THE SUSTAINABLE COOPERATIVE TARIFFS: A POLITICAL ECONOMY PERSPECTIVE.

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ABSTRACT:

The purpose of this paper is to examine the international trade cooperation in order to determine the sustainable tariff rates in a political economy perspective. This paper establishes a tariff-setting game among two countries as a two-phase game: negotiation phase and implementation phase. Provided that the politically optimum tariff is the non-cooperative tariff rate for each countries, our results show the following points. First, the sustainable tariff rate depends on the political weight placed on domestic import-competing industry, on the political influence of the foreign export industry and on the stakes of these two sector in domestic tariff policy. Second, cooperation is sustainable when countries involved in tariff negotiation are patient enough. Third, Asymmetry in discount factor affects the relative bargaining power of governments.

1. Introduction

Since GATT creation, tariff policy is set cooperatively by the GATT contracting parties and now by the WTO members. Through the eight rounds of trade negotiations, average *ad valorem* tariffs on industrial goods have fallen significantly from over 40% to less than 4%. However, this apparent success obscures the fact that high tariffs are still applied to protect some industrial sectors (tariff peaks). The gradual trade liberalization comes up against difficulties for some sectors although it succeeds in achieving free trade for numerous products. The purpose of this paper is to understand how tariff rates emerge from international cooperation process in order to explain the differences in protection levels across commodity groups by introducing political economy factors.

There are two distinct strands in the theoretical literature on tariff policy cooperation. First, trade cooperation is modeled as a cooperative game in which governments of countries involved in cooperation negotiate over the tariff rates. In one hand, Mayer (1981) develops a bargaining model to determine potential trade negotiation outcomes with a terms-of-trade approach. On the other hand, Grossman and Helpman (1995) address bilateral liberalization as a bargaining problem in a political economy perspective. These studies implicitly assume that international tariff agreements are directly and completely enforceable after negotiation. Therefore, they don't take into account the basic enforcement problem. The government's decision problem in trade policy can be represented as a tariff game which has the structure reminiscent of a Prisoner's Dilemma. Governments are better off when tariffs are set cooperatively but there is an incentive to defect in order to reap the consequent terms-of-trade gains. Because no international authority such as domestic courts can prevent countries to deviate, international trade agreements must be self-enforcing and hence must provide for sanctions against violators.

The second strand of the literature considers the enforcement issue. Several authors explain cooperative tariff rates as results of implicit cooperation in repeated game (e.g. Dixit, 1987; Riezman, 1991; Ludema, 2001; Bagwell and Staiger, 1990, 1997a, 1997b). According to this approach, low tariff levels are supported along the equilibrium path by the threat that raising the tariff may trigger a trade war. Governments are likely to be dissuaded from opportunistic behavior whenever the pursuit of short-term gains results in higher long-term losses. The implicit cooperation approach has the advantage of predicting self-enforcing agreements but it

abstracts away from the fact that cooperative tariffs are obtained by negotiation among countries (explicit cooperation). Contrary to the first approach which allows to predict a unique efficient trade agreement, the folk theorem of repeated game tell us that an infinite number of tariff rates can be supported as an subgame perfect equilibrium in the implicit cooperation approach.

In this paper, we analyze the tariff-setting game among countries as a game in which governments explicitly negotiate over the tariff rates, then enter a phase in which the negotiated agreements are implemented and sustained indefinitely in a self-enforcing manner. Furusawa (1999) adopts this method in modeling tariff-setting game. However, in his model policy is determined between unitary governments. He doesn't take into account the domestic political forces that influence government's decision. Instead of assuming that government welfare is given by national income, we allow that the government objective function embodies economic and political considerations in order to examine how political factors affect the content of sustainable trade agreements. There is extensive research into political economy of unilateral trade policy[1], however little effort has been devoted to examine negotiated tariff policy.

The remainder of this paper is in three parts. Section 2 sets out the theoretical framework of the model. In section 3, we consider the stage game in the implementation phase in order to examine how defection incentives influence tariff negotiations. Section 4 finds the sustainable politically optimal tariff agreements. Conclusions are given in the final section.

2. The theoretical framework

We develop a simple model in which we assume two countries, "home" and "foreign", with similar political and economic structures, although their tastes, endowments and political sensitivities may differ.

Residents of the home country are assumed to have identical quasilinear utility functions of the type

$$(1) \qquad U = x_z + \sum_{i=1}^{2} u_i(x_i),$$

where x_z is consumption of the numeraire good Z and x_i is consumption of good i, i = 1,2. The subutility functions $u_i(.)$ are assumed to be differentiable, increasing and strictly concave. Good Z serves as numeraire with a world market and domestic price equal to 1. Each resident of the home country earns an amount E and demands the non-numeraire goods i = 1,2 according to a demand function $d_i(p_i)$ which solves $u_i'(x_i) = p_i$, where p_i is the domestic price of good i. The consumer devotes the remainder of his total spending of E to the numeraire good, thereby attaining the utility level

$$(2) \qquad v(p_1, p_2, E) = E + \sum_{i=1}^{2} S_i(p_i),$$

where

$$(3) \qquad S_i(p_i) \equiv u_i[d_i(p_i)] - p_i \, d_i(p_i)$$

is the consumer surplus derived from the consumption of good i.

We assume that the numeraire good is produced from labor alone (the mobile factor in production) with constant returns to scale and units are chosen such that the price of a unit of Z and the competitive wage rate equal one. The production processes, in perfectly competitive sectors 1 and 2, use both labor and a factor that is specific to each sector, also with constant returns to scale. The two specific inputs are completely inelastic in supply and each earns a quasi-rent. As the wage rate is fixed at one, quasi-rent depends only on the domestic price of the good that it is used to produce. We denote the aggregate rent of the specific factor used in producing good i by $\Pi_i(p_i)$. Hotelling's lemma provides supply as a function of price

$$(4) \qquad y_i(p_i) = \Pi_i'(p_i)$$

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[1] See Magee, Brock and Young (1989) and Hillman (1989) for survey of this literature.

We assume that the home country imports good 2 and the foreign country imports good 1. We also assume that home and foreign countries are large enough to affect respectively good 2 and good 1 world prices (respectively π_2 and π_1) by imposing an *ad valorem* tariff. We denote national tariff by the parameter τ such that $p_2 = \pi_2 \tau$. Then $\tau > 1$ represents one plus the rate of tariff on import good. We assume that neither government is allowed to subsidize its imports nor to exercise any policy promoting or restricting its exports. Tariff generates per capita government revenue is

$$(5) \qquad r(p_2) = (\tau - 1) \, \pi_2 \, [d_2(p_2) - (1/N) \, y_2(p_2)]$$

where N measures the total (voting) population. The government revenue arising from the chosen tariff rate is distributed equally among the voters.

The total income of national residents has three possible sources. All individuals receive the same transfer from government, most derive their income from the sale of their labor and some individuals earn factor income as sector-specific factor owners. We assume that these assets are indivisible and nontradable so that individuals cannot hold more than one type of sector-specific factor.

The income of factor specific to the industry i owners depends on the domestic price of good i. Sector-specific factor owners have a direct stake in the tariff rate that goes beyond their general interest as consumers (Grossman and Helpman, 1995). Individuals with claims to factor specific to the import-competing sector are affected by national tariff rate whereas those with claims to factor specific to the export sector are affected by foreign tariff rate. The first seek to influence national tariff policy through collective action conducted by the interest group which represents their interests. We assume that they are organized into an interest group since we may think that they form a small number group (Olson, 1965). In our model, we don't specify how interest groups act[2] but we suppose that they seek to influence an incumbent government's decisions. Domestic consumers who are losers from national protection are too numerous to cooperate into an interest group because they face higher coordination costs. Therefore, we assume that they influence national government's decisions through election.

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[2] Collective action may take two different forms: electoral contributions and informational activity.

National government is assumed to maximize a weighted sum of consumer surplus, producer surplus (quasi-rent) and tariff revenue

$$(6) \qquad \Omega(p_1, p_2) = L + \Sigma \left\{ a_i \, \Pi_i(p_i) + N \, S_i(p_i) \right\} + N \, r(p_2),$$

where L is the aggregate labor supply and a_i represents the weight that the government attaches to the producer surplus earned by sector i ($a_i \geq 1$) which results from lobbying activities. Following Baldwin (1987), we allow for political economy influences with the assumption that governments may weigh producer surplus differently than consumer surplus and tariff revenue. This political-support specification is a general approach that can subsume various institutional forms of representative democracy.

Equations that relate to the foreign country are similar, except that the relevant variables, parameters and functions will be distinguish by asterisks. We next introduce notation for imports and exports. For the national country, imports of good 2 and exports of good 1 are respectively noted as

$$(7a) \qquad M_2(p_2) = N \, d_2(p_2) - y_2(p_2),$$

$$(7b) \qquad E_1(p_1) = y_1(p_1) - N \, d_1(p_1).$$

Similarly, for the foreign country, imports of good 1 and exports of good 2 are respectively noted as

$$(7a^*) \qquad M_1^*(p_1^*) = N^* \, d_1^*(p_1^*) - y_1^*(p_1^*),$$

$$(7b^*) \qquad E_2^*(p_2^*) = y_2^*(p_2^*) - N^* \, d_2^*(p_2^*).$$

Then world product markets clear when

$$(8a) \qquad M_2(p_2) = E_2^*(p_2^*),$$

$$(8b) \qquad E_1(p_1) = M_1^*(p_1^*).$$

Home and foreign governments have an incentive to exercise their market power in the world market of their importable good by imposing a politically optimal tariff, respectively τ^N and $\tau*^N$. They continue to apply their politically optimal tariff until they agree on new pair of tariffs in the trade negotiation. We design trade cooperation among nations as a two-phase game. In the game's first phase, governments bargain over a pair of tariffs. After the two governments agree on a cooperative tariff rates, these tariffs replace the status quo tariffs (τ^N, $\tau*^N$) and the implementation phase starts. In this second phase, governments continue to set the tariff rates at the agreed-upon level unless a government defects by selecting some other higher tariff rate. We assume that both governments adopt the trigger strategy in which a government reverts to the Nash equilibrium if its trading partner defects and continue to apply it for every period thereafter. The implementation phase can be considered as an infinitely repeated game and a mutually beneficial cooperative outcome can be supported by a subgame perfect equilibrium.

3. The implementation phase

The implementation phase is represented by an infinitely repeated game in which the stage-game payoff function for government is given by equation (6). In each stage game, government decides to apply negotiated tariff rates or to deviate to a higher-than-is-efficient tariff. There are incentives to pursue beggar-thy-neighbor trade policy which lead to a situation analogous to the Prisoner's Dilemma. The elements of table I indicate the four possible outcomes which correspond to the four pairs of strategies such that $\Omega(p_1^C, p_2^N) > \Omega(p_1^C, p_2^C) > \Omega(p_1^N, p_2^N) > \Omega(p_1^N, p_2^C)$ and $\Omega*(p_1*^N, p_2*^C) > \Omega*(p_1*^C, p_2*^C) > \Omega(p_1*^N, p_2*^N) > \Omega*(p_1*^C, p_2*^N)$, where p_1^C (p_1*^C) is the national (foreign) price of good 1 when foreign government imposes its cooperative tariff; p_2^C (p_2*^C) is the national (foreign) price of good 2 when national government applies its cooperative tariff; p_2^N (p_1*^N) is the national (foreign) price of good 2 (good 1) when national (foreign) government imposes its non-cooperative tariff.

Table I

		Foreign country	
		Cooperation	Non cooperation
National country	Cooperation	$\Omega(p_1^C, p_2^C)$; $\Omega^*(p_1^{*C}, p_2^{*C})$	$\Omega(p_1^N, p_2^C)$; $\Omega^*(p_1^{*N}, p_2^{*C})$
	Non cooperation	$\Omega(p_1^C, p_2^N)$; $\Omega^*(p_1^{*C}, p_2^{*N})$	$\Omega(p_1^N, p_2^N)$; $\Omega(p_1^{*N}, p_2^{*N})$

As mentioned above, government applies its Nash equilibrium tariff after the opposite country defection. Let us define the Nash equilibrium in the stage-game, that is, the politically optimal tariff.

The politically optimal tariff is set unilaterally by national government, ignoring external effects of its decision on political and economic foreign agents. It will be that which maximizes the government welfare,

(9) $\tau^N = \arg \max_\tau L + \Sigma \left\{ a_i \Pi_i(p_i) + N S_i(p_i) \right\} + N r(p_2).$

The first order condition for maximization of $\Omega(p_1, p_2)$ is obtained as follow,

(10) $\partial\Omega/\partial\tau = a_2 \Pi_2'(p_2) (\partial p_2/\partial\tau) + N u_2'[d_2(p_2)] d_2'(p_2) (\partial p_2/\partial\tau) - N d_2(p_2) (\partial p_2/\partial\tau)$
　　　　 $- N p_2 d_2'(p_2) (\partial p_2/\partial\tau) + \pi_2 M_2(p_2) + (\tau-1) (\partial\pi_2/\partial\tau) M_2(p_2) + (\tau-1) \pi_2$
　　　　 $M_2'(p_2) (\partial p_2/\partial\tau) = 0.$

Since $y_2(p_2) = \Pi_2'(p_2)$ and using the first order condition for utility maximization in consumption that $u_i'[d_i(p_i)] = p_i$, we obtain

(11) $\partial\Omega/\partial\tau = a_2 y_2(p_2) (\partial p_2/\partial\tau) - N d_2(p_2) (\partial p_2/\partial\tau) + \pi_2 M_2(p_2)$
　　　　 $+ (\tau-1) (\partial\pi_2/\partial\tau) M_2(p_2) + (\tau-1) \pi_2 M_2'(p_2) (\partial p_2/\partial\tau) = 0.$

Note that

$$(12) \quad (\partial p_2/\partial\tau) = \tau\,(\partial\pi_2/\partial\tau) + \pi_2,$$

which implies that

$$(13) \quad \partial\Omega/\partial\tau = [a_2\,y_2(p_2) - N\,d_2(p_2) + M_2(p_2) + (\tau-1)\,\pi_2\,M_2'(p_2)]\,(\partial p_2/\partial\tau)$$
$$- M_2(p_2)\,(\partial\pi_2/\partial\tau) = 0.$$

From Eq. (7a), we obtain

$$(14) \quad \partial\Omega/\partial\tau = [(a_2-1)\,y_2(p_2) + (\tau-1)\,\pi_2\,M_2'(p_2)]\,(\partial p_2/\partial\tau) - M_2(p_2)\,(\partial\pi_2/\partial\tau) = 0.$$

The border price change due to domestic tariff policy can be derived from Eq. (8a), which is rewritten as follow

$$(15) \quad B \equiv M_2(\pi_2\,\tau) - E_2^*(\pi_2) = 0.$$

So, we have

$$(16) \quad (\partial\pi_2/\partial\tau) = -\,[(\partial B/\partial\tau)\,/\,(\partial B/\partial\pi_2)] = -\,\{\pi_2\,M_2'(p_2)\,/\,[\tau\,M_2'(p_2) - E_2^{*\prime}(\pi_2)]\}$$

Substituting Eq. (16) into Eq. (12), we obtain

$$(17) \quad (\partial p_2/\partial\tau) = -\,\{\pi_2\,E_2^{*\prime}(\pi_2)\,/\,[\tau\,M_2'(p_2) - E_2^{*\prime}(\pi_2)]\}$$

The politically optimal *ad valorem* tariff for national country is obtained by substituting Eq. (16) and (17) into (14)

$$(18) \quad (\tau^N-1) = -\,(a_2-1)\,y_2(p_2)\,/\,[\pi_2\,M_2'(p_2)] + 1/\eta^*$$

where $\eta^* = E_2^{*\prime}(\pi_2)\,\pi_2\,/\,E_2^*(\pi_2)$ is the elasticity of foreign export supply. An analogous equation describes the equilibrium foreign non-cooperative *ad valorem* tariff

$$(18^*) \quad (\tau^{*N}-1) = -(a_1^*-1)\, y_1^*(p_1^*) / [\pi_1\, M_1^{*'}(p_1^*)] + 1/\eta$$

where $\eta = E_1'(\pi_1)\, \pi_1 / E_1(\pi_1)$ is the elasticity of national export supply. Note that $M_2'(p_2)$ and $M_1^{*'}(p_1^*)$, the change in net imports due to an increase in price, are negative. Thus, the greater the political weight placed on the surplus of producers in import-competing sector, the greater the production in import-competing sector, the greater the value of the Nash equilibrium tariff rate is. Note that a large domestic output raises the stakes for the owners of the specific input and makes them willing to strengthen their collective action. The second component of Eq. (18) and (18*) capture terms-of-trade motives for trade intervention. An inelastic foreign supply means a large aggregate gain from exploiting market power. The policy outcome in our model reduces to a familiar optimal tariff result when $a_2 = 1$ and $a_1^* = 1$, that is governments are immune from political pressures and act as benevolent servants of public interest. Since $a_2>1$ and $a_1>1$, The Nash equilibrium with domestic political considerations is greater than the normative optimal tariff.

4. The negotiation phase

In this section, we derive the solution of the entire game, i.e. possible tariff agreements. Cooperative tariff rates that emerge from the negotiation phase must be sustainable during the implementation phase, that is, governments have no incentive to deviate to a "higher-than-is-efficient tariff" (Bagwell and Staiger, 2000). Any trade agreement is self-enforcing in the following manner (Furusawa, 1999). Each government continues to set a cooperative tariff rate as long as the opposite country honors its commitments. If one government deviates by setting its non-cooperative tariff rate, its trading partner, in turn, sets its own Nash equilibrium tariff in the next period and continues to do so thereafter. Infinite reversion to the Nash equilibrium by both players implies a relative welfare loss in all future periods. A government would not incur such a loss if it were not exceeded by the immediate gain from defecting to its non-cooperative tariff rate when the other country imposes its cooperative tariff. Therefore, the threat of credible retaliation which makes future loss higher than immediate gain serves as an internal enforcement mechanism which makes possible sustainable cooperation.

The one-time gain for national and foreign governments from defecting and imposing their non-cooperative tariffs are respectively

(19) $W \equiv \Omega(p_1{}^C, p_2{}^N) - \Omega(p_1{}^C, p_2{}^C)$

(19*) $W^* \equiv \Omega^*(p_1^{*N}, p_2^{*C}) - \Omega^*(p_1^{*C}, p_2^{*C})$

The payoff to cooperation for national and foreign government in every ensuing period are respectively $\Omega(p_1{}^C, p_2{}^C) - \Omega(p_1{}^N, p_2{}^N)$ and $\Omega^*(p_1{}^{*C}, p_2{}^{*C}) - \Omega(p_1{}^{*N}, p_2{}^{*N})$. Let δ^3 (δ^*) represents the national (foreign) government's discount factor. Then the costs of defecting in future periods for national and foreign government are respectively

(20) $w \equiv [\delta / (1-\delta)] [\Omega(p_1{}^C, p_2{}^C) - \Omega(p_1{}^N, p_2{}^N)]$

(20*) $w^* \equiv [\delta^* / (1-\delta^*)] [\Omega(p_1{}^{*C}, p_2{}^{*C}) - \Omega(p_1{}^{*N}, p_2{}^{*N})]$

Cooperation is sustainable when $w \geq W$ and $w^* \geq W^*$, that is, short-term gains results in higher long-term losses. The national and foreign incentive constraint are expressed respectively by:

$a_2 \Pi_2(p_2{}^N) - a_2 \Pi_2(p_2) + N S_2(p_2{}^N) - N S_2(p_2) + N r(p_2{}^N) - N r(p_2) \leq$
$\qquad \beta [a_1 \Pi_1(\pi_1) + a_2 \Pi_2(p_2) + N S_1(\pi_1) + N S_2(p_2) + N r(p_2) - a_1 \Pi_1(\pi_1{}^N) -$
$\qquad a_2 \Pi_2(p_2{}^N) - N S_1(\pi_1{}^N) - N S_2(p_2{}^N) - N r(p_2{}^N)]$

$a_1^* \Pi_1^*(p_1^{*N}) - a_1^* \Pi_1^*(p_1^*) + N^* S_1^*(p_1^{*N}) - N^* S_1^*(p_1^*) + N^* r^*(p_1^{*N}) - N^* r^*(p_1^*) \leq$
$\qquad \beta^* [a_1^* \Pi_1^*(p_1^*) + a_2^* \Pi_2^*(\pi_2) + N^* S_1^*(p_1^*) + N^* S_2^*(\pi_2) + N^* r^*(p_1^*) -$
$\qquad a_1^* \Pi_1^*(p_1^{*N}) - a_2^* \Pi_2^*(\pi_2{}^N) - N^* S_1^*(p_1^{*N}) - N^* S_2^*(\pi_2{}^N) - N^* r^*(p_1^{*N})]$

Where $\beta = [\delta/(1-\delta)]$; $\beta^* = [\delta^*/(1-\delta^*)]$. They can be rewritten as follow

(IC) $a_2 \Pi_2(p_2) + N S_2(p_2) + N r(p_2) \geq$
$\qquad a_2 \Pi_2(p_2{}^N) + N S_2(p_2{}^N) + N r(p_2{}^N) + \beta [a_1 \Pi_1(\pi_1{}^N) + a_2 \Pi_2(p_2{}^N) +$
$\qquad N S_1(\pi_1{}^N) + N S_2(p_2{}^N) + N r(p_2{}^N) - a_1 \Pi_1(\pi_1) - a_2 \Pi_2(p_2) - N S_1(\pi_1) -$
$\qquad N S_2(p_2) - N r(p_2)]$

(IC*) $a_1^* \, \Pi_1^*(p_1^*) + N^* \, S_1^*(p_1^*) + N^* \, r^*(p_1^*) \geq$

$\quad\quad a_1^* \, \Pi_1^*(p_1^{*N}) + N^* \, S_1^*(p_1^{*N}) + N^* \, r^*(p_1^{*N}) + \beta^* \, [a_1^* \, \Pi_1^*(p_1^{*N}) +$

$\quad\quad a_2^* \, \Pi_2^*(\pi_2^{N}) + N^* \, S_1^*(p_1^{*N}) + N^* \, S_2^*(\pi_2^{N}) + N^* \, r^*(p_1^{*N}) - a_1^* \, \Pi_1^*(p_1^*) -$

$\quad\quad a_2^* \, \Pi_2^*(\pi_2) - N^* \, S_1^*(p_1^*) - N^* \, S_2^*(\pi_2) - N^* \, r^*(p_1^*)]$

Efficiency requires that governments choose tariff rates which maximize the joint governments' welfare

(21) $Z = \Omega(p_1, p_2) + \Omega^*(p_1^*, p_2^*) = L + a_1 \, \Pi_1(p_1) + a_2 \, \Pi_2(p_2) + N \, S_1(p_1) + N \, S_2(p_2) +$

$\quad\quad N \, r(p_2) + L^* + a_1^* \, \Pi_1^*(p_1^*) + a_2^* \, \Pi_2^*(p_2^*) + N^* \, S_1^*(p_1^*) + N^* \, S_2^*(p_2^*)$

$\quad\quad + N^* \, r^*(p_1^*)$

subject to the national and foreign incentive constraints. We suppose that (IC) and (IC*) are active.

By substituting (IC) and (IC*) into (21), we obtain the sustainable cooperative tariff rates such that

$\quad\quad (\tau^C, \tau^{*C}) = \text{argmax}_{(\tau, \tau^*)} \, Z$

where

(22) $Z = (1 - \beta) \, a_1 \, \Pi_1(p_1) + (1 - \beta) \, N \, S_1(p_1) - \beta \, a_2 \, \Pi_2(p_2) - \beta \, N \, S_2(p_2) - \beta \, N \, r(p_2) +$

$\quad\quad (1 - \beta^*) \, a_2^* \, \Pi_2^*(p_2^*) + (1 - \beta^*) \, N^* \, S_2^*(p_2^*) - \beta^* \, a_1^* \, \Pi_1^*(p_1^*) -$

$\quad\quad \beta^* \, N^* \, S_1^*(p_1^*) - \beta^* \, N^* \, r^*(p_1^*) + \gamma + \phi$

where $\gamma = L + a_2 \, \Pi_2(p_2^{N}) + N \, S_2(p_2^{N}) + N \, r(p_2^{N}) + \beta \, [a_1 \, \Pi_1(\pi_1^{N}) + a_2 \, \Pi_2(p_2^{N}) + N \, S_1(\pi_1^{N}) + N \, S_2(p_2^{N}) + N \, r(p_2^{N})]$ and $\phi = L^* + a_1^* \, \Pi_1^*(p_1^{*N}) + N^* \, S_1^*(p_1^{*N}) + N^* \, r^*(p_1^{*N}) + \beta^* \, [a_1^* \, \Pi_1^*(p_1^{*N}) + a_2^* \, \Pi_2^*(\pi_2^{N}) + N^* \, S_1^*(p_1^{*N}) + N^* \, S_2^*(\pi_2^{N}) + N^* \, r^*(p_1^{*N})]$.

The first order conditions for maximization of joint welfare are obtained as follow

(23) $\partial Z / \partial \tau = 0,$

(23*) $\partial Z/\partial \tau^* = 0$.

Eq. (23) is expressed as follow

(24) $\partial Z/\partial \tau = - \beta\ a_2\ \Pi_2{'}(p_2)\ (\partial p_2/\partial \tau) - \beta\ N\ u_2{'}[d_2(p_2)]\ d_2{'}(p_2)\ (\partial p_2/\partial \tau)$

$+ \beta\ N\ d_2(p_2)\ (\partial p_2/\partial \tau) + \beta\ N\ p_2\ d_2{'}(p_2)\ (\partial p_2/\partial \tau) - \beta\ \pi_2\ M_2(p_2)$

$- \beta\ (\tau{-}1)\ (\partial \pi_2/\partial \tau)\ M_2(p_2) - \beta\ (\tau{-}1)\ \pi_2\ M_2{'}(p_2)\ (\partial p_2/\partial \tau)$

$+ (1{-}\beta^*)\ a_2^*\ \Pi_2^{*'}(\pi_2)\ (\partial \pi_2/\partial \tau) + (1{-}\ \beta^*)\ N^*\ u_2^{*'}\ [d_2^*(\pi_2)]\ d_2^{*'}\ (\pi_2)\ (\partial \pi_2/\partial \tau)$

$- (1{-}\beta^*)\ N^*\ d_2^*(\pi_2)\ (\partial \pi_2/\partial \tau) - (1{-}\beta^*)\ N^*\ \pi_2\ d_2^{*'}(\pi_2)\ (\partial \pi_2/\partial \tau) = 0$.

Since $y_2(p_2) = \Pi_2{'}(p_2)$, $y_2^*(\pi_2) = \Pi_2^{*'}(\pi_2)$ and using the first order condition for utility maximization in consumption that $u_i{'}[d_i(p_i)] = p_i$ and $u_i^{*'}[d_i^*(p_i^*)] = p_i^*$ we obtain

(25) $\partial Z/\partial \tau = - \beta\ a_2\ y_2(p_2)\ (\partial p_2/\partial \tau) + \beta\ N\ d_2(p_2)\ (\partial p_2/\partial \tau) - \beta\ \pi_2\ M_2(p_2)$

$- \beta\ (\tau{-}1)\ (\partial \pi_2/\partial \tau)\ M_2(p_2) - \beta\ (\tau{-}1)\ \pi_2\ M_2{'}(p_2)\ (\partial p_2/\partial \tau)$

$+ (1{-}\beta^*)\ a_2^*\ y_2^*(\pi_2)\ (\partial \pi_2/\partial \tau) - (1{-}\beta^*)\ N^*\ d_2^*(\pi_2)\ (\partial \pi_2/\partial \tau) = 0$.

Eq. (12) implies that

(26) $\partial Z/\partial \tau = [- \beta\ a_2\ y_2(p_2) + \beta\ N\ d_2(p_2) - \beta\ M_2(p_2) - \beta\ (\tau{-}1)\ \pi_2\ M_2{'}(p_2)]\ (\partial p_2/\partial \tau)$

$+ [\beta\ M_2(p_2) + (1{-}\beta^*)\ a_2^*\ y_2^*(\pi_2) - (1{-}\beta^*)\ N^*\ d_2^*(\pi_2)]\ (\partial \pi_2/\partial \tau) = 0$.

Using Eq. (7a), (7b*) and (8a) we have

(27) $\partial Z/\partial \tau = [- \beta\ (a_2{-}1)\ y_2(p_2) - \beta\ (\tau{-}1)\ \pi_2\ M_2{'}(p_2)]\ (\partial p_2/\partial \tau)$

$+ \{[\beta{+}(1{-}\beta^*)]\ M_2(p_2) + (1{-}\beta^*)\ (a_2^*{-}1)\ y_2^*(\pi_2)\}\ (\partial \pi_2/\partial \tau) = 0$.

The sustainable cooperative tariff rate for national country is obtained by substituting Eq. (16) and (17) into (27)

(R) $(\tau^C{-}1) = \left[- (a_2 - 1)\ y_2(p_2)\ /\ [\pi_2\ M_2{'}(p_2)]\ \right] + \left[\ (1 + \xi)\ (1/\eta^*)\ \right] +$

$\left[\xi\ (a_2^* - 1)\ y_2^*(\pi_2)\ /\ [\pi_2\ E_2^{*'}(\pi_2)] \right]$

The sustainable cooperative tariff rate for foreign country is determined by proceeding in the same manner. So we obtain

$$(\text{R*}) \quad (\tau^C\text{*}-1) = \left[- (a_1\text{*}- 1)\, y_1\text{*}(p_1\text{*}) / [\pi_1 M_1\text{*'}(p_1\text{*})]\, \right] + \left[\, (1 + \xi\text{*})\, (1/\eta)\, \right] +$$

$$\left[\xi\text{*}\, (a_1 - 1)\, y_1(\pi_1) / [\pi_1 E_1\text{'}(\pi_1)]\right]$$

where $\xi = [(1 - \beta\text{*}) / \beta]$ et $\xi\text{*} = [(1 - \beta) / \beta\text{*}]$.

Eq. (R) and (R*) express the sustainable cooperative *ad valorem* tariff rate in each country as the sum of three components. The first bracketed term on the right hand side represents the first component that has exactly the same form as the first component of Eq. (18) and (18*). It reflects political influence of the import-competing industry specific factor owners on cooperative tariff policy: the more government is sensitive to the import-competing industry interest (the higher is the weight a_2 and $a_1\text{*}$), the greater is industry output and the higher is the sustainable cooperative tariff rate. Terms-of-trade motives for trade intervention appear in the second bracketed term on the right hand side. The third bracketed term on the right hand side captures the political influence of the trading partner export industry on domestic sustainable cooperative tariff rate. Because domestic tariff policy is set in conjunction with the trading partner through a process of international negotiations, trading partner preferences concerning domestic tariff rate are taken into consideration. In other words, the political influence of the trading partner export industry is one of the domestic cooperative tariff rate determinants.

A domestic cooperative tariff rate lower than the non-cooperative tariff is not sustainable when the trading partner discount factor is lower or equal to a half, since we have $\xi \geq 0$ ($\xi\text{*} \geq 0$) when $\delta\text{*} \leq \frac{1}{2}$ ($\delta \leq \frac{1}{2}$)[4]. This result is a conventional implication of the PD game according to which governments must be patient enough to maintain cooperation, that is, discount factors are sufficiently high. Though it is common practice to assume that the discount factor remains constant over time, it is nevertheless conceivable that the discount factor level change according to the time government has before it faces a re-election contest: the more elections are near, the more governments are concerned by short-run gains.

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[4] When $\delta \leq \frac{1}{2}$ ($\delta\text{*} \leq \frac{1}{2}$), the national (foreign) country is so impatient that the foreign (national) cooperative tariff rate is such that $\tau^N\text{*} \leq \tau^C\text{*}$ ($\tau^N \leq \tau^C$). In this case, negotiation fails and countries remain in the non-cooperative equilibrium (τ^N, $\tau^N\text{*}$).

Suppose now that both governments are patient enough to maintain cooperation ($\delta^*>\frac{1}{2}$ and $\delta>\frac{1}{2}$). Eq. (R) and (R*) show that the more patient a government is, the lower the trading partner sustainable cooperative tariff rate is. When $\delta^*>\frac{1}{2}$ and $\delta>\frac{1}{2}$, ξ and ξ^* are negative and are decreasing functions of respectively δ^* and δ. At the same time, the domestic sustainable cooperative rate increases with the domestic government discount factor. When δ (δ^*) approaches 1, ξ (ξ^*) goes to zero and the cooperative tariff rate goes to the non-cooperative level. Finally, we find that the more patient government benefits more than the impatient government from the negotiation. The government with the higher discount factor will cut less its tariff than its trading partner. The negotiation outcome is more favorable to the national country, i.e., $\xi>\xi^*$, if $\delta>\delta^*$. On the contrary, the negotiation outcome is more favorable to the foreign country, i.e., $\xi<\xi^*$, if $\delta<\delta^*$. This result shows that patience pays since it enhances bargaining power.

5. Conclusion

We have studied tariff policy cooperation as a bargaining problem in a political economy perspective. In our model, governments worry about preventing defections from potential agreements, and hence take into account that potential agreements must be self-enforcing when choosing their concession strategies. Enforcement is an important concern, since each government has a short-term incentive to deviate to a higher-than-is-efficient tariff. Governments are dissuaded from such opportunistic behavior only if the pursuit of short-term gains from protection results in long term losses from retaliation. We assume that governments adopt the trigger strategy in which a government reverts to the Nash equilibrium if its trading partner defects and continue to apply it indefinitely. We find that the domestic sustainable tariff rate depends on the political weight placed on domestic import-competing industry, on the political influence of the foreign export industry and on the stakes of these two sectors in domestic tariff policy (i.e. output level). The discount factor (patience) of governments has a great influence on the stability of an agreement. In politico-economic context, one would expect that, if politicians seek short-term success in particular when elections are near, the discount factor value would be low and therefore sustainable cooperation is jeopardized. A domestic cooperative tariff rate lower than the non-cooperative tariff is sustainable when the trading partner discount factor is sufficiently large. Asymmetry in discount factor affects the relative bargaining power of governments. We find that the government with the higher discount factor will cut less its tariff than its trading partner.

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