The Politics of Tariff Cooperation
in the Presence of Trade Costs

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Abstract

This study explores tariff cooperation under a representative democracy, comparing national welfare realized in three trading regimes: most favored nation (MFN), customs union (CU), and free trade agreement (FTA). Two points are addressed: Why have FTAs increased in recent decades when theoretical studies predict that CUs increase the level of national welfare? Second, why are most CUs formed between countries located near each other while FTAs can be formed between countries located far away? We build a model that examines the effect of trade costs and how tariff policy is determined in a representative democracy. We find that when the countries' income distribution is largely skewed, an FTA is more beneficial due to trade costs. However, when member countries are located near each other, a CU realizes the higher welfare.

Keywords: Regional trade agreement, Trade costs, Representative democracy

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1   Introduction

The world of today cannot be described without globalization. One aspect of globalization is captured as international trades between regions and countries, particularly as the number of regional trade agreements (RTAs)has rapidly increased for a couple of decades. When RTAs became effective in 1989, there were only 13. However, that number had risen to 253 in 2016. As the number tells, people today can enjoy goods produced in other countries, and firms can employ materials from other regions with ease. What we focus on here is the composition of these RTAs, or whether countries form an RTA as a customs union (CU) or a free trade agreement (FTA). Remarkably, the ratio of FTA to CU has risen; while the percentage of FTAs in all RTAs was 69% in 1989, it was 93% in 2016. Simply, the question now arises: Why are most newly formed FTAs and not CUs?

To approach the question, we set up a conjecture focusing on "distance." CUs seem to be strongly restricted by distance between the member countries. For example, MERCOSUR, EACU, EU, EU-Turkey, EU-Andorra, and EAC are all CUs, and we can easily see that these are only formed among intra-regional countries.[1] On the other hand, an FTA can be formed even if its member countries are located far from each other. These examples include the United States-Israel, Japan-Colombia, and New Zealand-Thailand. The conjecture is derived that if there is a certain distance between member countries, an FTA is a better way to form an RTA, and if not, CU is better. This locational restriction on the formation of RTAs can explain why only the number of FTAs has increased and that of CUs has not. Hence, in this study, we attempt to verify the conjecture with a theoretical approach.

How can we capture distance between countries in a theoretical model? We consider the question of CU and FTA by employing the concept of trade costs. Following Anderson and van Wincoop (2004), trade costs can be defined as all costs accrued in the process of shipping a good to its consumer: transportation costs, policy barriers, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs, local distribution costs, and so forth. The sum of these costs is not a negligible amount, even for developed countries. According to Anderson and van Wincoop's (2004) estimation, the trade costs for industrialized countries is at 170% in terms of the ad valorem tax equivalent: If we take 100 for production cost of a good, all costs accrued in the process of delivering it from the firm to consumers in other countries is evaluated as 170. We can easily imagine that the further away countries are located spatially, the more trade costs are accrued. However, most of the previous studies in the literature of international trade pay little heed to the existence of trade costs. Of all the costs accrued in trading abroad, they take only tariffs into account.[2] Hence, describing spatial distance between countries with the concept of trade costs and considering the question of RTA formation can be seen as a new approach in the literature.

Since Woodland's (1982) seminal work, literature on international trade have provided studies discussing whether CU or FTA can provide a higher level of national welfare to the countries forming the RTA. Most of the researches argue that each country can obtain a higher level of national welfare under a CU compared to an FTA (Saggi, 2006; Ornelas, 2007). The reason is quite simple. It depends on whether an externality exists or not. Under the regime of an FTA, there is no tariff between the member countries, but they independently determine to set a tariff to other countries that are not part of the RTA. If one of the member countries increases the tariff to third countries, it induces the country to decrease the amount of imports from the third countries and to increase it from the other member country. Then,

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[1]Abbreviations are defined as follows: MERCOSUR is Mercado Común del Sur, or officially, the Southern Common Market; EACU is the Eurasian Customs Union; EU is the European Union; EAC is the East African Community.

[2]Meanwhile, the field of new trade theory and new economic geography has been developed by incorporating trade costs (Helpman and Krugman, 1985; Fujita et al., 1999). Several studies in these fields deal with capital tax, examining the agglomeration of firms but not tariffs (Ludema and Wooton, 2000; Baldwin and Krugman, 2004; Ottaviano and van Ypersele, 2005). Accordingly, our approach aims to weave the two threads of previous studies.

profits of firms in the other member country increase, but the country that sets a higher tariff does not take this into account. This implies that the externality occurs here. On the other hand, under the regime of a CU, the member countries must cooperatively set a tariff to the third country, which means that determination of a tariff policy under a CU can internalize the externality. Therefore, a CU can bring a higher level of national welfare to the member countries of the RTA compared to the FTA.

We can see that there exists a gap between the reality and the theoretical arguments; the ratio of FTAs to CUs in the whole number of RTAs has rapidly increased in the last two or three decades, while the theoretical studies above predict that a CU can give a higher level of national welfare to the member countries. Why has the FTA been chosen so often as a form of RTA?

Facchini et al. (2013) address the gap between the reality and theory, introducing representative democracy to the political regime. In particular, they put an election stage before the stage in which tariff policies are determined; citizens in each country can vote to choose a policy-maker, and the elected policy-maker is delegated the power to determine a tariff policy for that country and set it in the next stage. This structure allows citizens to vote while foreseeing the next stage, which is called strategic delegation. With the introduction of representative democracy, they find that an FTA can provide a higher level of national welfare when compared to a CU as long as distribution of wealth is only skewed a little or the economic disparity in each country is small.

Income disparity in most countries has been widening for the past three decades however. For instance, the Organisation for Economic Co-operation and Development (OECD) (2014) reported that the Gini coefficient in OECD countries has risen by 3 points, from 0.29 in 1985 to 0.32 in 2014. In the United States, Finland, Israel, New Zealand, and Sweden, the Gini coefficient has increased more than 5 points. Meanwhile, the only countries in which the Gini coefficient has decreased are Greece and Turkey. As shown by this empirical fact, the economic disparity of many countries has tended to widen, rather than be reduced. If we follow the prediction of Facchini et al. (2013), with the assumption that governments adopt and form a trade regime that can provide a higher level of national welfare, the ratio of the CU in all RTAs should be increased in the world, where the economic disparity is widening. Nevertheless, not many are observed today. This suggests that there is still room to discuss why we observe so few CUs. There must be a certain factor taken into consideration, and this is a spatial aspect.

In this study, we attempt to reexamine the question of whether a CU or an FTA can yield the higher level of national welfare for member countries of the RTA with the concept of trade costs and to explain the phenomenon that the number of FTAs has largely risen compared to that of CUs. To shed light on the effect of trade costs, we simply incorporate it into Facchini et al.'s (2013) framework and compare levels of national welfare under three tariff regimes: CU, FTA, and most favored nation (MFN) as a benchmark. Particularly, we explore two cases: First, to see the effect of trade costs, we build a model where trade costs accrue symmetrically among all countries in the economy. Second, to examine the relation of distance between member countries and the formation of an RTA, we consider the situation where trade costs accrue between a member country and a third country, but there are no trade costs between the member countries, which implies that there is no distance between them, and compare this with the former case.[3]

As a result, it is newly found that an FTA can realize a higher level of national welfare in the member countries than a CU can in the case where trade costs exist and the income distribution is largely skewed or there is a sufficiently large economic disparity in each country. This result is a clear contrast to Facchini et al. (2013) and other studies in the literature. However, in the case where the member countries are located closely to each other or when we assume that no trade costs accrue between the countries, a CU can still realize a higher level of national welfare compared to an FTA, even if economic disparity is

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[3]As a previous work to examine the geographic characteristics of an FTA and CU, Lake and Yildiz (2016) endogenize the equilibrium path of tariff regimes among two close countries and one far country. To see it, they build a farsighted dynamic model, so the model and the mechanisms working behind it fundamentally differ from this analysis.

largely widened. This supports our conjecture that a better way to form an RTA depends on the distance between the member countries, and particularly, there cannot be as many CUs as FTAs because of such a spatial restriction.

The rest of this paper is organized as follows. In Section 2, we develop a model in which firms in each of three countries supply goods in an imperfect market, focusing on a tariff regime formed between two of the three countries. As key features of this model, it is assumed that trade costs accrue when they trade abroad, and a policy-maker in each country is elected by vote. The result of their elections and tariff policy in equilibrium of each case is determined in Section 3. In Section 4, we provide a welfare analysis and its interpretation. Finally, Section 5 contains our conclusion.

2 The Model

2.1 Basic Composition of the Economy

Following Facchini et al. (2013), we developed a standard oligopolistic trade model, which is composed of three countries and three goods, to examine the formation of RTAs.[4] There are countries A, B, and F: Countries A and B are perspective members of the RTA, while country F represents the rest of the world. There are goods 0, 1, and 2: Good 0 is produced in all of the countries and can be traded without tariff and trade costs. This good is supplied in a perfectly competitive market and treated as the numeraire. On the other hand, goods 1 and 2 are produced in duopolistic market. One of the firms is in country F, and the other firms producing goods 1 and 2 are in countries A and B, respectively. These duopolistic firms compete in quantities, which is Cournot competition. If firms export good 1 or 2 from their country to the other, they have to pay a tariff, $t_{s,d}^i$, and trade costs, $\tau_{s,d}^i$.

Here, $t_{s,d}^i$ denotes the tariff on good i transported from country s to country d, and other variables such as $\tau_{s,d}^i$ are denoted in the same manner. When the firms supply goods 1 or 2 to the markets of their own countries, no tariff or trade costs are accrued, either ($t_{A,A}^i = t_{B,B}^i = 0, \tau_{A,A}^i = \tau_{B,B}^i = \tau_{F,F}^i = 0$). In addition, using vectors and matrices, we define the tariff that country d imposes on good i as $\boldsymbol{t}_d^i = (t_{A,d}^i, t_{B,d}^i, t_{F,d}^i)$ and trade costs accrued with supplying good i to country d as $\boldsymbol{\tau}_d^i = (\tau_{A,d}^i, \tau_{B,d}^i, \tau_{F,d}^i)$. Similarly, the tariff on good i is denoted as $\boldsymbol{t}^i = (\boldsymbol{t}_A^i, \boldsymbol{t}_B^i, \boldsymbol{t}_F^i)$, and trade costs of good i are denoted as $\boldsymbol{\tau}^i = (\boldsymbol{\tau}_{A,d}^i, \boldsymbol{\tau}_{B,d}^i, \boldsymbol{\tau}_{F,d}^i)$.

2.2 Production Sector

As mentioned above, good 0 is supplied to a perfectly competitive market. The firms employ only labor to produce good 0 and use the same production technology $X_0 = L_0$. Since we treat good 0 as the numeraire, wages are equal to 1 in equilibrium.

Goods 1 and 2 are produced using only labor with constant-return-to-scale technology, which accrues a constant marginal cost m. The profit of the firm in country s producing good i is denoted as

$$\pi_s^i = \sum_{d=A,B,F} (p_d^i - m - t_{s,d}^i - \tau_{s,d}^i) x_{s,d}^i, \tag{1}$$

where $x_{s,d}^i$ is the amount of good i that the firm in country s supplies to country d and p_d^i is the price of good i in the market of country d. When the demand of good i in country d is denoted as x_d^i, $x_d^i = \sum_{s=A,B,F} x_{s,d}^i$ holds, according to the balance of demand and supply.

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[4]In the literature of regionalism, this has been employed in several studies such as Freund (2000), Krishna (1998), and Ornelas (2005, 2007), among others.

Rent from the firm's production is allocated to individuals in the country in proportion to the stake that they own. In this model, we assume that individuals in this model are not allowed to own stake in firms in other countries.

2.3   Preference and Heterogeneity of Individuals

Preferences of individuals are given by the quasi-linear utility function

$$u(x^0, x^1, x^2) = x^0 + \sum_i u^i(x^i), \tag{2}$$

where $u^i(x^i) \equiv Hx^i - (x^i)/2$. These preferences are identical among individuals in a country and across the countries and imply that the demand functions for goods 1 and 2 are linear, as $x^i = H - p^i$. As shown by the demand functions, it is assumed that the markets are segmented, which means that the prices of goods in country s are not changed by the tariffs of country d. Assuming that the firms' profits (1) are composed of a linearly added function, it implies that the governments' determinations on tariffs are strategically independent from each other in this model.

Regarding income, there exists a heterogeneity among individuals in a country where the population consists of mass one. They identically supply one unit of labor to the market but differ in the stake they own of the duopolistic firm in their country. The fraction of the duopolistic firm's profit allocated to individual l in country d is denoted by $\gamma_{d,l}$. We normalize the fraction of the profit allocated to the individual at the average of the distribution to one ($\bar{\gamma} = 1$), without loss of generality. Distributions of the stake are assumed to be symmetrical between countries A and B and positively skewed, as we can observe in the real world, which means that the stake of the individual at the median of the distribution is smaller than 1 ($\gamma^m < 1$). As stated by Dutt and Mitra (2002), γ_m is taken as the inverse index of economic disparity; when γ_m is close to zero, it means that the distribution of income is largely skewed and economic disparity is widened.

An individual obtains his/her income from wages, the return from his/her own stake , and the tariff revenue that the government of his/her country gains. Note that there are no public goods supplied by the government, only redistribution in a lump-sum manner. Hence, the income of individual l in country d can be written as

$$y_{d,l} = 1 + \gamma_{d,l} \, \pi_d^i + \sum_{s=A,B,F} \sum_{i=1,2} t_{s,d}^i x_{s,d}^i.$$

From the preferences expressed by (2), the indirect utility function of individual l in country d is written as follows:

$$
\begin{aligned}
v_{d,l}(\boldsymbol{t}^1, \boldsymbol{t}^2; \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \gamma_{d,l}) \;=\; & 1 + \gamma_{d,l} \, \pi_d^i(\boldsymbol{t}^i, \boldsymbol{\tau}^i) + \sum_s \sum_i t_{s,d}^i x_{s,d}^i(\boldsymbol{t}_d^i, \boldsymbol{\tau}_d^i) \\
& + \sum_i \left\{ u[x_d^i(\boldsymbol{t}_d^i, \boldsymbol{\tau}_d^i)] - p_d^i(\boldsymbol{t}_d^i, \boldsymbol{\tau}_d^i) x_d^i(\boldsymbol{t}_d^i, \boldsymbol{\tau}_d^i) \right\},
\end{aligned}
\tag{3}
$$

where $x_d^i = \sum_s x_{s,d}^i$ is the total quantity of good i sold in country d. The fourth term of the indirect utility function captures consumer surplus.

2.4   Timing of the Game

Timing of the three-stage game in this model is defined as follows:

1. In each country A and B, which are perspective members of the RTA, a policy-maker is elected by a majority vote. The power to determine the country's tariff policy is delegated to the policy-maker.

2. The policy-maker elected in the 1st stage makes a decision under a tariff policy regime: In the case of non-discriminatory "most-favored-nation" tariff policy (MFN), the policy-maker of each country chooses the non-discriminatory tariffs for all trades. In the case of an FTA between countries A and B, the policy-maker independently, or non-cooperatively, chooses the tariff on goods imported from country F. In the case of a CU between them, the policy-makers of both countries must decide cooperatively.

3. Taking the tariff policy determined in the 2nd stage, firms produce goods and compete in quantities. Consumption by individuals is also implemented at this stage.

We solve this model backwards and compare the welfares realized in the equilibria of each case.

3 Election and Tariff Policy in Equilibrium

3.1 3rd Stage: Production and Consumption

In this stage, firms make decisions on their production, taking the tariff policy $\boldsymbol{t}$ determined in the 2nd stage as given. The setting in which the markets are segmented in this model allows us to focus on the equilibria of countries A and B because tariffs imposed by the government of country F do not affect them.[5] If either RTA, MFN, or CU, is taking place, tariffs on all goods traded between countries A and B are set at zero, or $t_{A,B}^i = t_{B,A}^i = 0$ for all i. Otherwise, the regime of MFN is applied.

Solving the profit maximization problem of the firm in country d, the first order condition is yielded as follows:

$$\frac{\partial p_d^i}{\partial x_{s,d}^i} x_{s,d}^i + p_d^i = m + t_{s,d}^i + \tau_{s,d}^i. \tag{4}$$

Now, we focus on country A (country B can be analyzed similarly). With the assumption of the linear demand $x^i = H - p^i$, the equilibrium prices and quantities are obtained as

$$x_{A,A}^1 = \frac{H - m + t_{F,A}^1 + \tau_{F,A}^1}{3}, \quad x_{B,A}^2 = \frac{H - m + t_{F,A}^2 + \tau_{F,A}^2 - 2t_{B,A}^2 - 2\tau_{B,A}^2}{3},$$

$$x_{F,A}^1 = \frac{H - m - 2t_{F,A}^1 - 2\tau_{F,A}^1}{3}, \quad x_{F,A}^2 = \frac{H - m + t_{B,A}^2 + \tau_{B,A}^2 - 2t_{F,A}^2 - 2\tau_{F,A}^2}{3},$$

$$p_A^1 = \frac{H + 2m + t_{F,A}^1 + \tau_{F,A}^1}{3}, \qquad p_A^2 = \frac{H + 2m + t_{F,A}^2 + \tau_{F,A}^2 + t_{B,A}^2 + \tau_{B,A}^2}{3},$$

where we assume $H > m$. Again, we can confirm that the trade policy that can affect the price of goods 1 and 2 in country A is only that of the country itself.

3.2 2nd Stage: Tariff Policy Choice

In 2nd and 1st stages, we examine the tariff policy and policy-maker determined under three different trade regimes: MFN, FTA, and CU.

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[5]In the background, we assume that the government of country F imposes a tariff on goods imported from countries A and B, applying the regime of MFN.

In this subsection, the tariff policy is analyzed, taking the policy-maker elected by majority vote from citizens in each country as given. To discern the individual chosen as the policy-maker in country d, we denote the amount of the stake that he/she owns by $\hat{\gamma}_d$. In this model of representative democracy, it is assumed that the policy-maker behaves selfishly, which means that he/she pursues and maximizes only for his/her profit, not caring for the social welfare of the country when he/she decides the tariff policy. Additionally, he/she does not care about future elections either. Under the MFN and FTA regimes, the policy-makers of country A and B can independently, or non-cooperatively, determine the tariff imposed on goods from country F to maximize only his/her utility. However, under the CU regime, where they have to cooperatively determine it, they are assumed to maximize the added sum of their utilities, which is not weighted to one side.[6]

Similar to the analysis so far, we focus on the tariff policy chosen by the policy-maker of country A.

3.2.1 Most Favored Nation

In the case of MFN, choices of tariff policy must be non-discriminatory, which means that tariffs on good 2 imported from countries B and F need to be the same. Under the restriction, the policy-maker elected in country A sets the tariff on both goods 1 and 2 by solving the maximization problem of his/her indirect utility function $v_{A,P}$ as follows:

$$\max_{\boldsymbol{t}_A^i} \quad v_{A,P}(\boldsymbol{t}^1, \boldsymbol{t}^2; \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \hat{\gamma}_d) \tag{5}$$
$$\text{s.t.} \quad t_A^1 = t_{F,A}^1, \quad t_A^2 = t_{B,A}^2 = t_{F,A}^2$$

The tariff policies imposed by country A under MFN are derived as

$$t_A^{1,mfn}(\hat{\gamma}_A) \quad = \quad \frac{\left(H - m - 5\tau_{F,A}^1\right) + 2\hat{\gamma}_A\left(H - m + \tau_{F,A}^1\right)}{11 - 2\hat{\gamma}_A}, \tag{6}$$

$$t_A^{2,mfn} \quad = \quad \frac{2(H-m) - \tau_{B,A}^2 - \tau_{F,A}^2}{8}, \tag{7}$$

where $t_d^{i,mfn}$ denotes a tariff on good i in country d under the MFN regime. Hereafter, it is applied to tariff policies under other trade regimes.

3.2.2 Free Trade Agreement

In the case of FTA, no tariff can be imposed on goods traded between countries A and B, and the policy-maker of country A non-cooperatively determines the set tariffs on goods imported from country F. Under this condition, he/she faces the maximization problem of $v_{A,P}$ as follows:

$$\max_{\boldsymbol{t}_A^i} \quad v_A(\boldsymbol{t}^1, \boldsymbol{t}^2; \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \hat{\gamma}_d) \tag{8}$$
$$\text{s.t.} \quad t_{B,A}^2 = 0$$

This yields the tariff policies imposed by country A under the FTA as

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[6]If we assume there exists a difference in political bargaining power between the two countries, the objective function to be maximized can be a weighted sum of their utilities, but that is not considered here.

$$t_{F,A}^{1,fta}(\hat{\gamma}_A) = \frac{(H - m - 5\tau_{F,A}^1) + 2\hat{\gamma}_A\left(H - m + \tau_{F,A}^1\right)}{11 - 2\hat{\gamma}_A}, \tag{9}$$

$$t_{F,A}^{2,fta} = \frac{H - m + 4\tau_{B,A}^2 - 5\tau_{F,A}^2}{11}. \tag{10}$$

3.2.3 Customs Union

Finally, in the case of a CU, tariff policies vis-á-vis the rest of the world represented by country F must be the same, while no tariff can be imposed on goods traded between countries A and B as an FTA. In addition, as mentioned above, this is determined cooperatively between the policy-makers of countries A and B, solving the maximization problem of the evenly added sum of their utilities. This is written as follows:

$$
\begin{aligned}
\max_{\boldsymbol{t}^i} \quad & v_{A,P}(\boldsymbol{t}^1, \boldsymbol{t}^2; \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \hat{\gamma}_A) + v_{B,P}(\boldsymbol{t}^1, \boldsymbol{t}^2; \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \hat{\gamma}_B) \\
\text{s.t.} \quad & t_{A,B}^1 = t_{B,A}^2 = 0, \\
& t_{F,A}^1 = t_{F,B}^1, \\
& t_{F,A}^2 = t_{F,B}^2
\end{aligned}
\tag{11}
$$

By solving this, we obtain the tariff policies imposed on goods imported from country F to both countries forming the CU as

$$t^{1,cu}(\hat{\gamma}_A) = \frac{2(H - m) + 4\tau_{A,B}^1 - 5\tau_{F,A}^1 - 5\tau_{F,B}^1 + 2\hat{\gamma}_A[2(H - m) - 2\tau_{A,B}^1 + \tau_{F,A}^1 + \tau_{F,B}^1]}{22 - 4\hat{\gamma}_A}, \tag{12}$$

$$t^{2,cu}(\hat{\gamma}_B) = \frac{2(H - m) + 4\tau_{B,A}^2 - 5\tau_{F,A}^2 - 5\tau_{F,B}^2 + 2\hat{\gamma}_B[2(H - m) - 2\tau_{B,A}^1 + \tau_{F,A}^2 + \tau_{F,B}^2]}{22 - 4\hat{\gamma}_B}. \tag{13}$$

From now on, we define the tariff in the case of the CU as $\boldsymbol{t}^{cu}(\hat{\gamma}_A, \hat{\gamma}_B) \equiv (t^{1,cu}(\hat{\gamma}_A), t^{2,cu}(\hat{\gamma}_B))$.

Based on the analysis above, we can summarize the properties of tariffs determined by the policy-makers as follows:

Lemma 1: Tariffs and Stocks

In all three cases, the tariff of a country on goods that are also produced in that country is increased with the amount of stock in the firm that the policy-maker of the country owns. However, in the case of MFN and FTA, the country's tariff on goods that are not produced in that country does not depend on the amount of stock owned by the policy-maker of either country.

Proof.

This is easily confirmed by differentiating $t_{s,d}^{i,regime}$ with respect to $\hat{\gamma}_d$: $\partial t_A^{1,mfn}(\hat{\gamma}_A)/\partial\hat{\gamma}_A > 0$, $\partial t_{F,A}^{1,fta}(\hat{\gamma}_A)/\partial\hat{\gamma}_A > 0$, $\partial t^{1,cu}(\hat{\gamma}_A)/\partial\hat{\gamma}_A > 0$, $\partial t^{2,cu}(\hat{\gamma}_B)/\partial\hat{\gamma}_B > 0$, and $\partial t_A^{2,mfn}/\partial\hat{\gamma}_d = \partial t_{F,A}^{2,fta}/\partial\hat{\gamma}_d = 0$ $(d = A, B)$.

We can give an intuitive understanding to this result. The more stock that the policy-maker owns, the more likely he/she is to be a protectionist since the country's duopolistic firm portions out its profits to the owner according to the amount of his/her stock. Hence, the policy-maker has an incentive to set a higher tariff and reduce the amount of imports to obtain more profits.

3.3 1st Stage: Election

In the 1st stage, an election to choose an individual as policy-maker is called in each country simultaneously. We assume that all citizens are candidates for policy-maker and have the right to vote. As shown above, the tariff policy implemented in the 2nd stage can depend on who is elected as policy-maker or how much stock the policy-maker owns in the country's firm. Citizens are assumed to vote for the candidate who will maximize their utilities, foreseeing choices on tariff policy in the next stage.

We focus on the voting behavior of the individuals located at the median of the distribution of the firm stock in the country because it is well-known that the median voter theorem holds in this model. The single-peaked preferences and monotonicity between the tariff and the stock that the policy-maker owns must be confirmed. The former is easily verified from the second order condition of the indirect utility function of individuals while the latter is confirmed by differentiations of the tax rates derived in the 2nd stage. With respect to the amount of the policy-maker's stock, we can give an intuitive understanding: The more stock that he/she owns, the more likely the policy-maker is to be a protectionist. This means that he/she tends to set a higher tariff on imported goods that are also produced by the firm he/she owns. Therefore, there is monotonicity between the tariff and the amount of stock that the policy-maker owns.

3.3.1 Most Favored Nations

In the case of MFN, the median voter of country A faces the maximization problem of his indirect utility function $v_{A,m}$ as follows:

$$\max_{\hat{\gamma}_A} \quad v_{A,m}\left[\boldsymbol{t}^{1,mfn}(\hat{\gamma}_A), \boldsymbol{t}^{2,mfn}(\hat{\gamma}_B); \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \gamma_{A,m}\right] \tag{14}$$
$$\text{s.t.} \quad t_A^1 = t_{F,A}^1, \quad t_A^2 = t_{B,A}^2 = t_{F,A}^2$$

It yields that $\hat{\gamma}_A = \gamma_{A,m}$, which implies that he/she chooses his-/herself as policy-maker of the country. No strategic delegation occurs.

3.3.2 Free Trade Agreement

Similarly, in the case of FTA, the median voter of country A faces the maximization problem of his indirect utility function $v_{A,m}$ as follows:

$$\max_{\hat{\gamma}_A} \quad v_{A,m}\left[\boldsymbol{t}^{1,fta}(\hat{\gamma}_A), \boldsymbol{t}^{2,fta}(\hat{\gamma}_B); \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \gamma_{A,m}\right] \tag{15}$$
$$\text{s.t.} \quad t_{B,A}^2 = 0$$

It is obtained that $\hat{\gamma}_A = \gamma_{A,m}$. Again, no strategic delegation occurs.

3.3.3 Customs Union

Finally, in the case of CU, the median voter of country A faces the maximization problem of his indirect utility function $v_{A,m}$ as follows:

$$\max_{\hat{\gamma}_A} \quad v_{A,m}\left[\boldsymbol{t}^{cu}(\hat{\gamma}_A, \hat{\gamma}_B); \boldsymbol{\tau}^1, \boldsymbol{\tau}^2, \gamma_{A,m}\right] \tag{16}$$
$$\text{s.t.} \quad t_{A,B}^1 = t_{B,A}^2 = 0,$$
$$t^1 = t_{F,A}^1 = t_{F,B}^1,$$
$$t^2 = t_{F,A}^2 = t_{F,B}^2$$

Solving this problem, we derive the policy-maker elected in country A as

$$\hat{\gamma}_A^{cu} = \frac{24\gamma_{A,m}\left[4(H-m) - 3\tau_{A,B}^1 + \tau_{F,A}^1 + \tau_{F,B}^1\right] - 11(4\tau_{A,B}^1 + 5\tau_{F,A}^1 - 5\tau_{F,B}^1)}{2\left[24(H-m) - 22\tau_{A,B}^1 + \tau_{F,A}^1 + 11\tau_{F,B}^1\right]}. \tag{17}$$

Here, we find that strategic delegation can occur under the CU regime.

From the analysis of the equilibrium above, we can summarize the results as follows:

Proposition 1. (Facchini et al., 2013)
  While strategic delegation does not occur under the trade regimes of MFN and FTA, it does under the trade regime of CU.

What is the crucial factor to induce strategic delegation? Generally, the decisive median voter has an incentive to choose an individual other than him-/herself if there is a certain situation where he/she cannot maximize his/her utility by determining a public policy as a policy-maker: i) It is a case where public policies decided in the next stage by the countries' policy-makers have a strategic interdependency on each other due to the externality of policies, among others.[7] ii) It is a case where the policy-makers must consider the utility of some other individual and not only him-/herself (Facchini, et al., 2013). Obviously, the latter corresponds to the case we face, where the policy-makers have to determine tariff policies to maximize the added sum of their utilities.[8]

3.4 Symmetric Case

In this subsection, we carry an argument under the assumption that trade costs between the countries are symmetric ($\tau_{s,d}^i = \tau$ for all i, s, d) to shed light on the effect of trade costs on the tariffs and the election results in each country.

First, we can point out the relationship between trade costs and tariff rates as follows:

Lemma 2: Tariffs and Trade Costs
  When trade costs increase, tariffs imposed on imported goods by the policy-maker are more reduced in all three cases: MFN, FTA, and CU.

Proof.
  We can confirm this with $\partial t_{s,d}^{i,regime}/\partial\tau < 0$ ($i = 1, 2$, $regime = mfn$, fta, cu).

The intuition for Lemma 2 is straightforward. Trade costs induce a deterioration in the number of trades. Under a circumstance where the number of trades is lowered due to trade costs, the policy-maker's incentive to increase tariff revenue or protect the country's duopolistic firm is weakened. Therefore, tariffs are lowered with higher trade costs.

In addition, we newly find the relationship between trade costs and the policy-maker's property as follows:

Proposition 2.
  Policy-maker in the case of symmetric trade costs: *Under the CU tariff regime, the decisive median voter delegates the power to set a tariff to an individual who owns more stock than the median voter does when trade costs are significantly low or at zero. On the other hand, an individual who*

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[7]For example, strategic delegation in the literature of tax competition has been analyzed by Ihori and Yang (2009), Nishimura and Terai (2017), and Ogawa and Susa (2017).

[8]The former does not correspond to the case we are analyzing because the market in this model is segmented so that tariff policies do not affect each other, implying that there is no strategic interdependency.

owns less stock than the median voter does is elected by the policy-maker when trade costs are high. An individual with less income, or less stock in the country's duopolistic firm, is likely to be elected as the country's policy-maker when trade costs increase.

Proof.

It is shown that $\hat{\gamma}_A^{cu} - \gamma_{A,m} > 0$ holds with significantly small τ. On the other hand, $\hat{\gamma}_A^{cu} - \gamma_{A,m} < 0$ holds with significantly large τ. In addition, the tendency for delegation depending on trade costs is proved by differentiating $\hat{\gamma}_i^{cu}$ with respect to τ; $\partial\hat{\gamma}_d^{cu}/\partial\tau < 0$.

From the viewpoint of the median voter of country A, we try to give an interpretation to Proposition 2. As mentioned above, the decisive median voter cannot maximize his/her utility if he/she becomes the policy-maker under a CU. This is due to the rule that the policy-maker of country A must cooperatively determine the tariff policy with the policy-maker of country B, and this is why he/she has an incentive to strategically delegate this power to another citizen. Here, we focus on the composition and how it changes the median voter's welfare, assuming the situation that he/she becomes the policy-maker. This can be described as how the median voter's welfare level is affected by increasing the common tariff on good 1 under the CU tariff regime with the following formula:

$$\frac{\partial v_A(t^1, t^2; \tau, \gamma_{A,m})}{\partial t^1} = \underbrace{-\frac{\partial p_A^1}{\partial t^1} x_A^1}_{\text{change of CS}} + \underbrace{x_{F,A}^1 + t^1 \frac{\partial x_{F,A}^1}{\partial t^1}}_{\text{change of TR}} + \underbrace{\gamma_{A,m} \left(\frac{\partial \pi_{A,A}^1}{\partial t^1} + \frac{\partial \pi_{A,B}^1}{\partial t^1} \right)}_{\text{change of PS}}. \qquad (18)$$

We can decompose the effect of the tariff on the individual's welfare by terms: The first term captures the change in consumer surplus. The second and third terms express the change of tariff revenue. The last term with $\gamma_{A,m}$ captures the change in producer surplus.

The welfare captured as consumer surplus decreases with an increase of tariff because the amount of good 1 imported from country F is decreased. The change in tariff revenue cannot be defined because the tariff rate per unit is increased while total amount of imported good 1 is decreased. The part of welfare as producer surplus increases with the tariff because the amount of good 1 traded from country F to B is decreased, and that from A to B is increased when the common tariff on good 1 is increased.

Now, we stand on the viewpoint of the median voter of country B and observe how the common tariff on good 1 affects the level of his/her individual welfare. We can easily understand that the parts of welfare as consumer surplus and tariff revenue change similarly to that of the median voter of country A. However, the part of welfare as producer surplus is different because the median voter of country B does not own any stock in the duopolistic firm of country A, which implies that any increased profit for the firm does not matter to the individual welfare of the median voter of country B.

As examined by Facchini et al. (2013), in the case where there are no trade costs mainly due to the difference of ownership, the median voter of country A has more incentive to set a higher tariff on good 1 when compared to the median voter of country B. He/she foresees that the most preferred tariff rate could not be set if he/she becomes the policy-maker of the country. This is because the common tariffs are cooperatively determined under the CU regime, which implies that he/she must consider the welfare of the median voter of country B. To set his/her most preferred tariff rate, the median voter of country A has an incentive to delegate that power to an individual who owns more stock and will tend to set a higher tariff rate than he/she will.

In turn, we consider how the presence of trade costs affects incentives for the median voter of country A. As indicated in Proposition 2, the median voter of country A delegates the power to an individual who owns less stock and tends to set a lower tariff than he/she does when trade costs are significantly large. This implies that the presence of trade costs weakens the incentive of the median voter of country

A to set a higher tariff, and rather, it induces him/her to prefer setting a lower tariff than would the median voter of country B.

Simply put, when trade costs increase, the number of trades decrease. Particularly, it is the key fact that the decreased amount of good 1, which is imported from other countries, is asymmetric between the two countries. That of country A is larger than that of country B because the firm in country A produces good 1 and the citizens do not have to rely on imports when high trade costs accrue. Under the circumstance, the incentive for the median voter of country A to impose a tariff on the decreased tax base, or good 1, is weakened, compared to that of the median voter of country B. Therefore, the median voter of country A tends to delegate the power to an individual who owns less stock than he/she does when trade costs between the countries are increased.[9]

3.5   Asymmetric Case: No Trade Costs between the Member Countries

In turn, we examine a case of asymmetric trade costs: We assume here that trade costs accrue between the member countries and country F, and these are the same trade costs ($\tau^1_{F,d} = \tau^2_{F,d} = \tau$), while there are no trade costs between member countries A and B ($\tau^1_{A,B} = \tau^2_{B,A} = 0$). Namely, a situation where the member countries are located close to each other, compared to other countries, is assumed.

Delegation occurring in this situation, particularly under CU, is summarized as follows:

Proposition 3.

    Policy-maker in the case of asymmetric trade costs: *Under the CU regime, the policy-maker elected by majority vote in the equilibrium owns stock of the firm in the country in which he/she resides twice as much as the median voter does.*

Proof.

    This can be confirmed by substituting $\tau^1_{F,d} = \tau^2_{F,d} = \tau$ and $\tau^1_{A,B} = \tau^2_{B,A} = 0$ to (17). We obtain $\hat{\gamma}^{cu}_d = 2\gamma_{d,m}(d = A, B)$.

This shows that, in this case, the decisive median voter always delegates the power to determine the tariff policy to a citizen who owns more stock and has an incentive to set a higher tariff than he/she does while, in the symmetric case above, the median voter can choose a citizen who owns less stock and sets a lower tariff.

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[9]To see the effect in detail, we differentiate each component of (18) with respect to τ as follows:

$$\text{CS}: \quad \frac{\partial}{\partial\tau}\left(-\frac{\partial p^1_A}{\partial t^1}x^1_A\right) = \frac{1}{9} > 0,$$

$$\text{TR}: \quad \frac{\partial}{\partial\tau}\left(x^1_{F,A} + t^1\frac{\partial x^1_{F,A}}{\partial t^1}\right) = -\frac{2}{3} < 0,$$

$$\text{PS}: \quad \frac{\partial}{\partial\tau}\left[\gamma_{A,m}\left(\frac{\partial \pi^1_{A,A}}{\partial t^1} + \frac{\partial \pi^1_{A,B}}{\partial t^1}\right)\right] = \gamma_{A,m}\left(\underbrace{\frac{\partial^2 \pi^1_{A,A}}{\partial t^1 \partial\tau}}_{+} + \underbrace{\frac{\partial^2 \pi^1_{A,B}}{\partial t^1 \partial\tau}}_{-}\right) = 0,$$

respectively. It is indicated that when trade costs increase, the loss of consumer surplus from the imposition of the tariff is decreased while the effect of tariff revenue is weakened. In this model, the latter dominates the former. Additionally, trade costs do not affect the increase in the firm's profit. By adding all of them, we obtain

$$\frac{\partial^2 v_A(t^1, t^2; \tau, \gamma_{A,m})}{\partial t^1 \partial\tau} = -\frac{5}{9} < 0,$$

which implies that the incentive to set a high tariff is weakened with an increase in trade costs.

Why does such delegation occur? This can be interpreted in an analogous way, as Facchini, et al. (2013) mentioned above. In the case where there are no trade costs between the member country and the same trade costs accrue on imported goods from country F, both consumer surplus and tax revenue of the two countries are similarly affected by a change in external tariff. The difference in the decision-making of each country shows up due to the difference in producer surplus affected by the change in tariff. The decisive median voter in one country has an incentive to set a higher external tariff on the good produced in his/her own country, compared to those produced in other countries, to decrease the amount of goods exported from country F and increase it in his/her own country. Hence, in this case, the median voter has an incentive to delegate to a citizen who owns more stock than he/she does.[10]

4 Welfare Analysis

In this section, we compare the levels of welfare realized in each tariff regime for each of the cases. Particularly, we focus on the average level of welfare in a country, which implies a measure of the welfare of the individual who is located at the mean of the distribution of income, or stock ($\gamma_{d,l} = 1$).[11]

The welfares to be compared are as follows:

$$\bar{v}_d^{mfn}\Big[\boldsymbol{t}^{1,mfn}(\gamma_{A,m}), \boldsymbol{t}^{2,mfn}(\gamma_{B,m}); \tau, 1\Big], \tag{19}$$

$$\bar{v}_d^{fta}\Big[\boldsymbol{t}^{1,fta}(\gamma_{A,m}), \boldsymbol{t}^{2,fta}(\gamma_{B,m}); \tau, 1\Big], \tag{20}$$

$$\bar{v}_d^{cu}\Big[\boldsymbol{t}^{1,cu}(\hat{\gamma}_A^{cu}(\gamma_{A,m})), \boldsymbol{t}^{2,cu}(\hat{\gamma}_B^{cu}(\gamma_{B,m})); \tau, 1\Big], \tag{21}$$

where $\bar{v}_d^{regime}$ denotes the average welfare in country d under the tariff regime of $regime$.

As we have examined so far, it is also assumed that the shapes of stock distribution in each country are symmetric ($\gamma_{A,m} = \gamma_{B,m} = \gamma_m$).

4.1 Symmetric Case

Figure 1 shows the welfare ranking in each tariff regime in the case where trade costs accrue symmetrically among the countries. The ranking depends on trade costs (τ: vertical axis) and how skewed the income distribution is, which is symbolized with the location of the median voter in the distribution (γ_m: horizontal axis).

Note that Facchini et al. (2013) argue the welfare ranking on only the horizontal axis of Figure 1, and we extend their analysis by adding the new dimension of trade costs. Facchini et al.'s (2013) analysis concludes that an FTA can be the best tariff regime to maximize the average level of welfare when the distribution of income is not very skewed, which implies that economic disparity is small. However, if we consider the presence of trade costs, an FTA can also be best when economic disparity is large . We can summarize the result as follows:

Proposition 4.
   Welfare in the case of symmetric trade costs: *In the presence of trade costs among the countries, an FTA is more likely to realize a higher level of average welfare compared to a CU when income disparity becomes larger, or income distribution is more skewed.*

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[10]Remember that in the case of symmetric trade costs, there exists asymmetry between the member countries in amount of imports decreased due to the increase in trade costs. This is the key factor that gives the median voter an incentive to delegate to a citizen who owns less stock. However, the asymmetry does not exist in this case.

[11]This implies that we calculate and compare levels of welfare with the Benthamite social welfare function.
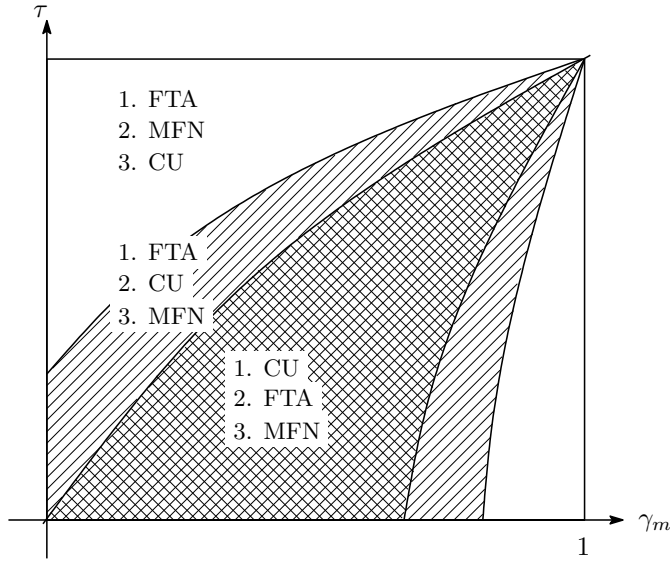
Figure 1: Average individual's welfare under symmetric trade costs
Vertical axis: Trade costs τ. Horizontal axis: γ_m

To interpret the result, we focus on the case where the median voter is located at $1/2$ in the distribution, or on the horizontal axis at ($\gamma_m = 1/2$). As derived in Facchini et al.'s (2013) analysis, the decisive median voter delegates an individual who owns as much stock as he/she does, which means $\hat{\gamma}^{cu}(0, \gamma_m) = 2\gamma_m$, under the CU regime. In this case, we assume that the power to determine tariff policy is delegated to the individual who is located at the average ($\hat{\gamma}^{cu}(0, 1/2) = 1$). Hence, a CU is the best tariff regime in the ranking to maximize the average level of welfare in the countries.

However, as pointed out in Proposition 2, an individual with less income, or less stock in the country's duopolistic firm, is likely to be elected as the country's policy-maker when trade costs increase ($\partial \hat{\gamma}_d^{cu}/\partial \tau < 0$). This means that the policy-maker elected by majority vote is receded from the average with the increase in trade costs, and the CU goes down in the average welfare ranking. Therefore, the CU is dominated by the FTA in the presence of significantly large trade costs.

Note that, basically, FTA>MFN holds because of the free trade between the two countries: While tariff revenue is decreased, the amount of traded goods as $x_{A,B}^1$ and $x_{B,A}^2$ is increased, and both consumer and producer surplus are improved under the FTA regime compared to the MFN regime. In addition, the external tariff imposed on goods from country F is decreased, and the amount of goods is increased. As a result, this induces an increase in consumer surplus of the member countries. This is what they call a "tariff-complementarity effect." [12]

4.2 Asymmetric Case: No Trade Costs between the Member Countries

Figure 2 shows the welfare ranking in each tariff regime in the case where trade costs accrue asymmetrically between the countries; the same trade costs accrue between country F and the member countries A and B, but there are no trade costs between them. Similar to Figure 1, the ranking depends on trade costs (τ: vertical axis) and how skewed income distribution is, which is symbolized with location of the median voter in the distribution (γ_m: horizontal axis).[13]

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[12]For a detailed explanation of tariff-complementarity effect, see Ornelas (2005) and Saggi and Yildiz (2009).

[13]As pointed out with Figure 1, the horizontal axis of Figure 2, indicating the ranking when no trade costs exist, is also what Facchini et al.(2013) argue.
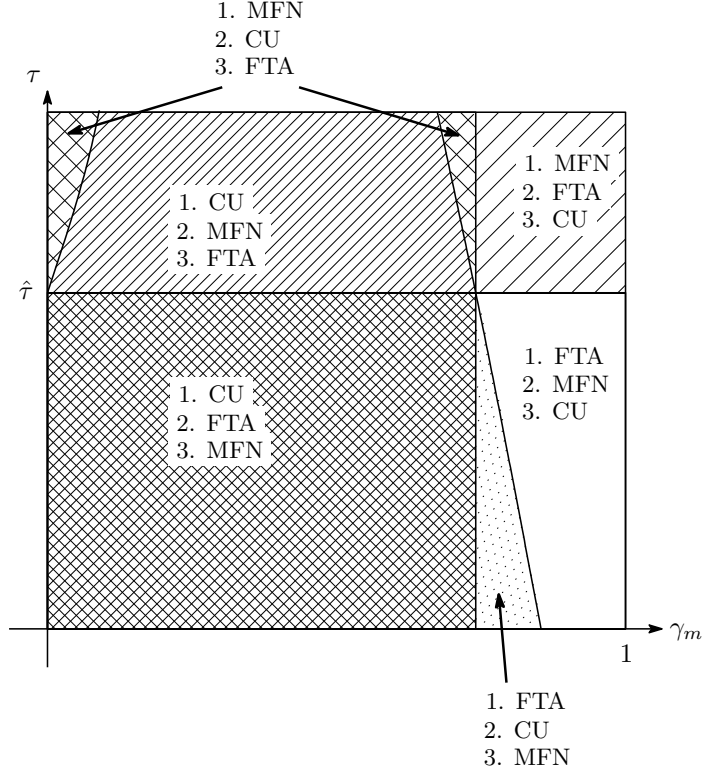
Figure 2: Average individual's welfare under asymmetric trade costs
Vertical axis: Trade costs τ. Horizontal axis: γ_m

As one of the features of Figure 2, it is observed that an MFN can realize a higher level of average welfare than an FTA can when trade costs are significantly high, specifically, higher than $\hat{\tau}$. To interpret this fact, we should remember why an FTA can realize a higher level of welfare in the case where no trade costs exist: If the member countries shift their trade regime from MFN to FTA, they lose the tariff revenue that had been imposed on the goods traded between them. However, due to the tariff-complementarity effect, tariffs imposed on goods imported from country F are decreased and the amount is increased, so consumer surplus is improved. The gain basically exceeds the loss in tariff revenue. Therefore, a higher welfare is realized under the FTA regime when compared to the MFN regime.

Nevertheless, when trade costs between country F and the member countries are significantly high, consumers of one member country must rely on goods imported from the other member country, so the amount is increased compared to the case when no trade costs exist. Under this situation, shifting from an MFN to an FTA induces a great loss in tariff revenue, and the tariff-complementarity effect, which can improve consumer surplus, is weakened. Hence, an MFN can realize a higher level of welfare than an FTA.

This result can be summarized as follows:

Proposition 5.

Welfare under MFN and FTA in the case of asymmetric trade costs: *In the case where there are no or small trade costs, an FTA can realize a higher level of average welfare compared to an MFN. However, when trade costs are significantly large between the member countries and the outside country, the ranking of realized average welfare is reversed.*

Now, we focus on the case in which trade costs are higher than $\hat{\tau}$ and see where a CU ranks in welfare: Is the average level of welfare realized under CU higher than that of MFN, lower than that of

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FTA, or between them? As pointed out in Proposition 3, the decisive median voter always delegates the power to determine tariff policy to the citizen who owns twice as much stock as he/she does under the regime of CU. This implies that, when $\gamma_{d,m} = 1/2$, the citizen who is located in the average of the distribution of stock becomes the policy-maker, and he/she sets the tariff rate, considering his/her own welfare. Therefore, in that case, the average welfare realized under a CU can be higher than that under an MFN. However, when the median voter is located above $1/2$, a citizen located above the average becomes the policy-maker so that the tariff rate becomes too high for the citizen located at the average. Hence, when the location of the median voter in the distribution is far away from the average, the average welfare realized under a CU goes down in the ranking. We can similarly interpret why the average welfare realized under a CU is lower than that under an MFN when the median voter is located close to zero.

In turn, we consider the case where trade costs are lower than $\hat{\tau}$. Basically, the same interpretation works in this case. When the location of the median voter is at or close to $1/2$, the average welfare under a CU is highest in the ranking because the power to set tariff policy is delegated to the citizen at or close to the average. However, when the median voter owns more stock than $1/2$, the location of the policy-maker moves away from the average, which induces that a CU is lowered in the ranking of average welfare.

Finally, it should be emphasized that, contrary to the case of symmetric trade costs, the average welfare under a CU would never be lower than that of FTA, even if the location of the median voter is close to zero or the income disparity in the countries has become large. In the extreme case where $\gamma_{d,m} = 0$, which implies that the median voter does not own any stock or receives any dividend of the firm's profits, the equilibria of a CU and an FTA become exactly the same. As mentioned above, the delegation by the median voter under a CU occurs due to the incentive to increase the amount of goods exported to the other member country and the profits of the firm. However, if the median voter does not own any stock in the firm, he/she does not care about it, which means that he/she does not have an incentive to delegate. In this situation, the average welfare realized under a CU is equivalent to that under an FTA.[14] Therefore, when the location of the median voter moves away from $1/2$ in the distribution and goes down to zero, the average welfare under a CU is decreased and gets closer to that of an FTA but never becomes lower.[15]

Comparing Figures 1 and 2, we can summarize the main finding of this analysis as follows:

Corollary.

Distance of the member countries and trading regime: *When there is income disparity in each of the member countries, whether the CU regime can realize a higher average welfare than an FTA depends on the existence of trade costs: If they are located close to each other and no trade costs accrue, a CU can keep a higher level of average welfare than an FTA can. On the other hand, if they are located far from each other and trade costs accrue, an FTA can realize a higher level of average welfare than a CU can.*

5 Concluding Remarks

In this analysis, we have examined tariff cooperations under a representative democracy, comparing the national welfare of the member countries realized in three types of trading regimes, MFN, CU, and FTA, aiming to answer two questions: First, there is a contradiction between the reality and the theoretical

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[14]This can be confirmed by evaluating tariff policy under both of the regimes with respect to $\tau_{A,B}^1 = \tau_{B,A}^2 = 0$, $\tau_{F,d}^1 = \tau_{F,d}^2 = \tau$, and $\gamma_{d,m} = 0$.

[15]This is why a CU is ranked 2nd in welfare when trade costs are higher than $\hat{\tau}$ and $\gamma_{d,m}$ is close to zero. In this case, MFN>FTA holds, so the average welfare under a CU can become lower than that under an MFN. On the other hand, a CU is not 2nd in the ranking when trade costs are lower than $\hat{\tau}$ because FTA>MFN holds in that situation.

predictions in the literature of international trade. In the literature, it has been argued that the level of national welfare under an FTA is likely to be lower than that under a CU, but the number of FTAs has risen in the last two or three decades compared to that of CUs. There must be a missing factor that has not been taken into consideration. Second, most CUs in the real economy are formed between countries that are located close to each other. However, most FTAs can be formed between countries far away from each other. Why does this clear difference appear?

To shed light on this, we focus on trade costs. Even in the modern globalized world, trade costs are not negligible for every country, whether it is a developed country or not. We incorporate this in the representative democracy model built by Facchini et al. (2013): In the first stage, citizens in each country vote to choose a policy-maker, and in the second stage, he/she sets a tariff policy under a regime. Using this framework, we examine two polar cases: One is the case where trade costs accrue symmetrically among the member countries and the outside country to simply focus on the effect of trade costs. The other is the case where trade costs accrue asymmetrically among the countries; there are no trade costs between the member countries, but the same trade costs accrue between them and the outside country.

As one of the main results of our study, we find that, in the case of symmetric trade costs and when the income distribution in the countries is largely skewed, an FTA can realize a higher level of national welfare than a CU can. This result is contrary to existing studies in the literature. Additionally, we also find that in the case of asymmetric trade costs, even if the income distribution in the countries is very skewed, a CU can realize a higher level of average welfare than an FTA can. Therefore, from the viewpoint of national welfare, a government's choice of tariff regime can be changed, depending on the distance between potential member countries.

However, as a limitation, we can point out that the result mentioned above is derived under the assumption that trade costs between the countries are perfectly symmetric when they exist. By this assumption, we can simply focus on the effect of trade costs in the discussion of RTAs, but it is still considered to be a strong restriction. In addition, we assume that the location of the median in the distribution of stock represents the extent of income disparity in a country, but the measurement of inequality among citizens can be considered in other ways. These points remain for future research.

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