Expansion of FTA, Overlapping FTA and Market Size

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May 23, 2011

Abstract

This paper investigates whether the formation of bilateral overlapping FTAs between dissimilar countries becomes a building block or a stumbling block for multilateral free trade (MFT). Our main conclusions are as follows: Suppose that a bilateral FTA between symmetric countries is already formed. (i) A bilateral FTA becomes a stumbling block for MFT through overlapping FTAs while it acts as a building block for MFT through expansion of FTA when market sizes of member and nonmember countries are quite similar. (ii) When market size of nonmember country is smaller than that of member countries, then overlapping FTAs leads to MFT while expansion of FTA may or may not. (iii) If the nonmember country of original FTA is large, then expansion of FTA may not achieve MFT while overlapping FTAs cannot. (iv) When the market size of nonmember country is quite large as compared with member countries, MFT never arises through overlapping FTAs, expansion of FTA, and an negotiation of multilateral trade agreement

1   Introduction

In recent times, many countries and regions have attempted to form preferential trade agreements (PTAs). The number of PTAs notified to GATT/WTO in force has increased from 81 in 1993 to 211 as of July 18, 2008; that is, the number of

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PTAs has more than doubled in these 15 years[1]. We observe three noteworthy features of recent PTAs: (i) A majority of the recently established PTAs are bilateral agreements. (ii) Most of the recent PTAs are free trade agreements (FTAs). (iii) FTAs between dissimilar countries have increased, whereas most FTAs were formed between similar countries in the past. According to Fiorentino, Crawford, and Toqueboeuf (2009), as of December 2007, bilateral agreements account for 76% of all PTAs that are notified and in force and 93% of those that are signed and under negotiation[2]. FTAs account for 82% of all PTAs that are notified and in force and 93% of those that are signed and under negotiation. The major clusters of PTAs are North-South PTAs, accounting for 37% of all PTAs notified and in force, and 56% of those that are signed and under negotiation. A majority of overlapping FTAs comprise a number of bilateral FTAs between dissimilar countries, while FTAs between developed countries were generally formed earlier.

These observed features of recent PTAs raise questions regarding whether the formation of a bilateral FTA between dissimilar countries in the existence of FTA between similar countries becomes, as Bhagwati (1993) claimed, "a building block" or "a stumbling block" for multilateral free trade (MFT), and how asymmetry in market size affects the feasibility of FTAs and the realization of MFT through bilateral FTAs[3]. However, to our knowledge, this issue has received little attention, because the above features of PTAs are the latest trends in the global arena. Therefore, taking the recent features of PTAs into account, we investigate how the difference in market size among countries affects the feasibility of MFT. In our paper, we use the expression "building block" to indicate that the formation of a bilateral FTA eventually leads to MFT, while "stumbling block" implies that it hampers the establishment of MFT.

Previous studies have examined some aspects of PTAs[4]. One strand conducts a static analysis of PTAs and investigates the endogenous formation of bilateral FTAs (e.g., Freund 2000; Endoh 2006). In these studies, it has not been determined whether a bilateral FTA leads to MFT. The other strand conducts a dynamic

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[1]These numbers include notifications made under GATT Article XXIV, GATS Article V, and the Enabling Clause. Visit the WTO web page at http://www.wto.org/english/tratop_e/region_e/region_e.htm for further details.

[2]We should note that in Fiorentino, Crawford, and Toqueboeuf (2009), bilateral agreements may include more than two countries when one of them is a PTA itself.

[3]Baldwin (2006) pointed out that the multilateralization of existing and emerging regionalism is required in order to achieve free global trade under circumstances wherein regionalism is permanent and unlikely to change; further, he considered the role of the WTO in the multilateralization of regionalism.

[4]See Bhagwati (1993) and Panagariya (2000) for a survey.

time-pass analysis, as called by Bhagwati (2008), which is related to this paper. This strand considers whether the formation of PTAs serves as a building block or a stumbling block for MFT (e.g., Krishna 1998; Yi 1996, 2000; Ornelas 2005a, 2005b; Aghion, Antràs, and Helpman 2007). These analyses assume that all countries are *symmetric* in most case[5]. These assumptions do not necessarily match the features of recent PTAs; that is, dissimilarity among countries is frequently observed.

Moreover, we should note that, in these analyses, PTA expansion tends to be considered to occur only through expansion in the membership of existing PTAs, and not through the creation of new PTAs. As Mukunoki and Tachi (2006) investigated that another way of expanding PTAs exists, the formation of overlapping FTAs[6]. When one of the member countries of the existing FTA forms another FTA with a nonmember country, then a hub-and-spoke system develops[7]. Mukunoki and Tachi (2006) assumed that countries are symmetric and showed that even if an expansion of bilateral FTAs through new memberships cannot achieve MFT, the formation of overlapping FTAs can generate free trade[8]. Nomura et al. (2009) introduced market asymmetry into the similar three-country model and showed that a formation of bilateral FTA acts as a building block for MFT through overlapping FTAs only when the initial FTA is formed between two larger countries, and the bilateral FTA cannot be expanded by the addition of a new member[9]. We should note that Nomura et al. (2009) assumed that all countries are different with respect to market size.

As mentioned above, FTAs between similar countries were generally formed earlier and then FTAs between dissimilar countries have proliferated recently, and these FTAs are overlapping in many cases. In order to take these features of recent PTAs into account, we confirm the condition of forming a bilateral FTA and then investigate an overlapping FTA and an expansion of FTA lead to MFT in the pres-

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[5]Ornelas (2005b) partly introduced market asymmetry. Krishna (1998) also considers the asymmetry of market size.

[6]We should note that overlapping agreements can be formed only when the existing PTA is an FTA. If an existing PTA is a CU, then each member country cannot negotiate individually with nonmember countries.

[7]For example, Chile is attaining the position of a hub country, creating or negotiating FTAs with New Zealand, Brunei, Singapore, China, India, Japan, and other countries. Singapore and Thailand have also become active in the formation of bilateral FTAs in recent years.

[8]Mukunoki and Tachi (2006) assumed that the tariff level is exogenous and external tariff remains in the same level after any FTA is formed.

[9]Saggi and Yildiz (2010) considered similar issues in a different model (i.e., competing exporters' model) and showed that when countries have asymmetric endowments, global free trade can be a stable equilibrium only when countries can form bilateral agreements.

ence of FTA between similar countries by introducing asymmetry of market size and endogenizing external tariff[10].

Our model is related to that of Saggi (2006), who considered whether PTAs are building or stumbling blocks for multilateral tariff cooperation in an infinitely repeated game with three countries. However, there are important differences between our model and that of Saggi (2006). Saggi (2006) investigated the effects of PTAs on the degree of multilateral tariff cooperation. In contrast to our model, Saggi (2006) did not consider the effects of both expanding and overlapping PTAs. In addition, Saggi (2006) assumed that a single PTA is exogenously given, whereas we investigate the endogenous formation of FTAs and examine whether this formation acts as a building or a stumbling block for MFT.

Our main conclusions are as follows: Suppose that a bilateral FTA between symmetric countries is already formed. (i) A bilateral FTA becomes a stumbling block for MFT through overlapping regime while it acts as a building block for MFT through expanding regime when market sizes of member and nonmember countries are quite similar. (ii) When market size of nonmember country is smaller than that of member countries, then overlapping regime leads to MFT while expanding regime may or may not. (iii) If the nonmember country of original FTA is large, then expanding regime may not achieve MFT while overlapping regime cannot. (iv) When the market size of nonmember country is quite large as compared with member countries, MFT never arises through overlapping regime, expanding regime, and an negotiation of MTA.

The rest of this paper is organized as follows. Section 2 develops the model. Section 3 shows the preliminary results. The feasibility of overlapping FTAs as well as expansion of FTA are considered in section 3. Section 4 investigates whether overlapping FTAs and expansion of FTA lead to FTA. Section 5 concludes the paper.

2   The Model

Consider a world economy with three countries, denoted by country $1, 2,$ and 3. Each country has a single local firm and a domestic market. We assume that the markets are segmented. The demand function of market i $(i = 1, 2, 3)$ is given by

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[10]Ornelas (2005b) endogenized external tariff in Krishna (1998)'s model. He demonstrates that the formation of bilateral FTA reduces nonmember country's benefit from MFT and may thereby serve as a stumbling block for MFT.

the following:

$$P^i = 1 - d^i Q^i, \tag{1}$$

where $Q^i = q_1^i + q_2^i + q_3^i$ is the total quantity supplied to market i; and q_j^i is the quantity supplied by the firm in country j to market i. Each government i imposes a specific tariff t_j^i on imports from country j. All firms compete *à la* Cournot in all markets. We assume that firms have an identical cost function and normalize the production cost to zero. Further, there are no transportation costs among the markets. The profits of firm j in market i are given by

$$\pi_j^i = (P^i - t_j^i)q_j^i. \tag{2}$$

The welfare function of country i is the sum of consumer surplus, producer surplus of its local firm, and the tariff revenue, represented by

$$W^i = \frac{(1 - P^i)Q^i}{2} + (\pi_i^i + \pi_i^j + \pi_i^k) + t_j^i q_j^i + t_k^i q_k^i. \tag{3}$$

In the initial situation, there are no FTA. Therefore, each government sets its specific tariff independently so as to maximize its national welfare. We assume that only one FTA is negotiated at once, and that any FTA is never dissolved after its formation. Governments engaging in the present negotiation are interested in knowing whether the formation of an FTA improves national welfare, as compared with the status quo. However, they are not concerned about how the present FTA influences future negotiations over other FTAs[11].

In the first round, two of the three governments negotiate to form a bilateral FTA. Now, suppose that one bilateral FTA is formed. Given that this situation is status quo, another negotiation will also be conducted. There are two possible paths to MFT after the formation of a bilateral FTA. (i) When both members of the existing bilateral FTA agree to accept the nonmember country as a new member, MFT is realized (*expanding regime*). (ii) When one of the bilateral FTA members forms another FTA with a nonmember country, a hub-and-spoke system arises. Under the hub-and-spoke system, two spoke countries can negotiate an FTA (spoke-spoke FTA), which leads to MFT (*overlapping regime)*. Therefore, two rounds occur in an expanding regime, whereas three rounds occur in an overlapping regime. Figure 1 shows the time line, while Figure 2 illustrates the possible paths to MFT under

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[11]Such a myopic assumption of players is also assumed in the literature on the process of network structure. See, for example, Watts (2001).

both expanding and overlapping regimes.

[Figures 1 and 2 around here.]

Each round proceeds as shown in the following three-stage game. In the first stage, governments negotiate for an FTA. Given the initial situation (pattern of existing FTAs), the countries engage in an FTA negotiation. These countries then choose their unilateral stance on the FTA, that is, whether to participate or not. Each government chooses to participate only when the resulting social welfare is higher under the newly formed FTA than under the status quo. The FTA will be formed when all the governments involved in the negotiation choose to participate. Otherwise, no FTA formed and the status quo continues. In the second stage, all governments set their import tariff so as to maximize social welfare independently and simultaneously. When an FTA is formed, the governments of member countries do not impose any internal tariff; they only set an external tariff. In the third stage, firms compete *à la* Cournot in all markets, given the tariff levels set by the governments in the previous stage. We solve this game in each round by backward induction.

3 Preliminary Results

In this section, we first consider the outcome in the initial situation where no FTA exists, and then we confirm the feasibility of bilateral FTA.

3.1 Initial Situation: No FTA

First, let us confirm the outcome in the initial situation where no FTA is formed. That is, each government set its tariff rate independently. In the third stage, given t_j^i, firms compete *à la* Cournot in all markets. Note that we can treat each market separately because the marginal costs are constant (zero). From Eqs. (1) and (2), the profit-maximizing quantity by firm j in market i is given by

$$q_j^i = \frac{1}{4d^i}\left(1 + \sum_{h=1,2,3} t_h^i\right) - t_j^i. \tag{4}$$

In the second stage, each government determines the tariff level so as to maximize national welfare. From Eqs. (1) through (4), the social welfare of country i

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is given by the following:

$$W^i = \frac{1}{32d^i}(3 - t_j^i - t_k^i)^2 \tag{5}$$
$$+ \left[\frac{1}{16d^i}\left(1 + t_j^i + t_k^i\right)^2 + \frac{1}{16d^j}\left(1 - 3t_i^j + t_k^j\right)^2 + \frac{1}{16d^k}\left(1 - 3t_i^k + t_j^k\right)^2\right]$$
$$+ t_j^i\left(\frac{1}{4d^i}(1 - 3t_j^i + t_k^i)\right) + t_k^i\left(\frac{1}{4d^i}(1 + t_j^i - 3t_k^i)\right), j, k \neq i.$$

The first term represents consumer surplus; the terms within the square brackets denote producer surplus; and the sum of the third and last terms indicates the tariff revenue in country i. Maximizing Eq. (5) with respect to t_j^i given t_k^i, we have the first-order conditions:

$$t_j^i = \frac{3 + 11t_k^i}{21}, \; t_k^i = \frac{3 + 11t_j^i}{21}. \tag{6}$$

Eq. (6) shows that the optimal tariff level does not depend on the tariff level set by other countries. This is owing to the assumption of segmented markets.

Noting that the most favored nation (MFN) clause of GATT requires that import tariff by a country should not depend on the country from which the import originates, we obtain optimal tariff level when no FTA is formed from Eq. (6):

$$t^{MFN} = (t_j^i)^* = \frac{3}{10}, \; i, j = 1, 2, 3. \tag{7}$$

Eq. (7) satisfies the MFN clause.

Because there is no FTA in the initial situation, each government does not do anything in the first stage. Thus, Eq. (7) shows the equilibrium tariff rates.

Substituting Eq. (7) into Eq. (5), we obtain social welfare as shown in Table 1.

	W^i
Country 1	$\frac{1}{100}(\frac{40}{d^1} + \frac{1}{d^2} + \frac{1}{d^3})$
Country 2	$\frac{1}{100}(\frac{1}{d^1} + \frac{40}{d^2} + \frac{1}{d^3})$
Country 3	$\frac{1}{100}(\frac{1}{d^1} + \frac{1}{d^2} + \frac{40}{d^3})$

Table 1: Social welfare without an FTA

3.2 Feasibility of Bilateral FTA

Now, we consider whether a bilateral FTA can be formed. Even in the FTA negotiation process, the outcome of the third and second stages are the same as those for the case of no FTA, such as Eqs. (4) and (6). In the first stage, governments negotiate whether they can form an FTA. Note that we restrict our attention to the situation where only one FTA is negotiated at once and where any FTA is never dissolved after its formation.

Suppose that an FTA between countries 1 and 2 is formed. In this case, governments 1 and 2 do not set any internal tariffs ($t_2^1 = t_1^2 = 0$) and impose an external tariff against nonmember country 3, so as to maximize their own national welfare. In contrast, government 3 does not change the tariff level on imports from countries 1 and 2. Thus, the formation of the bilateral FTA does not change the quantity supplied to market 3 (note that $t_1^3 = t_2^3 = t^{MFN}$). The optimal external tariff under the bilateral FTA are calculated as follows:

$$t^{ext} = t_3^1 = t_3^2 = \frac{1}{7}. \tag{8}$$

Eqs. (7) and (8) show that member countries decrease the external tariff level relative to that under the MFN clause voluntarily (i.e., $t^{ext} < t^{MFN}$), which is called *tariff complementarity effect*[12]. Article XXIV of GATT requires that, after forming PTAs, member countries should not raise tariff level against nonmember countries, although the formation of PTAs is permitted. Eq. (8) shows that this requirement is met.

Substituting $t_2^1 = t_1^2 = 0$, $t_1^3 = t_2^3 = t^{MFN}$, and Eq. (8) into Eq. (5), we can determine the social welfare under the bilateral FTA.

	$W_{bilateral}^i$
Country 1	$\frac{5}{14d^1} + \frac{4}{49d^2} + \frac{1}{100d^3}$
Country 2	$\frac{4}{49d^1} + \frac{5}{14d^2} + \frac{1}{100d^3}$
Country 3	$\frac{5}{245d^1} + \frac{5}{245d^2} + \frac{98}{245d^3}$

Table 2: Social welfare under bilateral FTA

From Tables 1 and 2, changes in the welfare of each country arising from the bilateral FTA are specified below:

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[12]See, Bagwell and Staiger (1999). Saggi (2006) obtained the same result in a model similar to ours.

$$W_{bilateral}^1 - W^1 = -\frac{3}{70d^1} + \frac{351}{4900d^2} > 0 \text{ if } d^1 > \frac{70d^2}{117}, \tag{9a}$$

$$W_{bilateral}^2 - W^2 = \frac{351}{4900d^1} - \frac{3}{70d^2} > 0 \text{ if } d^1 < \frac{117d^2}{70}, \tag{9b}$$

$$W_{bilateral}^3 - W^3 = \frac{51(d^1 + d^2)}{4900d^1d^2} > 0. \tag{9c}$$

From Eq. (9), we obtain the following result.

Proposition 1 *(i) A bilateral FTA can be formed when the market sizes of the negotiating countries are similar, that is $\frac{70d^j}{117} < d^i < \frac{117d^j}{70}$, irrespective of the market size of nonmember country. (ii) It also benefits nonmember country and increases world welfare.*

The intuition underlying Proposition 1 is explained as follows. The formation of a bilateral FTA increases consumer surplus, but decreases tariff revenue thorough tariff elimination effect on member country as well as tariff complementarity effect on nonmember county (*Allocation Effect*). Under assumptions in this paper, allocation effect is always positive, that is, an increase in consumer surplus exceeds a decrease in tariff revenue by a formation of FTA.

It also decreases the profit in home market through tariff elimination effect as well as tariff complementarity effect indirectly, while increases the profit in the partner's market through tariff elimination effect directly (*Rent Shifting Effect*). We should note that the bilateral FTA does not change the profit in the nonmember's market owing to segmented markets. Rent shifting effect tends to be positive (negative) when market size of partner country is large (small) relative to own market[13]. Therefore, when partner's market size is sufficiently small relative to own market, rent shifting effect is negative and this negative effect dominates a positive allocation effect. That is why a bilateral FTA can be formed only when negotiating countries are similar.

4 Analysis

As mentioned in Section 1, FTAs between similar countries were generally formed earlier while FTAs between dissimilar countries have been increased recently. Thus, this section investigates whether a formation of bilateral FTA between similar

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[13]Rent shifting effect becomes positive if $d^i > \frac{384}{351}d^j$ under $i - j$ FTA.

country leads to MFT through overlapping regime (subsection 4-1) as well as expanding regime (subsection 4-2).

As shown in Proposition 1, a bilateral FTA is formed when negotiating countries are similar. From hereon, we maintain the following assumption for simplicity.

Assumption 1 $d^1 = d^2 \equiv d$ *and* $0 < d^3 < 2d$.

4.1 Overlapping Regime

4.1.1 Hub-and-Spoke System

Suppose that a bilateral FTA between countries 1 and 2 is already formed. Each country 1 and 2 becomes a hub country when it forms a bilateral FTA with country 3. The overlapping FTA is formed only when the resulting social welfare of each member country of new FTA exceeds the welfare under the status quo.

Suppose that countries 1 and 3 conclude a bilateral FTA[14]. In this case, a hub country 1 imposes no tariff against both spoke countries 2 and 3. In contrast, each spoke country, 2 and 3, does not impose a tariff against the hub country 1, while they set an external tariff against each other independently; the tariff level in this case is the same as the optimal external tariff under the bilateral FTA (see Eq. (8)). Thus, the values of welfare of each country under a hub-and-spoke system are stated below.

	$W^i_{hub-spoke}$
Country 1	$\frac{667}{1568d} + \frac{4}{49d^3}$
Country 2	$\frac{47}{112d} + \frac{1}{49d^3}$
Country 3	$\frac{65}{784d} + \frac{5}{14d^3}$

Table 3: Social welfare under hub-and-spoke system

From Tables 2 and 3, we derive the welfare change arising from the hub-and-spoke system, starting from a bilateral FTA.

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[14]The same holds true for country 2 in the case where country 2 becomes a hub country, because of symmetry between countries 1 and 2 (Assumption 1).

$$W^1_{hub-spoke} - W^1_{bilateral} = -\frac{3}{224d} + \frac{351}{4900d^3} > 0, \tag{10a}$$

$$W^2_{hub-spoke} - W^2_{bilateral} = -\frac{15}{784d} + \frac{51}{4900d^3} > 0 \text{ if } d^3 < \frac{68}{125}d, \tag{10b}$$

$$W^S_{hub-spoke} - W^3_{bilateral} = \frac{33}{784d} - \frac{3}{70d^3} > 0 \text{ if } d^3 > \frac{56}{55}d, \tag{10c}$$

From Eq. (10), we obtain the following results.

Proposition 2 *(i) Suppose that a bilateral FTA between countries* 1 *and* 2 *is already formed. Hub-and-spoke system arises if* $\frac{56}{55}d < d^3$. *(ii) Under hub-and-spoke system, welfare of nonmember of newly formed FTA, that is country* 2, *is decreased.*

Proposition 2 states that hub-and-spoke system arises if nonmember country of existing bilateral FTA is smaller in some degree than member countries. Let us consider intuition behind Proposition 2.

First, we discuss country 1. By being a hub country, country 1 eliminates tariff against country 3, i.e., tariff elimination effect also works in this case, but this tariff elimination effect is weaker than that by a formation of first FTA under MFN clause. This is because a tariff against country 3 has already reduced from $\frac{3}{10}$ to $\frac{1}{7}$ through tariff complementarity effect of bilateral FTA between countries 1 and 2. Therefore, an increase in consumer surplus and a decrease in tariff revenue become small, and then allocation effect is small while it remains positive. Tariff complementarity effect does not work by being a hub country because a tariff against country 2 was already eliminated by FTA between countries 1 and 2. It means that a decrease in profit in home market is lower than that under MFN case because tariff complementarity effect does not work. On the other hand, an increase in profit in partner's market is the same through tariff elimination effect on country 1. Therefore, rent shifting effect tends to be positive as compared with original bilateral FTA case. Thus, being a hub country is always beneficial.

Next, we consider a spoke country 3 which is nonmember of first bilateral FTA. Before forming a hub-and-spoke FTA, country 3 imposes optimal tariff level t^{MFN} against both countries 1 and 2. By forming an FTA with country 1, country 3 eliminates tariff against country 1 and reduces tariff level against country 2. Thus, both tariff elimination effect and tariff complementarity effect work. It means that a magnitude of allocation effect is the same as under a formation of first FTA. However, rent shifting effect on country 3 changes. As compared with a bilateral FTA under MFN clause, tariff elimination effect on country 3 lowers because tariff

against country 3 was already lowered, although tariff complementarity effect does not work on country 2 in country 1's market. Therefore, nonmember country of first FTA has an incentive to be a spoke country unless the market size of own is larger than that of hub country.

Finally, we discuss another spoke country 2. The formation of hub-and-spoke FTA does not change allocation effect on country 2 but decreases rent shifting effect on country 2. Hub-and-spoke FTA decreases firm 2's profit in the hub country market because tariff elimination effect on firm 3 works while tariff complementarity effect does not work on firm 2. It increases firm 2's profit in market of country 3 through tariff complementarity effect but this effect is weakened by tariff elimination effect on firm 1. That is why the formation of hub-and-spoke FTA benefits country 2 only when market size of country 3 is sufficiently large relative to that of original member countries, i.e., $d^3 < \frac{68}{125}d$. This condition dose not hold when both countries 1 and 3 have an incentive to form a hub-and-spoke FTA.

4.1.2 Spoke-Spoke FTA

We now consider whether two spoke countries, 2 and 3, have an incentive to form a bilateral FTA under a hub-and-spoke system. Under a hub-and-spoke system, the hub country 1 imposes no tariffs on both spoke countries, while the spoke countries impose external tariffs on each other, with the tariff levels being the same as shown in Eq. (8). If they form a bilateral spoke-spoke FTA, then MFT arises. Substituting $t_i^j = 0$ into (5), we obtain each country's welfare under free trade.

	W_{FT}^i
Country 1	$\frac{13}{32d} + \frac{2}{32d^3}$
Country 2	$\frac{13}{32d} + \frac{2}{32d^3}$
Country 3	$\frac{4}{32d} + \frac{11}{32d^3}$

Table 4: Social welfare under free trade

From Tables (3) and (4), the changes in the welfare of each country arising from the formation of a spoke-spoke FTA are specified below:

$$W_{FT}^1 - W_{hub-spoke}^1 = -\frac{15(d + d^3)}{784dd^3} < 0, \tag{11a}$$

$$W_{FT}^2 - W_{hub-spoke}^2 = \frac{3(22d - 7d^3)}{1568dd^3} > 0, \tag{11b}$$

$$W_{FT}^3 - W_{hub-spoke}^3 = \frac{3(22d^3 - 7d)}{1568dd^3} > 0 \text{ if } d^3 > \frac{7}{22}d. \tag{11c}$$

From here, we obtain the following results.

Proposition 3 *(i) Under a hub-and-spoke system, the formation of a spoke-spoke FTA is feasible if $d^3 < \frac{7}{22}d$, which in turn leads to MFT. (ii) A spoke-spoke FTA is detrimental to the hub country.*

The formation of a spoke-spoke FTA eliminates external tariffs on each spoke firm in the spoke countries' markets; this leads to MFT. Let us consider a spoke country. By forming a spoke-spoke FTA, the tariffs between spoke countries reduce to zero. This tariff elimination effect worsens effective cost advantage in home market against another spoke country's firm indirectly. Each spoke country's firm directly mitigates its cost disadvantage in another spoke country's market by tariff elimination. Then, the produce surplus in relatively smaller spoke country is greater than that in another spoke country. Noting that allocation effect is always positive, the spoke-spoke FTA benefits the spoke country unless its market size is sufficiently large relative to another spoke country.

For the original hub country, the formation of a spoke-spoke FTA eliminates the effective cost advantages in both spoke countries' markets and then decreases the profits of the hub-country firm in both spoke markets. Because allocation effect does not work, the formation of a spoke-spoke FTA is always detrimental to the hub country.

4.2 Expanding Regime

In this subsection, we examine whether a formation of bilateral FTA leads to an MFT in an expanding regime. From Proposition 1 and Assumption 1, we proceed to this discussion on the presumption that a bilateral FTA between symmetric countries 1 and 2 exist.

Given the existence of an FTA between countries 1 and 2, all governments negotiate for its expansion, which leads to MFT. Similar to the case of a bilateral FTA, each government decides its unilateral stance for the expansion, and the FTA

expands only when all governments agree with the negotiation. From Tables 2 and 4, the changes in welfare arising from an expansion of the bilateral FTA are mentioned as follows:

$$W_{FT}^1 - W_{bilateral}^1 = -\frac{51}{1568d} + \frac{21}{400d^3} > 0 \text{ if } d^3 < \frac{686}{425}d, \qquad (12a)$$

$$W_{FT}^2 - W_{bilateral}^2 = -\frac{51}{1568d} + \frac{21}{400d^3} > 0 \text{ if } d^3 < \frac{686}{425}d, \qquad (12b)$$

$$W_{FT}^3 - W_{bilateral}^3 = \frac{33}{392d} - \frac{9}{160d^3} > 0 \text{ if } d^3 > \frac{147}{220}d. \qquad (12c)$$

Eq. (12) indicates the following:

Proposition 4 *An expansion of a bilateral FTA through new membership is feasible if $\frac{147}{220}d < d^3 < \frac{686}{425}d$.*

Let us consider the intuition behind Proposition 4. An expansion of bilateral FTA through new membership gives positive allocation effect for all countries. As d^3 increases given d (i.e., the relative market size of country 3 becomes small), rent shifting effect on both member countries of bilateral FTA turns to negative, and then outweighs a positive allocation effect. In contrast, for country 3, rent shifting effect increases as d^3 increases because increases in profits in markets 1 and 2 are relatively large to decreases in home market 3. Therefore, new member country 3 tends to have an incentive to join the bilateral FTA as own market size is smaller, while both member countries of original FTA does not have an incentive to accept new member of FTA if country 3 is small, i.e., $d^3 > \frac{686}{425}d$.

5 Feasibility of MFT under overlapping regime and expanding regime

Now, we investigate whether a bilateral FTA acts as a building block or a stumbling block for MFT and how the difference in market sizes between member and nonmember countries affects the feasibility of MFT.

First, we confirm the feasibility of an MTA. From Tables 1 and 4, we observe

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the changes in welfare arising from a shift to MTA, as shown below:

$$W_{FT}^1 - W^1 = \frac{3(14d - d^3)}{800dd^3} > 0, \tag{13a}$$

$$W_{FT}^2 - W^2 = \frac{3(14d - d^3)}{800dd^3} > 0, \tag{13b}$$

$$W_{FT}^3 - W^3 = \frac{3(28d^3 - 15d)}{800dd^3} > 0 \text{ if } d^3 > \frac{15}{28}d. \tag{13c}$$

Proposition 5 *An MTA is negotiated if $d^3 > \frac{15}{28}d$.*

The formation of MTA brings positive allocation effect on all countries. Whether rent shifting effect becomes positive or negative is depends on the differences of market sizes. For a relatively large country, it tends to be negative because a decrease in profit in home market tends to be greater than an increase in profit in smaller country market by forming an MTA. When home market is sufficiently large (such as $d^3 > \frac{15}{28}d$), rent shifting effect is negative and outweighs positive allocation effect. That is why a larger country may not have an incentive to form an MTA while smaller countries always have an incentive to conclude it. Proposition 5 implies that an MTA is not feasible when one large country and two small countries exist[15]. This proposition may suggest that it is difficult to form an MTA because there are many small countries and a few large countries in the real world.

On the basis of Propositions 2, 3, 4, and 5, we establish the following:

Proposition 6 *Suppose that a bilateral FTA between symmetric countries is already formed. (i) A bilateral FTA becomes a stumbling block for MFT through overlapping regime while it acts as a building block for MFT through expanding regime when market sizes of member and nonmember countries are quite similar. (ii) When market size of nonmember country is smaller than that of member countries, then overlapping regime leads to MFT while expanding regime may or may not. (iii) If the nonmember country of original FTA is large, then expanding regime may or may not achieve MFT while overlapping regime cannot. (iv) When the market size of nonmember country is quite large as compared with member countries, MFT never arises through overlapping regime, expanding regime, and an negotiation of MTA.*

Figure 3 summarizes these results. In region 1, MFT never arises while both overlapping and expanding regimes achieve MFT in region 3. In region 2, expand-

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[15]Ornelas (2005b) showed similar results.

ing regime acts as a stumbling block while overlapping regime serves as a building block. In contrast, overlapping regime leads to MFT but expanding regime cannot in region 4.

Now, let us consider the role of market asymmetry on feasibility of the issue. The above results show that, when countries are similar, expanding regime always achieves MFT but overlapping regime may or may not. In particular, it states that, if all countries are symmetric, expanding regime acts as a building block although overlapping regime serves as a stumbling block. These results are quite contrast to that obtained in Nomura et al. (2009) which had investigated similar issues in the situation all three countries differ with respective to market size. Nomura et al. (2009) showed that overlapping FTAs leads to MFT only when two larger countries form a bilateral FTA initially, and a bilateral FTA is never expanded[16]. These results indicates that whether and in which regime MFT is realized depend on the difference of market size not only between member countries of bilateral FTA but also between member and nonmember countries.

In reality, FTAs among developed countries were formed at the beginning, while FTAs among developed and developing countries have been increasing as mentioned in Section 1. Our paper shows that, if larger countries form a bilateral FTA earlier, either overlapping or expanding regime leads to MFT. This implies that the formation of a bilateral FTA can serve as a building block for MFT, although this is an exception to the non-discrimination rule under GATT/WTO.

6   Concluding Remarks

This paper has investigated the feasibility of MFT through both overlapping and expanding regimes in the presence of market asymmetry between member and nonmember countries of an existing bilateral FTA. It has determined whether the bilateral FTA leads to MFT in a three-country model, wherein each country has a local firm and a domestic market. We summarize the main conclusions as follows: Suppose that a bilateral FTA between symmetric countries is already formed. (i) A bilateral FTA becomes a stumbling block for MFT through overlapping regime while it acts as a building block for MFT through expanding regime when market sizes of member and nonmember countries are quite similar. (ii) When the market size of nonmember country is smaller than that of member countries, then over-

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[16]We should note that our assumption of market asymmetry is different from that in Nomura et al. (2010), in which it cannot consider the situation where all countries are symmetric.

lapping regime leads to MFT while expanding regime may or may not. (iii) If the nonmember country of original FTA is large, then expanding regime may achieve MFT while overlapping regime cannot. (iv) When the market size of nonmember country is quite large as compared with member countries, MFT never arises through overlapping regime, expanding regime, and an negotiation of MTA.

Future studies can extend this paper into several directions. Our main conclusions are derived under assumption of symmetry between member countries. It is interesting to construct a model including where all countries can be symmetric as well as asymmetric. In this paper, we have not considered lobbying practices, which is a potential extension of the model[17]. It would be interesting to introduce cost differences among firms and multiple number of firms and/or countries.
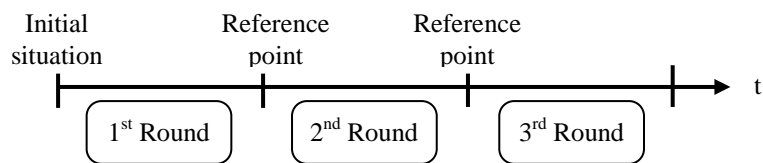
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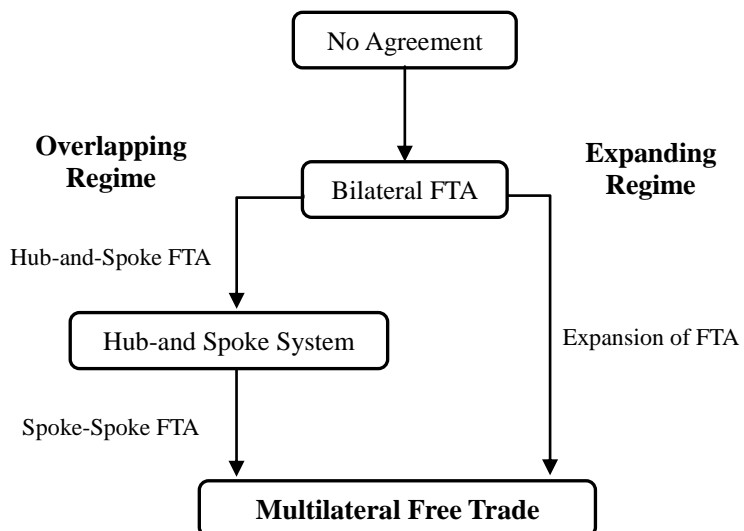
Figure 1 Time line

Initial   Reference   Reference
situation   point   point   t

1st Round 2nd Round 3rd Round

Stage game in each round

- 1st stage: negotiation on FTA
- 2nd stage: tariff determination
- 3rd stage: Cournot competition

Figure 2 Possible Paths to Multilateral Free Trade

No Agreement

Overlapping Regime   **Expanding Regime**

Bilateral FTA

Hub-and-Spoke FTA

Expansion of FTA

Hub-and Spoke System

Spoke-Spoke FTA

Multilateral Free Trade

Figure 3 Feasibility of MFT