Globalization and Cooperation in Trade Policy

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Abstract

This paper analyzes a relationship between trade costs and tariff policy, and explores the effects of globalization on tariff determined by governments. Traditional trade theory has augured the situation where trade policy setting by governments for national welfare induce higher tariff than cooperative trade policy. This result is caused by externality on exports of foreign country and also observed in this paper. We construct simple two country model with trade costs and show that globalization in terms of decreasing trade costs induces non cooperative governments to employ the trade policy preventing international trade. In contrast, under the cooperative trade policy setting, the governments tend to agree to remove trade barriers and implement the policy to generating international trade with the progress of globalization.

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Keywords Trade Costs, Tariff Policy, Cooperative Trade Policy, Imperfect Competition

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1 Introduction

A progress of globalization so far can be interpreted as an integration of national economies over the world, e.g. advances in transportation technology, information technology, electric trading system, or international law system. A cooperative tariff reduction also plays a critical role to promote globalization since it removes trade barriers originated in national borders. However, a tariff reduction not necessarily is the same as the globalization. Trade policy, including tariff settings, is made with some policy objective, and thus is determined by government for several reasons ; the protection of infant industries, getting political contribution from lobby groups, or abidance by rules agreement on trade policy. The existence of several reasons lie behind leads us to recognize the importance to treat trade policies as the endogenous instruments explicitly when we study the consequence of globalization. In this paper, based on two country model with intra-industrial trade, we analyze the relationship between globalization and the endogenous trade policy set by governments.

Although the extent of globalization is represented with various ways, it is a standard way to represent the globalization by the trade costs defined broadly. According to Anderson and van Wincoop(2004), broad trade costs include the costs of transportation, information, contract enforcement, or adjustment to foreign standard, which are intimately related to globalization. The reduction of trade costs generates the expansion of international trade, which means the economic integration between countries in the terms of trading goods, which enables us to consider broad trade costs as the extent of globalization in this paper.

We focus on the impacts of globalization on the trade policy implemented by governments. In particular, we clarify whether the governments tend to employ more liberalized trade policy when they face with globalization. Traditional theory of trade policy argues that if trade policy is determined by the non-cooperative governments, they tend to impose higher tariff at the expense of foreign country (Johnson, 1954). The inefficiently high tariff is cased from terms-of-trade externality in the standard trade theory, and it appears in our model. What our paper argues is that, in the presence of traditional terms-of-trade externality, the globalization captured by the decrease in trade costs induces governments to employ protective trade policy. This is because the globalization increases competition in the integrated market, and thus it reduces the rents of domestic industry, resulting the government to protect the industry. A cooperation of trade policy would settle this problem, and terms-of-trade externality is internalized by the cooperative choice of trade policy. In the cooperation, it is possible that governments do not impose tariff but pro-

vide subsidies for international trade in order to improve the economic efficiency among countries. Furthermore, as the progress of globalization, the governments employ the policy to generate international trade. Since the losses from transportation shrink in the process of globalization, the governments reduce tariff (or provide more subsidies) to expand imports from abroad. Therefore, the globalization fosters trade liberalization.

The remainder of the paper is organized as follows. Section 2 presents the simple intra-industrial trade model with trade costs. In section 3, we analyze the two schemes of trade policy setting; unilateral trade policy and cooperative trade policy. The impacts of globalization on the policy choices under different policy scheme are analyzed. We conclude the paper in section 4.

2 The economy

There are two symmetric countries($r = H, F$). Each country has two sectors called the agricultural sector and the manufacturing sector. Consumers in both countries have identical preference for agricultural and manufacturing good. We assume that each consumer supplies one unit labor force and thus the population size l in each country is equal to labor force endowment.

The agricultural sector operates under perfect competition and constant return to scale using only labor. To produce one unit agricultural good, one unit labor need to be employed in this sector. Assuming that agricultural goods are numeraire, the price and wage rate are equal to 1.

The manufacturing sector produces horizontally differentiated goods which are imperfectly substitutable for each other. The production of manufacturing goods is operated under imperfect competition. The one variety ω is produced by one manufacturing firm which is negligiblly small and does not influence the behavior of other firms in the sector. Formally, there is a continuum Ω of the manufacturing firms in the economy. Note that the set Ω also represents the set of all varieties of manufacturing goods in the economy. Assuming that there is no entry to this sector, we normalize the size of set, $|\Omega| = 1$. These firms are located evenly in each country so that the domestic consumers have one-half of the firm's ownerships in the economy. The set of the firms located in the country r is denoted by $\Omega_r \subset \Omega$ whose size is one-half, $|\Omega_r| = 1/2$.

International transportation of manufacturing goods incur trade costs τ. To purchase one unit manufacturing goods from abroad, consumers have to pay τ in addition to the goods' price and tariff imposed by government. In this paper, we assume that transport

sector is perfectly competitive so that transport services are elastically supplied with marginal cost pricing. Furthermore, each national government imposes import tariff t_r on manufacturing goods. In contrast to trade cost, the tariff is imposed on imported goods and evenly distributed to consumers in the country. To simplify the analysis, agricultural goods are assumed to be shipped without trade costs.

2.1 Consumers

All consumers in the economy are identical. We formulate the preference of consumers with quadratic utility function as follows:

$$\begin{aligned} & u(q(\omega), q_0; \omega \in \Omega) \\ & = \int_\Omega q(\omega) d\omega - \frac{1-\gamma}{2} \int_\Omega q(\omega)^2 d\omega - \frac{\gamma}{2} \left(\int_\Omega q(\omega) d\omega \right)^2 + q_0, \end{aligned} \tag{1}$$

where $q(\omega)(q_0)$is amounts of manufacturing (agricultural) goods consumption and γ denotes the degree of substitutability between manufacturing goods. The higher γ represents that consumers recognize manufacturing goods as less differentiated. If $\gamma = 0$, it means that manufacturing goods are perfectly different from one another. In contrast if $\gamma = 1$, every manufacturing good is recognized as identical. Consumers in country r maximize utility subject to the following budget constraints.

$$\int_{\Omega_r} p(\omega) q(\omega) d\omega + \int_{\Omega_s} [p(\omega) + t_r + \tau] q(\omega) d\omega + q_0 = y_r, \tag{2}$$

for $r \neq s, \;\; r, s = H, F$. y_r represents consumer's income including the wage, rent from firms' ownership and tax distribution. The consumers in country r have to pay the trade costs and tariff to purchase the variety of manufacturing goods produced by the firm $\omega \in \Omega_s$. From utility maximization problem, we can reduce demand functions for manufacturing goods as follows:

$$q_{rr}(\omega) = \frac{1}{1-\gamma} [1 - p_{rr}(\omega) - \gamma(1 - P_r)], \qquad if \;\; \omega \in \Omega_r, \tag{3}$$

$$q_{sr}(\omega) = \frac{1}{1-\gamma} [1 - p_{sr}(\omega) - t_r - \tau - \gamma(1 - P_r)], \qquad if \;\; \omega \in \Omega_s. \tag{4}$$

where $q_{sr}(\omega)(p_{sr}(\omega))$ represents the consumption (price) of manufacturing goods ω in country r, produced in country s $(r, s = H, F)$. P_r is price index defined by

$$P_r \equiv \int_{\Omega_r} p_{rr}(\omega)d\omega + \int_{\Omega_s} [p_{sr}(\omega) + t_r + \tau]d\omega \tag{5}$$

This price index represents the sum of consumer's price and average price supplied in the country since the number of firms is 1 in the economy.

2.2 Equilibrium

The manufacturing firm producing the variety of ω supplies to domestic and foreign country. Therefore, the operating profit $\pi_r(\omega)$ of the firm located in country r is

$$\pi_r(\omega) = lp_{rr}(\omega)q_{rr}(\omega) + lp_{rs}(\omega)q_{rs}(\omega) \qquad r \neq s, \quad r, s = H, F. \tag{6}$$

Each firm maximizes the profit with respect to price given the price index P_r and other firms' behavior in the market. According to first order conditions of profit maximization problem, all the firms in country r will set the own price as follows:

$$p_{rr} = \frac{1}{2}[1 - \gamma(1 - P_r)], \tag{7}$$

$$p_{rs} = p_{ss} - \frac{t_s + \tau}{2}. \tag{8}$$

Regardless of the variety of differentiated goods, manufacturing goods are symmetrically priced by the firms. Thus, we omit an expression of the variety ω from now on. The domestic price set by firms is higher than the exports price, but consumers have to pay trade costs and tariff in addition to the price, $p_{rs} + t_s + \tau$ which is higher than domestic price. Furthermore, utilizing the definition of price index P_r, the equilibrium prices are determined as follows:

$$p_{rr} = \frac{4(1 - \gamma) + \gamma(t_r + \tau)}{4(2 - \gamma)}, \tag{9}$$

$$p_{rs} = \frac{4(1 - \gamma) - (4 - 3\gamma)(t_s + \tau)}{4(2 - \gamma)}. \tag{10}$$

From first order condition, we can find the relationship, $p_{rs} = (1-\gamma)q_{rs}$ whichgives the quantities in the equilibrium.

$$q_{rr} = \frac{4(1-\gamma) + \gamma(t_r + \tau)}{4(1-\gamma)(2-\gamma)}, \tag{11}$$

$$q_{rs} = \frac{4(1-\gamma) - (4-3\gamma)(t_s + \tau)}{4(1-\gamma)(2-\gamma)}. \tag{12}$$

The equilibrium prices depend on tariff rate imposed by governments. From (9), domestic price in country r increases as government of country r imposes higher tariff on import. Imposing tariff on import goods protects the domestic firms from the competition with foreign firms. More detail about this point will be mentioned in the end of this subsection. It follows form (6) that the equilibrium profit distributed to the owners of firm is $\pi_r = (1-\gamma)\sum_i q_{ri}^2$. In this paper, our focus is limited to a case that international trade is feasible between countries. To make sure that the volume of demand from foreign country is positive in the equilibrium, we assume that

$$t_r + \tau < \frac{4-3\gamma}{4(1-\gamma)}. \tag{13}$$

The RHS in this condition is reduced by increasing γ. When $\gamma = 1$, in which manufacturing goods are not differentiated among the sector, the RHS approximates to zero so that international trade is not available with positive trade costs or tariff. Consumers can perfectly substitute domestic goods for import goods with higher price by trade costs.

We now characterize the national welfare in the equilibrium. In our model, the welfare can be decomposed into the gross welfare and, the value of imports and exports. The decomposed welfare helps us to explore the two different regime of trade policy and the effects of globalization. Per-capita income in country r is constituted by the total of wage w_r, rent of production activity and distributed tax revenue;

$$y_r = w_r + \frac{1}{2}\frac{\pi_r}{l} + \frac{TR_r}{l}, \tag{14}$$

where wage rate is equal to 1. In the RHS of (14), third term represents the tariff revenue distributed from the government. The government of each country imposes unit tax on imported manufacturing goods and thus, total tariff revenue in country r is

$$TR_r = \frac{l}{2} t_r q_{sr}. \tag{15}$$

As Frusawa and Konishi (2004, 2007), using (6),(14) and (15), we can decompose per-capita welfare in country r. The decomposed welfare $V_r(t_r, t_s, \tau)$ is represented by

$$V_r(t_r, t_s, \tau) = U_r(t_r, \tau) + EX_r(t_s, \tau) - IM_r(t_r, \tau) \tag{16}$$

where in RHS of (16), each term is defined by

$$U_r(t_r, \tau) \equiv \frac{1}{2} \sum_{i=r,s} q_{ir} - \frac{1-\gamma}{4} \left[\sum_{i=r,s} q_{ir}^2 \right] - \frac{\gamma}{4} \left[\sum_{i=r,s} q_{ir} \right]^2 + 1, \tag{17}$$

$$EX_r(t_s, \tau) \equiv \frac{1}{2} p_{rs} q_{rs}, \tag{18}$$

$$IM_r(t_r, \tau) \equiv \frac{1}{2} (p_{sr} + \tau) q_{sr}. \tag{19}$$

where the value of production and price are evaluated by (9)-(12). $U_r(t_r, \tau)$ means the gross utility and $EX_r(t_s, \tau)(IM_r(t_r, \tau))$ denotes the value of exports to(imports from) country s. Taking the first derivative on (17)-(19), we can find the feature of equilibrium. All value of (17)-(19) is reduced as trade costs or tariff increase. There are clear intuitions behind these derivatives. Although the domestic consumptions q_{rr} are increasing with tariff, total consumptions $\sum_{i=r,s} q_{ir}$ decrease, which decreases the gross utility when tariff rates increase. However increase in q_{rr} means the profit of manufacturing firms (the rents from its ownership) gains since domestic market of manufacturing goods becomes less competitive. Therefore, we may consider that the government of each country is able to implement tariff policy to protect domestic industry in exchange of consumers' surplus. The values of export and import are also decreasing due to trade costs or tariff. It is obvious that increasing trade costs and tariff induce consumers in each country cut down the consumption form foreign country.

3 Trade Policy under Trade Costs

Thus far, tariff rates are exogenously given for consumers and firms as trade costs. However the governments impose tariff in accordance with the regime of trade policy. In this

section, we explore the two types of trade policy under trade costs and demonstrate that the progress of globalization has different effects on the tariff determined by governments depending on the policy regime.

3.1 Unilateral Trade Policy

In this subsection, we analyze the trade policy where each government determine the level of import tariff non-cooperatively and show the effects of globalization on the tariff imposed by governments. There are negative externalities in this setting. Thus, the tariff level in the unilateral trade policy is higher than the tariff level in optimal trade policy. This point is discussed in section 3.2. The governments choose the level of tariff to maximize the national welfare. The maximization problem of government of country r is

$$\max_{t_r} V_r(t_r, t_s, \tau). \tag{20}$$

Using (16)-(19), the first order condition of this problem is

$$\frac{\partial U_r}{\partial t_r} - \frac{\partial IM_r}{\partial t_r} = 0. \tag{21}$$

In RHS of (21) denoting the effects of tariff on national welfare in country r, the first term means the loss of gross utility and the second term means the reduction of expenditure to imports induced by the increase in import price. Each terms represent the benefit and cost of imposing tariff on import goods. From (21), we can find that the level of tariff imposed by government does not depend on the tariff imposed by rival country, so that there are no strategic interdependence, shown in Yi(1996). This feature of formulation allows us to analyze the trade policy under monopolistic competition more simply. Subsequently, we can derive the tariff level under unilateral trade policy as follows:

$$t^N = \frac{2(1-\gamma)(1-\tau)}{6-5\gamma}. \tag{22}$$

(22) shows that the tariff imposed under the non-cooperative policy setting is always positive due to $\gamma \in (0, 1)$ and (13). Moreover, the effect of globalization is denoted by $dt^N/d\tau < 0$. From (22), we have the following proposition.

Proposition 1 (Unilateral Trade Policy) *When each government pursues the trade policy unilaterally, the import goods are imposed positive tariff to protect the domestic industry. Furthermore, the globalization in terms of trade costs fosters the protective trade policy.*

Under the unilateral trade policy, each government imposes the positive tariff on imports. This result is usually observed in the theory of trade policy setting. Taxation on import goods increase the domestic productions and decrease the foreign production, thus the profit of domestic firms increase at the expense of foreign firms. Applying tariff policy for national welfare, the governments can induce the profit to shift from foreign country. This is why the tariff in unilateral trade policy is always positive. Such protective trade policy is motivated by externality on exports of foreign country. Each government determines the level of tariff rate considering of its effect on national welfare in its country. That is, it does not account for any effects of the trade policy on the welfare in the foreign country($\partial EX_s/\partial t_r$). The externality on terms of trade result in the positive tariff which is higher than the tariff imposed in cooperation discussed in next section3.2.

Globalization in terms of decreasing trade costs leads the governments to implement the higher tariff. We can interpret this result as below. The globalization by decreasing trade costs increases the imports, as well as total consumptions in the country. While, the consumptions of domestic productions are reduced by substitute for import goods and thus, the profits of domestic firms in the country loose. Consequently, the governments are induced to impose higher tariff on imports raised by globalization so as to compensate the loss of profit by lump-sum distribution.

3.2 Trade Policy Cooperation

We suppose that each government can agree the trade policy cooperation, and the trade policy cooperation is enforceable. This assumption excludes the problem of deviation from the cooperation. When governments cooperate in setting trade policy, the maximization problem is given by

$$\max_{t_H, t_F} V_H(t_H, t_F, \tau) + V_F(t_F, t_H, \tau). \tag{23}$$

The first order conditions of this problem are

$$\frac{\partial U_r}{\partial t_r} + \frac{\partial EX_s}{\partial t_r} - \frac{\partial IM_r}{\partial t_r} = 0 \qquad r \neq s, \;\; r, s = H, F. \tag{24}$$

Denote the tariff imposed under the trade agreement t^C which satisfy (24). Comparing (21) and (24), we can show that the tariffs under the trade agreement are lower than the unilateral trade policy. From (24) and the derivatives of (17)-(19), we can show

$$\frac{\partial U_r}{\partial t_r} - \frac{\partial IM_r}{\partial t_r} = -\frac{\partial EX_s}{\partial t_r} > 0, \tag{25}$$

and thus, $t^N > t^C$ due to the concavity of $\partial U_r/\partial t_r - \partial IM_r/\partial t_r$. The tariff imposed by the government has negative effects on exports of other country. Under the unilateral trade policy, the governments cannot realize these effects when they determine the level of tariff. In this ways, negative externality occurs so that the level of tariff imposed unilaterally is higher than the tariff in the trade agreement.

Next, we explore the feature of tariff imposed in trade agreement and analyze the effects of globalization on the trade agreement. Solving (24) for t, the level of tariff in the trade agreement is

$$t^C \quad = \frac{(5\gamma^2 - 12\gamma + 8)\tau - 8(1-\gamma)^2}{\gamma^2 - 8\gamma + 8}. \tag{26}$$

In contrast with the unilateral trade policy, each government may implement the subsidy on imports. The sign of (26) depends on trade costs and the degree of substitutability among manufacturing goods. In the trade agreement, the governments adopt the subsidy policy, if

$$\tau < \frac{8(1-\gamma)^2}{5\gamma^2 - 12\gamma + 8} \equiv \tau^{sub}. \tag{27}$$

Condition (27) is represented in figure 1. Figure 1 shows which trade policies, subsidy or tariff, applied in the trade agreement depending on trade costs and the degree of substitutability. In the shaded area of the figure, international trade is not feasible due to high trade costs, and the high degree of substitutability tends to be obstacle to the trade. The implication of figure 1 is summarized by proposition 2.

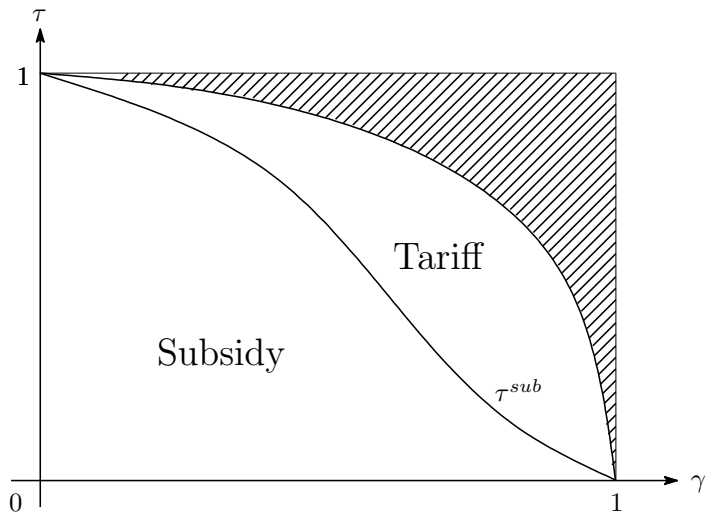

Figure 1: Trade Policy in the trade agreement

Proposition 2 (Trade Policy under the Cooperation) *When the governments agree to coordinate the trade policy, it depends on the trade costs and type of trading goods that the trade agreement adopts the tariff or subsidy.*

We analyze the trade policies in the area except the shaded. Note that in the case of the cooperative trade policy, the governments impose tariff not for tariff revenue or domestic income. Because, under (23), the increase of tariff revenue in one country is equivalence to the decrease of income in other country, these effects cancel each other out, which the cooperation between countries internalizes the externality on exports of foreign country. It follows that the cooperative policy is implemented to achieve an efficiency of the economy. Specifically, there are two objectives for an achievement of efficiency: adjustment of the distorted price in manufacturing sector and mitigation of the loss made by international transportation. As figure1 shows, the combination of relatively large τ and γ implies that the governments agree to impose the tariff on imports. If international transportation is very costly, the governments impose tariff to restrict importing the manufacturing goods as so to avoid the losses of international transportation. On the other hand, the large γ facilitate the substitution for imports so that the consumer price of manufacturing good is sensitive to the other prices and not so distorted by the firms. It is required in the case of large γ for governments to constrain the loss of international transportation rather than to adjust the distorted prices using subsidy policy.

Proposition 2 states that the positive tariff may be employed even in cooperative

equilibrium which is not shown in previous study ignoring trade costs. In the previous study without any trade costs, the governments always employ subsidy policy to manufacturing firms to induce marginal costs pricing. However, in the real world, the policy of imports subsidy is seldom observed even in the circumstance that governments agree to coordinate the policy. The gap between previous studies and trade policies in practice is filled by assuming the trade costs undoubtedly existing in the real world. As empirical research, Anderson and van Wincoop(2004) showed, trade costs are significantly large even between industrial country. Recalling that the positive tariff policy will be employed in higher trade costs from figure1, our model can explain that governments impose positive tariff on imports even in cooperation, which is consistent to most of trade agreements.

Furthermore, the globalization affects the trade policy in the trade agreement unlike the unilateral policy. From (26), we can demonstrate that the level of tariff rate decreases with the progress of globalization, $dt^C/d\tau > 0$. As mentioned above, the governments have no incentive to protect domestic industry under the cooperation since the tariff effects on foreign country are perceived by each government. As long as the governments implement the cooperative trade policy, the decrease in trade costs as globalization motivates governments to adjust the distorted price rather than mitigate the losses of transportation. As a result, the cooperative trade policy will be shifted to the policy removing trade barrier in order to attain the efficiency in imports market. These findings lead to proposition 3.

Proposition 3 (Globalization Effects on the Trade Agreement) *The globalization induces the governments to implement the policy to foster the international trade.*

The globalization effects in the trade agreement are opposite to the case of unilateral trade policy. It is obvious reasons that the trade agreement work out to clear the externality from the policy implementation unilaterally. In the presence of externality, the globalization effects promoting the competition between the countries become the reason of shift to protective trade policy in each country. Therefore, if both countries in the economy impose the tariff unilaterally, the countries worse off by higher tariffs reducing the income each other. However, when each country agree the cooperation on trade policy, the incentive to implement the protective trade policy disappear and the objective of trade policy setting changes over toward the more efficient international trade. The efficiency of trade can be interpreted by to what extent the governments reduce the losses due to international transportation. Therefore, under the trade agreement, the globalization in terms of trade costs decreasing cases the governments to lower the tariff.

4 Conclusion

We have constructed two country model with trade costs where government of each country implements tariff policy. The main argument of our study is that whether the progress of globalization results in trade liberalization depends on the regime under which governments act. Under the regime of unilateral trade policy setting, in which the governments determine the level of tariff independently, the governments impose higher tariff than an efficient level, and that the progress of globalization leads governments to employ protective policy. In this case, the governments care about the reduction of domestic income caused by intensive competition which is resulted by the globalization. On the other hand, under the regime of trade policy cooperation, in which the governments implement the trade policy accounting for its policy effects on other country, enables to internalize the terms-of-trade externality. In this cooperative regime, the globalization, the reduction of trade costs, does not affect the income allocation between countries, which the protective trade policy is not motivated unlike the regime of unilateral trade policy. As a result, the globalization contributes to arrive in trade liberalization.

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