The Politics of Tariff Cooperation
in the Presence of Trade Costs

Taiki Susa*   Masafumi Tsubuku†

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Abstract

In this study, we explore tariff cooperations under representative democracy, comparing national welfare realized in three types of trading regime; most favored nation treatment, customs union (CU), and free trade agreement (FTA). There is a puzzle that a number of FTA has been rapidly increasing for a couple of decades, compared to that of CU, while most of theoretical studies in the literature predict CU can bring on a higher level of national welfare than FTA. To shed light on it, we build a model featured by two key factors: First, we examine a situation in the presence of trade costs. Second, tariff policy is determined under the regime of representative democracy. As a result, in the case where the income distribution in the countries is largely skewed, FTA is able to realize a higher level of national welfare than CU, contrary to existing studies in the literature.

Keywords: Trade costs, Representative democracy, Regional trade agreement

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*College of Business Administration and Information Science, Chubu University, 1200 Matsumoto-cho, Kasugai-shi, Aichi, 487-8501, Japan email: susa@isc.chubu.ac.jp

†School of Economics, Daito Bunka University, 1-9-1 Takashimadaira, Itabashi-ku, Tokyo, 175-8571 Japan email: tsubuku@ic.daito.ac.jp

1 Introduction

The world of today cannot be described without globalization. One aspect of globalization is captured as international trades among regions and countries, particularly, as rapid increase of number of regional trade agreements (RTA) for a couple of decades: The number of RTA, which had become effective in 1989, was only 13. However, it has been risen up 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, more and more. Then, what we focus here is composition of these number of RTA, or whether countries form RTA as a customs union (CU) or free trade agreement (FTA). Remarkably, the ratio of FTA to CU have been raised; while the percentage of FTA in the whole RTAs was 69% in 1989, it is 93% in 2016. What is the reason that most of RTAs newly formed are FTA? Do governments of the countries form FTA, because it does not cost and is much easier than CU in the sense that they do not have to cooperate in tariff to third countries?

Since the seminal work of Woodland (1982), literature in international trade have provided studies discussing which, CU or FTA, can give higher level of national welfare to the countries forming the RTA. Most of the researches argue that each of the countries is able to obtain higher level of national welfare under CU, compared to FTA (Saggi, 2006; Ornelas, 2007). The reason of it is pretty simple. It depends on whether an externality exists or not. Under the regime of FTA, there is no tariff between the member countries, but they independently determine to set tariff to third countries, which are out of the RTA. If one of the member countries increase the tariff to third countries, it induces the country to decrease an amount of imports from the third countries and to increase it from the other member country. Then, profits of firms in the other member country increase, but the country, which sets a higher tariff, does not take it into account. This implies that the externality occurs here. On the other hand, under the regime of CU, the member countries have to cooperatively set tariff to the third country, which means that determination of tariff policy under CU can internalize the externality. Therefore, CU can bring on an higher level of national welfare to the member countries of the RTA, compared to FTA.

Here, it seems that there is a non-negligible contradiction between the reality and the theoretical arguments; the ratio of FTA to CU in the whole RTAs is rapidly increasing in this two or three decades, while theoretical studies predict that CU can give higher level of national welfare to the member countries. Why have CU been formed not so many as FTA?

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 where tariff policies are determined; citizens in each countries can vote to choose a policy-maker of there country, and the policy-maker elected through the voting is delegated the power to determine a tariff policy for the country and set it in the next stage. The structure allows citizens to vote while foreseeing the next stage, which is called strategic delegation. With the introduction of representative democracy, they find that FTA can give a higher level of national welfare, compared to CU, as long as skewness of distribution of wealth is a little, or economic disparity in each countries is small.

However, income disparity in most countries of the world has been widening for this three decades. For instance, OECD (2014) report that Gini coefficient of OECD countries have risen by 3 points; it was 0.29 in 1985 and has gone up to 0.32 in 2014. Particularly, in the United States, Finland, Israel, New Zealand, and Sweden, Gini coefficient of these countries have increased more than 5 points. Meanwhile, the countries that their Gini coefficient decreased are only Greece and Turkey. As shown by the empirical fact, economic disparity of many coutries tend to widen, rather than to be reduced. If we follow the prediction of Facchini et al. (2013), with assumption that governments adopt and form a trade regime which can give a higher level of national welfare, a ratio of CU in the whole RTAs should be increased in the world, where the economics disparity is widening. Nevertheless, it is not observed today. It suggests that there is still a room to discuss the reason why we observe so few of CU. There must be a certain

factor that should be taken into consideration.

In this study, we reconsider the puzzle of CU and FTA, by focusing on the existence of trade costs. Following Anderson and van Wincoop (2004), the definition of trade costs can be given as all costs accrued in the process 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. Summing up all of these costs, it is not a negligible amount even for developed countries. According to the estimation by Anderson and van Wincoop (2004), the trade costs for industrialized countries is at 170% in terms of ad valorem tax equivalent: If we take 100 for production cost of a good, all costs accrued in the way delivering it from its firm to consumers in other countries is evaluated as 170. However, all of the previous studies in the literature of international trade pay little heed to the existence of trade costs. In all kinds of costs accrued in trading with abroad, they take account of only tariff. 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). A number of studies in these fields deal with capital tax, examining agglomeration of firms, but not tariff (Ludema and Wooton, 2000; Baldwin and Krugman, 2004; Ottaviano and van Ypersele, 2005). Accordingly, what we try in this study is to reexamine the question which, CU or FTA, can yield a higher level of national welfare to member countries of the RTA, in the presence of trade costs.

In order to shed light on effect of trade costs, we simply incorporate it in the framework of Facchini et al. (2013) and compare levels of national welfare under three tariff regimes; CU, FTA, and most favored nation (MFN) as a benchmark. It is newly found that FTA can realize a higher level of national welfare in the member countries than CU, in the case where trade costs exist the income distribution is largely skewed, or there is sufficiently large economic disparity in each country. This result is a clear contrast to Facchini et al. (2013) and other studies in the literature.

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 imperfect market, focusing on a tariff regime formed between two countries of the three. As key features of this model, it is assumed that trade costs accrue when they trade with abroad, and a policy-maker in each countries are elected through voting. The result of their elections and tariff policy in equilibrium of each cases are determined in Section 3. In Section 4, we give a welfare analysis and its interpretation. Finally, Section 5 concludes.

2 The Model

2.1 Basic Composition of the Economy

Following Facchini et al. (2013), we develop a standard oligopolistic trade model, which is composed of three countries and three goods, in order to examine the formation of RTAs.[1] There are country A, B, and F: Country A and B are perspective members of RTA, while country F represents the rest of the world. There are good 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 perfectly competitive market and treated as the numareire. On the other hand, good 1 and 2 are produced in duopolistic market. One of the firms is located in country F, and the other firm producing good 1 (2) is located in country A (B), respectively. These duopolistic firms compete in quantities, which is Cournot competition. If firms export good 1 or 2 from their country to other, they have to pay tariff, $t_{s,d}^i$, and trade costs, $\tau_{s,d}^i$.

Here, $t_{s,d}^i$ denotes tariff on good i transported from country s to country d, and other variables as $\tau_{s,d}^i$ are denoted in the same manner. When the firms supply good 1 or 2 to markets of their countries, there

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

accrues no tariff and trade costs, either ($t^i_{A,A} = t^i_{B,B} = 0, \tau^i_{A,A} = \tau^i_{B,B} = \tau^i_{F,F} = 0$). In addition, using vectors and matrices, we define tariff that country d imposes on good i as $\boldsymbol{t}^i_d = (t^i_{A,d}, t^i_{B,d}, t^i_{F,d})$ and trade costs accrued with supplying good i to country d as $\boldsymbol{\tau}^i_d = (\tau^i_{A,d}, \tau^i_{B,d}, \tau^i_{F,d})$. Similarly, tariff on good i is denoted as $\boldsymbol{t}^i = (\boldsymbol{t}^i_A, \boldsymbol{t}^i_B, \boldsymbol{t}^i_F)$ and trade costs of good i is denoted as $\boldsymbol{\tau}^i = (\boldsymbol{\tau}^i_{A,d}, \boldsymbol{\tau}^i_{B,d}, \boldsymbol{\tau}^i_{F,d})$.

In this paper, we mainly carry an argument under assumption that trade costs between the countries are symmetric ($\tau^i_{s,d} = \tau$ for all i, s, d), in order to shed light on the effect of trade costs to the results of election and the levels of welfare in each country.[2]

2.2 Production Sector

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

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

$$\pi^i_s = \sum_{d=A,B,F} (p^i_d - m - t^i_{s,d} - \tau)x^i_{s,d}, \tag{1}$$

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

Rent from production of the firm in 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 of 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 good 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 prices of goods in country s is not changed by tariffs of country d. Taking account of the assumption that profits of the firms (1) are composed of linearly added function, it implies that determinations on tariffs by the governments are strategically independent from each other in this model.

On their income, there exist 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 the 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 symmetry between country 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 so small as closed to zero, it means that the distribution of income is largely skewed and economic disparity is widened.

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[2]Later on, the authors are planning to examine the case where trade costs are not perfectly symmetric.

An individual obtains his/her income from wage, return from the stake of his/her own, and tariff revenue the government of his/her country gains. Note that there is no public goods supplied by government, but only redistribution in lump-sum manner. Hence, 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:

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\begin{aligned}
v_{d,l}(\boldsymbol{t}^1, \boldsymbol{t}^2; \tau, \gamma_{d,l}) &= 1 + \gamma_{d,l} \, \pi_d^i(\boldsymbol{t}^i, \tau) + \sum_s \sum_i t_{s,d}^i x_{s,d}^i(\boldsymbol{t}_d^i, \tau) \\
&\quad + \sum_i \left\{ u[x_d^i(\boldsymbol{t}_d^i, \tau)] - p_d^i(\boldsymbol{t}_d^i, \tau) x_d^i(\boldsymbol{t}_d^i, \tau) \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 through majority voting. The power to determine tariff policy of the country is delegated to the policy-maker.

2. The policy-maker, elected through voting in the 1st stage, makes a decision under a regime of tariff policy: In the case of non-discriminatory "most-favored-nation" tariff policy (MFN), the policy-maker of each country chooses the non-discriminatory tariffs on all trades. In the case of free trade agreement between country A and B (FTA), he/she independently, or non-cooperatively, chooses tariff on goods imported from country F. In the case of customs union between them (CU), the policy-makers of both countries have to decide it cooperatively.

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

We solve this model backwards and compare the welfares realized in 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 2nd stage as given. The setting that the markets are segmented in this model allows us to focus on the equilibria of country A and B, because tariffs imposed by the government of country F do not affect them.[3] If either RTA, MFN or CU, is taken place, tariffs on all goods traded between country A and B are set zero, or $t_{A,B}^i = t_{B,A}^i = 0$ for all i. Otherwise, the regime of MFN is applied.

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

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

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

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

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

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

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

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

3.2 2nd Stage: Tariff Policy Choice

In 2nd and 1st stage, we examine tariff policy and policy-maker determined under three different trade regimes: most favored nation (MFN), free trade agreement (FTA), and customs union (CU).

In this subsection, tariff policy is analyzed, taking the policy-maker elected through majority voting 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 policy-maker behaves so much selfish, which means that he/she pursue and maximize only his/her profit, not caring for social welfare of the country, when he/she makes a decision on tariff policy. Additionally, he/she does not care about next elections, either. Under the regime of MFN and FTA, the policy-makers of country A and B can independently, or non-cooperatively, determine tariff imposing on goods from country F, to maximize only his/her utility. However, under the regime of CU, 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.[4]

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

3.2.1 Most Favored Nation

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

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

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

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

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$$t_A^{1,mfn}(\hat{\gamma}_A) = \frac{(H - m - 5\tau) + 2\hat{\gamma}_A\,(H - m + \tau)}{11 - 2\hat{\gamma}_A},$$

$$t_A^{2,mfn} = \frac{H - m - \tau}{4},$$

where $t_d^{i,mfn}$ denotes a tariff on good i in country d under the regime of MFN. 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 country A and B and the policy-maker of country A non-cooperatively determines to set tariffs on goods imported from country F. Under this condition, he/she faces the maximization problem of $v_{A,P}$ as follows:

$$\max_{\boldsymbol{t}_d^i} \quad v_d(\boldsymbol{t}^1, \boldsymbol{t}^2; \tau, \hat{\gamma}_d)$$
$$\text{s.t.} \quad t_{B,A}^2 = 0 \tag{6}$$

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

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

$$t_{F,A}^{2,fta} = \frac{H - m - \tau}{11}.$$

3.2.3 Customs Union

Finally, in the case of 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 country A and B as FTA. In addition, as mentioned above, it is determined cooperatively between the policy-makes of country A and B, solving the maximization problem of the evenly added sum of their utilities. It is written as follows:

$$\max_{\boldsymbol{t}^i} \quad v_{A,P}(\boldsymbol{t}^1, \boldsymbol{t}^2; \tau, \hat{\gamma}_A) + v_{B,P}(\boldsymbol{t}^1, \boldsymbol{t}^2; \tau, \hat{\gamma}_B)$$
$$\text{s.t.} \quad t_{A,B}^1 = t_{B,A}^2 = 0,$$
$$t_{F,A}^1 = t_{F,B}^1, \tag{7}$$
$$t_{F,A}^2 = t_{F,B}^2$$

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

$$t^{1,cu}(\hat{\gamma}_A) = \frac{2(H - m) - 6\tau + 4\hat{\gamma}_A(H - m)}{22 - 4\hat{\gamma}_A},$$

$$t^{2,cu}(\hat{\gamma}_B) = \frac{2(H - m) - 6\tau + 4\hat{\gamma}_B(H - m)}{22 - 4\hat{\gamma}_B}.$$

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

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

Lemma 1: Tariffs and Stocks

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

Proof.

It is easily confirmed by differentiating $t_{s,d}^{i,regime}$ with respect to $\hat{\gamma}_d$: $\partial t_A^{1,mfn}(\hat{\gamma}_A)/\partial \hat{\gamma}_A > 0$, $\partial t_{F,A}^{1,fta}(\hat{\gamma}_A)/\partial \hat{\gamma}_A > 0$, $\partial t^{1,cu}(\hat{\gamma}_A)/\partial \hat{\gamma}_A > 0$, $\partial t^{1,cu}(\hat{\gamma}_B)/\partial \hat{\gamma}_B > 0$, 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. With more stocks that the policy-maker owns, he/she is more likely to be a protectionist, since the duopolistic firm of the country portions out its profits to the owner according to the amount of his/her stocks. Hence, the policy-maker has an incentive to set a higher tariff and reduce an amount of the imports, in order to obtain more profits.

Lemma 2: Tariffs and Trade Costs

In all of the three cases, tariffs imposed on both imported goods by the policy-maker are more reduced, when trade costs increase.

Proof.

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

An intuition for Lemma 2 is also a bit straightforward. Existence of trade cost induce deterioration of amounts of trades. Under an circumstance where an amount of trades is lowered due to trade costs, the incentive of the policy-maker to increase tariff revenue or protect the duopolistic firm of the country is weakened. Therefore, tariffs are lowered with higher trade costs.

3.3 1st Stage: Election

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

We focus on voting behavior of the individuals located at the median of the distribution of the firm stock in the country, because well-known the median voter theorem holds in this model. It is required to confirm the single-peaked preferences and monotonicity between tariff and the stock that the policy-maker owns. 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 stock of policy-maker, we can give an intuitive understanding to it: With more amount of the stock that he/she owns, the policy-maker is more likely to be a protectionist. It means that he/she tends to set a higher tariff to imported goods, which is also produced by the firm he/she owns. Therefore, monotonicity between 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:

$$\max_{\hat{\gamma}_A} \quad v_{A,m}\left[\boldsymbol{t}^{1,mfn}(\hat{\gamma}_A), \boldsymbol{t}^{2,mfn}(\hat{\gamma}_B); \tau, \gamma_{A,m}\right] \tag{8}$$
$$\text{s.t.} \quad t_A^1 = t_{F,A}^1, \quad t_A^2 = t_{B,A}^2 = t_{F,A}^2$$

It yields that $\hat{\gamma}_A = \gamma_{A,m}$, which implies that he/she chooses his-/herself for 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:

$$\max_{\hat{\gamma}_A} \quad v_{A,m}\left[\boldsymbol{t}^{1,fta}(\hat{\gamma}_A), \boldsymbol{t}^{2,fta}(\hat{\gamma}_B); \tau, \gamma_{A,m}\right] \tag{9}$$
$$\text{s.t.} \quad t_{B,A}^2 = 0$$

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:

$$\max_{\hat{\gamma}_A} \quad v_{A,m}\left[\boldsymbol{t}^{cu}(\hat{\gamma}_A, \hat{\gamma}_B); \tau, \gamma_{A,m}\right] \tag{10}$$
$$\text{s.t.} \quad t_{A,B}^1 = t_{B,A}^2 = 0,$$
$$t^1 = t_{F,A}^1 = t_{F,B}^1,$$
$$t^2 = t_{F,A}^2 = t_{F,B}^2$$

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

$$\hat{\gamma}_A^{cu} = \frac{6\gamma_{A,m}\left[4(H-m) - \tau\right] - 11\tau}{12(H-m) - 5\tau}. \tag{11}$$

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

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 regime 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 can not 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 policy-makers of the countries has strategic interdependency to each other, due to existence of externality of policies, among others.[5] ii) It is a case where the policy-makers have to take account of utility of some other individual, not only him-/herself (Facchini et al.,

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[5]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 (forthcoming).

2013). Obviously, the latter corresponds to the case we face, where the policy-makers have to determine tariff policies in order to maximize the added sum of their utilities.[6]

We newly find the relationship between trade costs and the property of policy-maker as follows:

Proposition 2.

Under tariff regime of customs union, the decisive median voter delegates the power to set tariff to an individual, who owns more stocks than the median voter does, when trade costs are significantly low or zero. On the other hand, an individual, who owns less stocks than the median voter does, is elected by the policy-maker, when trade costs are high. An individual with less income, or less stocks of the duopolistic firm of the country, is likely to be elected as the policy-maker of the country, 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 of delegation depending on trade costs is proved by differentiating $\hat{\gamma}_i^{cu}$ with respect to τ; $\partial \hat{\gamma}_d^{cu} / \partial \tau < 0$.

Standing on 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 can not maximize his/her utility, if he/she becomes the policy-maker under customs union. This is due to the rule the policy-maker of country A must cooperatively determine tariff policy with the policy-maker of country B and the reason why he/she has an incentive to strategically delegates the power to another citizen. Here, we focus on composition and its changes of the median voter's welfare, assuming an situation he/she becomes the policy-maker. It could be described how the level of the median voter's welfare is affected by increasing the common tariff on good 1 under the tariff regime of customs union, with the formula as follows:

$$\frac{\partial v_A(t^1, t^2; \tau, \gamma_{A,m})}{\partial t^1} = \underbrace{-\frac{\partial p_A^1}{\partial t^1} x_A^1}_{\text{change of CS}} + \underbrace{x_{F,A}^1 + t^1 \frac{\partial x_{F,A}^1}{\partial t^1}}_{\text{change of TR}} + \underbrace{\gamma_{A,m} \left(\frac{\partial \pi_{A,A}^1}{\partial t^1} + \frac{\partial \pi_{A,B}^1}{\partial t^1} \right)}_{\text{change of PS}}. \qquad (12)$$

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

The welfare captured as consumer surplus decreases with increase of tariff, because an amount of good 1 imported from country F is decreased. The change of tariff revenue can not be defined, because tariff rate per unit is increased, while total amount of imported good 1 is decreased. The part of welfare as producer surplus increases with tariff, because the amount of good 1 traded from country F to B is decreased, and instead, that from country 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 see how the common tariff on good 1 affect the level of his/her individual welfare. We can easily understand the parts of welfare as consumer surplus and tariff revenue similarly change as 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 of the duopolistic firm of country A, which implies that increased profit of the firm does not matter for the individual welfare of the median voter of country B.

In the case where there exists no trade costs as examined by Facchini et al. (2013), mainly due to the difference of the ownership, the median voter of country A has an incentive to set higher tariff on good

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[6]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 to each other, implying that there is no strategic interdependency.

1, compared to the median voter of country B. He/she foresees the most preferred tariff rate could not be set, if he/she becomes the policy-maker of the country. This is just because the common tariffs are cooperatively determined under the regime of customs union, which implies that he/she has to take the welfare of the median voter of country B into consideration. In order to set the most preferred tariff rate for him/her, the median voter of country A has an incentive to delegate the power to an individual, who owns more stocks and tends to set a higher tariff rate than he/she does.

In turn, we consider how the presence of trade costs affects incentive of 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 stocks and tends to set a lower tariff than he/she does, when trade costs are significantly large. It implies that the presence of trade costs weaken 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, compared to the median voter of country B.

Simply, when trade costs increase, the amount of trades are decreased. 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 of median voter of country A to impose tariff on the decreased tax base, or good 1, is weakened, compared to the median voter of country B. Therefore, the median voter of country A tends to delegate the power to an individual, who owns less amount of stocks than he/she does, when trade costs between the countries are increased.[7]

4 Welfare Analysis

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

The welfares to be compared are as follows:

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[7]To see the effect in detail, we differentiate each component of (12) with respect to τ as follows:

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

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

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

respectively. It is indicated that, when trade costs increase, the loss of consumer surplus from 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 of 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 increase of trade costs.

$$\bar{v}_d^{mfn}\Big[\boldsymbol{t}^{1,mfn}(\gamma_{A,m}),\boldsymbol{t}^{2,mfn}(\gamma_{B,m});\tau,1\Big], \tag{13}$$

$$\bar{v}_d^{fta}\Big[\boldsymbol{t}^{1,fta}(\gamma_{A,m}),\boldsymbol{t}^{2,fta}(\gamma_{B,m});\tau,1\Big], \tag{14}$$

$$\bar{v}_d^{cu}\Big[\boldsymbol{t}^{1,cu}(\hat{\gamma}_A^{cu}(\gamma_{A,m})),\boldsymbol{t}^{2,cu}(\hat{\gamma}_B^{cu}(\gamma_{B,m}));\tau,1\Big], \tag{15}$$

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

As we have examined so far, it is also assumed that shapes of distribution of stocks in each country are symmetric ($\gamma_{A,m} = \gamma_{B,m} = \gamma_m$). Figure 1 shows the ranking of the welfares in each tariff regime, depending on trade costs (τ: vertical axis) and skewness of distribution of income, which is symbolized with location of the median voter in the distribution (γ_m: horizontal axis).
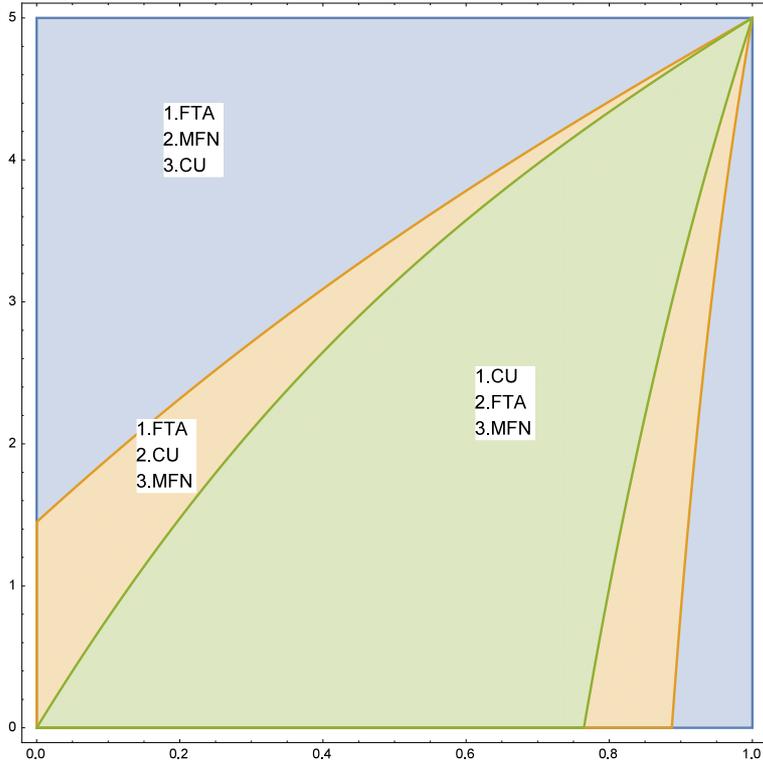
Figure 1: Average individual's welfare under symmetric trade costs
Vertical axis: Trade costs τ. Horizontal axis: γ_m

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, which is trade costs. The analysis of Facchini et al. (2013) concludes that FTA can be the best tariff regime to maximize the average level of welfare, when the distribution of income is not so much skewed, which implies that economic disparity is small. To the contrary, if we take account of the presence of trade costs, FTA can be the one also when economic disparity is large. We can summarize the result as follows:

Proposition 3.

In the presence of trade costs, FTA is more likely to realized a higher level of average welfare compared to CU, when income disparity, or skewness of income distribution, becomes larger.

In order to give an interpretation to the result, we focus on the case where the median voter is located at $1/2$ in the distribution, or the horizontal axis ($\gamma_m = 1/2$). As derived in the analysis of Facchini et al. (2013), the decisive median voter delegates an individual who owns stocks as much as he/she does, which means $\hat{\gamma}^{cu}(0, \gamma_m) = 2\gamma_m$, under the regime of CU. In this case we are assuming here, 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, 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 stocks of the duopolistic firm of the country, is likely to be elected as the policy-maker of the country, when trade costs increase ($\partial \hat{\gamma}_d^{cu}/\partial \tau < 0$). It means that the policy-maker elected through voting is recede from the average with increase of trade costs, and CU is going down in the average welfare ranking.[8] Therefore, CU is dominated by FTA, in the presence of significantly large trade costs.

5   Concluding Remarks

In this analysis, we have examined tariff cooperations under representative democracy, comparing national welfare realized in three types of trading regime; most favored nation treatment, customs union (CU), and free trade agreement (FTA), aiming to solve a puzzle of the real and the theoretical prediction in the literature of international trade. In the literature, it has been argued that the level of national welfare under FTA is likely to be lower than that under CU is, while a number of FTA has been upsurging in the last two or three decades, compared to that of CU.

To shed light on it, we focus on the existence of trade costs. Even in modern globalized world, trade costs are not negligible for every country, no matter whether it is a developed country or not. We incorporate it to 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 set a tariff policy under a regime.

As the main result of our study, in the case where the income distribution in the countries is largely skewed, FTA can realize a higher level of national welfare than CU, which is contrary to existing studies in the literature.

However, as a limitation, we can point out that the result mentioned above is derived under assumption trade costs between the countries are perfectly symmetric. By the assumption, we simply focus the effect of trade costs in discussion of regional trade agreements, but it is still said a strong restriction. This point is remained for future research.

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[8]Basically, the welfare level under FTA exceeds that under MFN because of the free trade between the two countries: While tariff revenue is decreased, 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 regime of FTA, compared to MFN.

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