

\[
\tilde{\pi}_H^F = \tilde{S}_H^F + \tilde{\pi}_H^F = \frac{1}{2} \left[ \frac{3A - C_H - C_p - C_W + (s_H + s_p)}{4} \right]^2 + \frac{1}{2} \left[ \frac{A - 3C_H + C_p + C_W + (3s_H - s_p)}{4} \right]^2
\]

It is not surprising that consumers’ surplus and thus home welfare tends to be larger when technological spillovers are larger. Note, however, that the effects of \(s_H\) and \(s_p\) on consumers’ surplus are the same. It is also a natural result that firm H’s profit increases by a rise in \(s_H\) but decreases by a rise in \(s_p\).

First, consider the case where firm W’s FDI decreases \(C_H\) (\(s_H > 0\) and \(s_p = 0\)). Then

\[
\tilde{\pi}_H^F = \frac{1}{32} \left[ (3A - C_H - C_p - C_W)^2 + 2(A - 3C_H + C_p + C_W)^2 \right]^2
\]

\[
+ \frac{1}{32} \left[ (s_H)^2 + 2(3s_H)^2 + 2(3A - C_H - C_p - C_W)s_H
\]

\[
+ 4(A - 3C_H + C_p + C_W)(3s_H) \right]
\]

Second, consider the case where firm W’s FDI decreases \(C_p\) (\(s_H = 0\) and \(s_p > 0\)). Then
In both cases, the first term represents home welfare $V_H^T$ in free trade ($t=0$). Under Assumption 1, the second term is positive. Therefore, the home welfare under FDI with technological spillovers is higher than that without technological spillovers.

When we incorporate technological spillovers concerning outside firm $W$’s FDI, the home government’s choice of optimal external tariff rate remains qualitatively unchanged. That is, under exogenous FDI costs, the optimal external tariff rate is $t_w$ for low levels of $F$ while it is $t_E$ under endogenous FDI policy. To see this, we will use Figure 6. Suppose that the value of $V_H^F$ lies between $V_H^T$ in free trade ($t=0$) and the maximized home welfare $V_H^{T^*}$. First, we look at the case of exogenous FDI cost. When $F$ is so small (thus $t_w$ is so low) that $t_w \leq t_E$ holds, home government induce firm $W$ to choose FDI and can attain the highest welfare $V_H^F$ by setting an external tariff rate slightly above $t_w$. In this sense, the optimal tariff rate is $t_w$. Next, consider the case of endogenous FDI cost. The home government can choose the welfare-maximizing tariff rate $t_E$ under exporting by selecting $t_w$ equal to $t_E$. Thus $V_H^{T^*}$ is attained.

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9 The value of $V_H^F$ can be above the maximized home welfare $V_H^{T^*}$ under exporting. Then, under exogenous FDI cost, the optimal external tariff rate for low levels of $F$ will be (a tariff rate slightly above) $t_w$ which induces firm $W$ to engage in FDI. Under endogenous FDI policy, the optimal FDI policy will be $F^*=0$. 

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Proposition 6 (Optimal External Tariff Rates under Technology Spillovers): Suppose that the FDI cost $F$ is exogenous. When $F$ is so small that $0 < t_w < t_E$ holds, the optimal external tariff rate for the home country is $t_w$. Suppose that the FDI cost $F$ is endogenous, the optimal external tariff rate is $t_E$. Therefore, the properties of external tariff rates remain the same as in the case without technology spillovers.

6. Concluding Remarks

This paper provides new theoretical insight about whether PTAs promote or hinder unilateral trade liberalization toward nonmembers from the two viewpoints. First we have investigated
whether the external tariff rate set by home government will increase or decrease when economic factors within an FTA change. Second, we consider an endogenous determination not only of trade policy but also of foreign direct investment (FDI) policy.

An interesting finding is that the properties of the optimal external tariff rate may change drastically when endogenizing FDI policy. First, when FDI cost is exogenous, if that cost is sufficiently low, the optimal external tariff rate is the critical rate at which an outside firm switches their supply mode from exporting to FDI. This tariff rate (i) lowers by economic growth in terms of an expansion of the home market. The optimal external tariff rate rises by economic growth in terms of an improvement of productivity (a reduction in marginal costs) of (ii) home and (iii) inside firms of an FTA. These results suggest that economic growth in an FTA may have opposite effects on the external trade liberalization, depending on what the growth means. (iv) A reduction in productivity of an outside firm (due to trade diversion) raises the optimal external tariff rate.

Second, when FDI policy is endogenously determined, the optimal external tariff rate is the tariff rate at which home welfare is maximized when outside firms choose to export. In contrast to the case of exogenous FDI policy, this tariff rate (i) rises by economic growth in terms of an expansion of in the home market demand. (ii) The optimal external tariff rate rises by an improvement of home firm’s productivity. These results suggest that economic growth of home
country will hinder external trade liberalization. (iii) An improvement of inside firm’s productivity and (iv) a reduction in outside firm’s productivity reduce the optimal external tariff rate, i.e., promote external trade liberalization. We will explain that even if we incorporate technological spillovers concerning outside firm’s FDI, these findings remain intact.

In closing, we provide four qualifications of this paper. First, we focused only on the welfare maximization of the home country. This enables us to interpret the economic integration of country H and country P as an FTA, not as a customs union. However, it is important to consider how the total welfare of two countries H and P (we have examined it in Appendix 3) or that of all the three countries may change. Second, we interpreted a fixed FDI cost as an FDI policy. However, FDI policy should be a wider concept. If we allowed the possibility of FDI subsidies, we should take into account the welfare effect of the associated tax collections (see e.g., Ishii (2006)). These problems are left for future research.

Appendix 1: From a Pro-FTA Regime to an FTA Regime

In order to justify the setting and analysis of our FTA model that follows, we derive an equilibrium under a pro-FTA regime. Before a formation of an FTA, the home government sets a common tariff rate \( t_B \) to countries P and W.

Firm H’s profit function is \( \pi_H = \{ A - \{ Y_H + Y_P + Y_W \} - C_H \} Y_H \), while firm k’s profit
functions are \[ \pi_k = \left\{ A - [Y_H + Y_P + Y_W] - (C_k + t_B) \right\} Y_k \] \( (k=P,W) \). Thus the reaction functions of firm H, P and W are, respectively:

\[
A - 2Y_H - Y_P - Y_W = C_H
\]

\[
A - Y_H - 2Y_P - Y_W = C_P + t_B
\]

\[
A - Y_H - Y_P - 2Y_W = C_W + t_B
\]

We obtain equilibrium values under the pro-FTA regime as follows \( (B) \) means “before” FTA.

\[
y_H^B = \frac{A - 3C_H + (C_P + t_B) + (C_W + t_B)}{4}
\]

\[
y_P^B = \frac{A + C_H - 3(C_P + t_B) + (C_W + t_B)}{4}
\]

\[
y_W^B = \frac{A + C_H + (C_P + t_B) - 3(C_W + t_B)}{4}
\]

\[
p_B = \frac{A + C_H + (C_P + t_B) + (C_W + t_B)}{4},
\]

\[
\pi_H^B = \left[ y_H^B \right]^2, \quad \pi_P^B = \left[ y_P^B \right]^2, \quad \pi_W^B = \left[ y_W^B \right]^2
\]

Under Assumption 1, all the three firms’ equilibrium outputs under free trade are positive. Let us derive the condition under which their equilibrium outputs are positive under a positive tariff rate \( t_B \):

\[
t_B < \frac{A + C_H - 3C_P + C_W}{2},
\]

\( (B) \)

Under \( (B) \), the home government maximizes her welfare \( V_H^B \), which is the sum of consumers’ surplus, firm H’s profit and the tariff revenue from firms P and W:

\[
V_H^B = \frac{1}{2} \left[ \frac{3A - C_H - C_P - C_W - 2t_B}{4} \right]^2 + \left[ \frac{A - 3C_H + C_P + C_W + 2t_B}{4} \right]^2
\]
The optimal tariff rate under the pro-FTA regime is:

\[ t_B = \frac{3A - C_H - C_P - C_W}{10} \]

The maximized home welfare under the pro-FTA regime is:

\[ V_{H}^{*} = \frac{1}{32} \left[ (3A - C_H - C_P - C_W)^2 + 2(A - 3C_H + C_P + C_W)^2 \right] \]

Which country will be a FTA partner of home country?

If home country forms an FTA, the partner will be country P. To see why, we should pay attention to the fact that when forming an FTA, eliminating the pro-FTA tariff from one of the two countries (country P or W) has the same effect on consumers’ surplus. Thus we focus on changes in home firm’s profit and tariff revenues. First, firm H’s profit will be larger when a tariff over a rival firm with higher marginal cost (firm P) is eliminated than when a tariff over a rival firm with lower marginal cost (firm W) is eliminated. Second, country H loses less tariff revenues when forming an FTA with country P. This is because firm P’s tariff payment is smaller than firm W’s due to his higher marginal cost (equilibrium output is smaller). Therefore country H will form an FTA with country P rather than with country W.

Does Home Country have an Incentive to form an FTA?

Let us next consider whether country H has an incentive for forming an FTA. We immediately see that country H has higher welfare when forming an FTA and choosing the optimal external tariff rate than when it stays in the pro-FTA regime:

\[ V_{H}^{T*} - V_{H}^{*} = \frac{1}{32} \left[ \frac{(3A - C_H + 7C_P - 9C_W)^2}{21} \right] > 0 \]

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Therefore, country H chooses forming an FTA than staying in the pro-FTA regime.

*Is the optimal external tariff rate lower than the pro-FTA optimal tariff rate?*

Finally, we examine whether the optimal external tariff rate under an FTA is lower than that under the pro-FTA regime. From \( t_B > t_E \), we obtain

\[
33\alpha + 91\beta > 69\gamma
\]

where

\[
\alpha = A - C_H \quad \beta = C_H - C_P \quad \gamma = C_H - C_W
\]

Given \( \gamma \), we draw a line representing the relation between \( \alpha \) and \( \beta \). Combining it with Assumption 1 (\( \beta < \gamma \) and \( \alpha > \beta + \gamma \)), we find the \((\alpha, \beta)\) area that ensures \( t_B > t_E \).

Given marginal costs of firms, the optimal external tariff rate under an FTA is lower than that under the pro-FTA regime if the home market demand is large enough.

**Appendix 2: Directions of Dynamic Economies of Scale**

We examine how each firm’s equilibrium output changes when moving from the pro-FTA regime to the FTA regime. First, a change in home firm H’s output is

\[
Y_H^T - Y_H^B = \frac{t_E - 2t_B}{4}
\]

Since we consider the case when \( t_E < t_B \) holds, this is negative. Thus home firm H decreases its equilibrium output. If we suppose dynamic economies of scale over firms, home firm will decrease its marginal productivity (\( C_{H1} \) increases) after home government forms an FTA. Second, a change in inside firm P’s output is

\[
Y_P^T - Y_P^B = \frac{t_E + 2t_B}{4} > 0
\]
Inside firm P increases its equilibrium output and thus its marginal productivity (C_P decreases) after home government forms an FTA. Third, a change in outside firm W’s output is
\[ Y^T_W - Y^B_W = \frac{2t_E - 3t_E}{4} \]
Outside firm W can either increase or decrease its equilibrium output and thus its marginal productivity (C_W can increase or decrease) after home government forms an FTA. If \( t_E < \frac{2}{3}t_g \) holds, firm W’s output increases and thus we should focus on the case where C_W decreases. When \( \frac{2}{3}t_g < t_E < t_g \) holds, firm W’s output decreases and thus we should focus on the case where C_W increases.

Finally, suppose that home welfare is a proxy for aggregate income, which is a source of market demand. We have already shown above that home welfare under an FTA regime exceeds that under the pro-FTA regime. Thus we could suppose that the home market demand A will increase after the formation of an FTA.

Appendix 3: Optimal Tariff of Customs Union

In the text, we consider the maximization of home welfare when deriving an optimal tariff rate. We can instead maximize the sum of the welfare of country H and P. This means that the optimal external tariff is for a customs union.

The external tariff rate that maximizes \( V_{CU} = V^T_H + V^T_P = V^T_H + \pi^T_H \) is:
\[ t_{CU} = \frac{5A + C_H + C_P - 7C_W}{19} \]

The maximized welfare of customs union is:
\[ V^{*}_{CU} = \frac{1}{32} \left[ \frac{(5A + C_H + C_P - 7C_W)^2}{19} + (3A - C_H - C_P - C_W)^2 + 2(A - 3C_H + C_P + C_W)^2 \right] \]
The tariff rate $t_{CU}$ has different properties from $t_E$. Comparing this to (9), we find the sign of $C_H$ is opposite to the corresponding term in $t_E$. If a PTA (customs union) maximizes total welfare of countries H and P, an improvement of home firm’s productivity increases the optimal external tariff rate $t_{CU}$.

References


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