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In this paper, we construct a two-country model with an imperfectly competitive final-good and international transportation sector. The importing country has only a final-good market. When the final-good is imported, the exporting firm needs to use the international transportation service. The importing and exporting countries have final-good and international transportation firms, respectively. Under this setting, we consider tariff and commodity tax reforms to improve both the welfare and government revenue of the importing country. We show that tariff reduction with a constant commodity tax, or a commodity tax reduction with constant tariff, achieves improvements in both welfare and government revenue if the market size is sufficiently small. On the other hand, a rise in the commodity tax by the same level as a given tariff reduction causes a reduction in welfare, while the government may lose revenue.

Keywords: Tariff, Commodity Tax, Monopoly, International Transportation

Subject classification codes: F12, F13

1. Introduction

The government revenue of developing countries still relies heavily on tariff income. Therefore, tariff reductions through World Trade Organization negotiations and regional trade agreements may reduce government revenues. For example, according to the World Bank's World Development Indicators, the share of tariff revenue in government revenue was around 20% in Sri Lanka in 2010. To compensate for reduced government revenue,

some countries have introduced other taxes, for example, commodity taxes, to maintain revenue streams. According to the IMF (2005), Sri Lanka, Cote d'Ivoire, and Kenya lost tax revenue through tariff reductions, even though they began to impose commodity taxes thereafter. Therefore, suitable tariff and tax reforms are very important tasks for developing countries.

The literature related to tariff and tax reform with imperfect competition has been increasing (e.g., Keen and Ligthart, 2005; Naito and Abe, 2008; Fujiwara and Kitamura, 2012, 2013; Fujiwara, 2013, 2014). International trade needs international transportation, especially if the countries involved are islands, such as Sri Lanka and Japan. Therefore, it is important to take the international transportation sector into account. In addition, the literature related to tariff and tax reforms does not consider the transportation sector. However, as in Hummels (2007), the role of transportation costs is growing, whereas tariffs as a trade barrier are becoming less important.

There has been growing interest in research that considers an imperfectly competitive international transportation sector (Francois and Wooton, 2001; Andriamananjara, 2004; Abe, Hattori, and Kawagoshi, 2014). However, these studies do not consider tariff and tax reform. Therefore, our approach differs from the existing literature[1].

[1] Abe and Kawagoshi (mimeo) also take into account the transportation sector. They set up the model not only for international transportation, but also for a domestic transportation sector. In addition to this, they consider the role of the distance of both international and domestic transportation in environmental policies in transportation. Higashida (mimeo) analyzes alliances and antitrust immunity of container firms in international trade. Ishikawa and Tarui (mimeo) analyze the effect of various trade policies on shipping capacity. Takarada et al. (2014) examine environmental policy in the international transportation sector under perfect competition. The model setting is also similar to the

In particular, we extend Naito and Abe (2008) to examine the effects on government revenue and welfare of tariffs and commodity taxes when considering an international transportation sector. The detailed model structure is as follows. There are two countries. The importing country has a final-good market. The final-good is homogeneous and is produced by a home firm and a foreign firm. There is an international transportation firm in both countries. If the foreign firm exports its good, it needs to use this transportation firm. The welfare of the importing country is composed of the consumer surplus, the profits of both the final-good firm and the international transportation firm, and government revenue, with government revenue being composed of tariff and tax revenue.

We obtain the following three results. First, a domestic commodity tax reduction increases both welfare and tax revenue without any reform of the tariff level if the market is sufficiently small. The intuition of this result is as follows. The effect of a reduction in commodity tax on government revenue has three components. The first is the direct effect of the reduction, which is to decrease government revenue. Second, the commodity tax reduction raises the amount of consumption, causing government revenue to increase. The third effect is similar to the second one; a decrease in the commodity tax increases the amount of imports, causing government revenue from the tariff to increase. The first effect is dominated by the other two effects if the market size is sufficiently small. In this case, the total government revenue increases. Furthermore, the consumer surplus and profits of both the final-good producers and international transportation firms have positive effects on welfare. As a result, welfare increases, regardless of the sign of government revenue.

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studies of the vertical related market such as Ishikawa and Lee (1997), Ishikawa and Spencer (1999), Chen et al. (2004).

The second result is that a tariff reduction with no change in the commodity tax increases both welfare and government revenue. Again, we obtain this result only if the market size is sufficiently small. The mechanism behind this result is as follows. The effect on government revenue has three components. The first is the direct effect of the tariff reduction. Second, domestic production decreases, causing government revenue from commodity tax to decrease. Third, the amount of imports is increased by the tariff reduction. Therefore, the tax bases of both the commodity tax and the tariff increase. If the market size is sufficiently small, government revenue increases. Meanwhile the consumer surplus and profit of the international transportation firm increase welfare. On the other hand, the profit of the final-good firm decreases. Welfare always increases as a consequence of the tariff reduction if the market size is sufficiently small.

The result, as in Keen and Ligthart (2002, 2005), is that if the government increases its commodity tax by exactly the same level as the tariff reduction, there is always a welfare loss, while government revenue may or may not increase. This result is similar to Keen and Ligthart (2005) and Fujiwara and Kitamura (2012). The mechanism underlying our result is different from those of the above studies, because we take into account the international transportation sector, whereas the above studies consider only the final-good sector. The effect on government revenue and welfare is the sum of the first and second results. The overall effect on government revenue is negative if the market size is sufficiently small. On the other hand, the effect on welfare is always negative if international trade is allowed.

This paper is organized as follows. In section 2, we set up the basic model. Section 3 analyzes the effects of the tariff and tax policies. Section 4 concludes this paper.

2. The Model

There are two countries, 1 and 2. Country 1 has a single final-good market. The final good is homogeneous and is produced by both a home and a foreign firm. There is an international transportation firm in each importing or exporting country. If a foreign firm exports its good from exporting country to importing country, it must use this international transportation firm. This model structure is illustrated in Fig. 1.

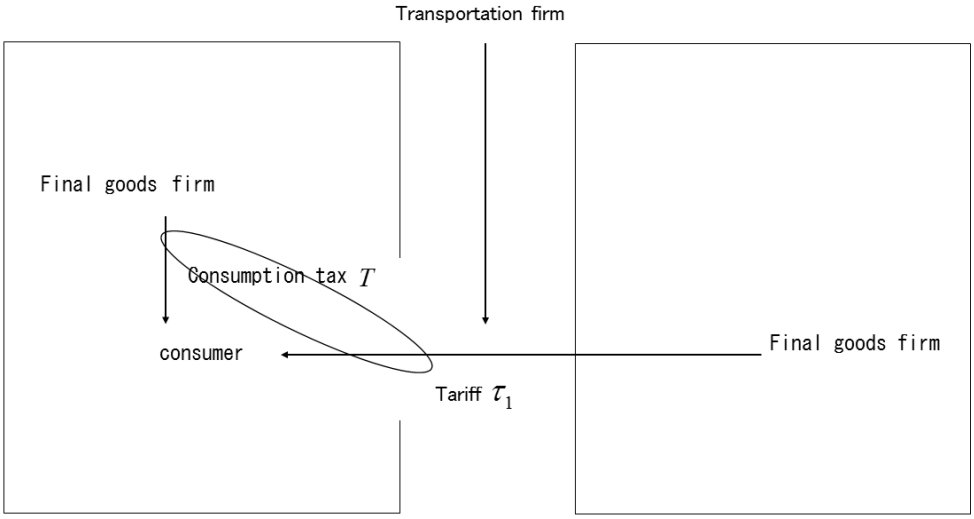

Figure 1. the model structure

The inverse demand function is assumed as follows:

$$p = \alpha - \beta(q_{11} + q_{21}), \tag{1}$$

where p is the consumer price in country 1, q_{11} is the amount of consumption in the importing country produced by firm 1 and q_{21} is the amount of consumption in the importing country produced by firm 2.

The profits of the final-good firms are:

$$\pi_1 = p_1 q_{11} - T q_{11} \tag{2}$$

and

$$\pi_2 = p_2 q_{21} - (\tau_1 + t + T) q_{21}, \tag{3}$$

where T is the commodity tax, t is the transport price, and τ_1 is the specific tariff imposed by the importing country. We assume that these variables are positive.

Substituting (1) into (2) and (3), we solve the profit maximization problems. For the first-order conditions with respect to q_{11} and q_{21}, we obtain:

$$\alpha - \beta q_{11} - \beta (q_{11} + q_{21}) - T = 0 \tag{4}$$

and

$$\alpha - \beta q_{21} - \beta (q_{11} + q_{21}) - \tau_1 - t - T = 0. \tag{5}$$

From (4) and (5), we obtain:

$$q_{11} = \frac{\alpha + t + \tau_1 - T}{3\beta} \tag{6}$$

and

$$q_{21} = \frac{\alpha - 2(t + \tau_1) - T}{3\beta}. \tag{7}$$

The amount of supply of the goods produced by firm 2 and consumed in the importing country is equal to the amount of demand for the international transportation. Therefore, from (7), we derive the following transportation price, which we define as the inverse demand function for the international transportation:

$$t = \frac{1}{2}(\alpha - 3\beta Q - 2\tau_1 - T), \tag{8}$$

where $Q = q_{21}$ is the amount of international transport.

The profit of the transportation firm is as follows:

$$\Pi = tQ. \tag{9}$$

By the first-order condition of the transportation firm, we obtain:

$$Q = \frac{\alpha - 2\tau_1 - T}{6\beta}. \tag{10}$$

To summarize the results at equilibrium, we obtain[2]:

$$t = \frac{1}{4}(\alpha - 2\tau_1 - T), \tag{11}$$

$$q_{11} = \frac{5\alpha + 2\tau_1 - 5T}{12\beta}, \tag{12}$$

$$q_{21} = \frac{\alpha - 2\tau_1 - T}{6\beta}, \tag{13}$$

$$p_1 = \frac{5\alpha + 2\tau_1 + 7T}{12}, \tag{14}$$

$$\pi_1 = \frac{(5\alpha + 2\tau_1 - 5T)^2}{144\beta}, \tag{15}$$

$$\pi_2 = \frac{(\alpha - 2\tau_1 - T)^2}{36\beta}, \tag{16}$$

$$\Pi = \frac{(\alpha - 2\tau_1 - T)^2}{24\beta}, \tag{17}$$

and

$$CS = \frac{(7\alpha - 2\tau_1 - 7T)^2}{288\beta}, \tag{18}$$

where CS is the consumer surplus of the importing country.

[2] We assume that $\alpha > 2\tau_1 + T$ holds to ensure international trade.

	t	q_{11}	q_{12}	p_1	π_1	π_2	Π_1	CS
Consumption tax T	−	−	−	+	−	−	−	−
Tariff τ_1	−	+	−	+	+	−	−	−

Table 1. Effects of partial reforms

Using (12) to (18), we summarize the effects of the commodity tax and tariff in Table 1. A raise in τ_1 increases the cost of the final-good firm in country 2. Then the amount of the final-good consumption produced in country 2 decreases, whereas the amount of the final-good consumption produced in country 1 increases. Therefore, the profit of the final-good firm in country 1 increases. On the other hand, the profit of the final-good firm in country 2 decreases. A reduction in the volume of international transportation decreases the profit of the transportation firm. Through the final-good price increases, the consumers' surplus decreases. A raise in T increases the costs of the final-good firms in both countries. Then, the profits of both firms decreases. Therefore, the amount of final-good production decreases. Through the reduction in international trade, the profit of the international transportation firm decreases. As a result, the consumer price of the final good increases, then the consumers' price decreases.

The government revenue is defined as:

$$G = T\left(q_{11} + q_{21}\right) + \tau_1 q_{21}. \tag{19}$$

The welfare of the importing country is defined as:

$$W = CS + \pi_1 + \delta\Pi + G, \tag{20}$$

where if the nationality of the transportation firm is the importing (exporting) country, $\delta = 1(0)$

Total differentiation of the importing country's government revenue yields:

$$\mathrm{d}G = \frac{7\alpha - 4\tau_1 - 14T}{12\beta}\mathrm{d}T + \frac{\alpha - 4\tau_1 - 2T}{6\beta}\mathrm{d}\tau_1. \tag{21}$$

Total differentiation of the importing country's welfare yields:

$$\begin{aligned}\mathrm{d}W = &\frac{(-5-4\delta)\alpha + (-23+4\delta)\tau_1 + (-18+8\delta)T}{48\beta}\mathrm{d}T \\ &+ \frac{(5-4\delta)\alpha + (-14+8\delta)\tau_1 + (-9+4\delta)T}{24\beta}\mathrm{d}\tau_1.\end{aligned} \tag{22}$$

3. Tariff and Tax Reform

1. Commodity Tax Reduction, Tariff Unchanged: $\mathbf{d}T < 0,\ \mathbf{d}\tau_1 = 0$

For the tariff and tax reform, we rewrite (21) and (22) as follows:

$$\mathrm{d}G = \frac{7\alpha - 4\tau_1 - 14T}{12\beta}\mathrm{d}T, \tag{23}$$

$$\mathrm{d}W = \frac{-9\alpha - 19\tau_1 - 10T}{48\beta}\mathrm{d}T \quad if\ \delta = 1 \tag{24}$$

and

$$\mathrm{d}W = \frac{-5\alpha - 23\tau_1 - 18T}{48\beta}\mathrm{d}T \quad if\ \delta = 0. \tag{25}$$

We obtain the condition that increases both government revenue and country 1's welfare. This condition is summarized in proposition 1.

Proposition 1 *Suppose that* $(4\tau_1 + 14T)/7 > \alpha$ *holds. The commodity tax reduction with no tariff change increases both government revenue and welfare.*

Proof. Equations (24) and (25) imply that $dW > 0$ regardless of the nationality of the transportation firm; while (23) implies that $\mathrm{d}G > 0 \Leftrightarrow (4\tau_1 + 14T)/7 > \alpha$. Q.E.D.

The intuition of proposition 1 is as follows. Through total differentiation of (19), we obtain:

$$\mathrm{d}G = \underbrace{\left(q_{11}+q_{21}\right)}_{+}\mathrm{d}T + \underbrace{T\left(\frac{\partial q_{11}}{\partial T}+\frac{\partial q_{21}}{\partial T}\right)}_{-}\mathrm{d}T + \underbrace{\tau_1\frac{\partial q_{21}}{\partial T}}_{-}\mathrm{d}T. \tag{26}$$

The first term on the right hand side is the direct effect on the commodity tax revenue. By reducing the commodity tax, i.e., with $\mathrm{d}T<0$, this first term decreases the government revenue. The second term is the indirect effect on the commodity tax revenue. This term increases, because with the tax reduction, consumption increases. Therefore, the commodity tax revenue increases. The last term is the effect of the commodity tax reduction on the tariff revenue. Following the commodity tax reduction, the amount of consumption of imported goods increases. Thus, the last term increases the government revenue. If the market size is sufficiently small, the effect of the first term is dominated by the second and third terms. As a result, the overall government revenue increases.

For the welfare of the importing country, we obtain:

$$\mathrm{d}W = \left(\underset{-}{\frac{\partial CS}{\partial T}}+\underset{-}{\frac{\partial \pi_1}{\partial T}}+\delta\underset{-}{\frac{\partial \Pi}{\partial T}}+\underset{?}{\frac{\partial G}{\partial T}}\right)\mathrm{d}T. \tag{27}$$

The sign of government revenue is ambiguous; however, other components of welfare have negative signs. The overall effect of the commodity tax reduction on welfare is therefore generally positive.

2. Tariff Reduction, Commodity Tax Unchanged: $\mathbf{d}T=0,\ \mathbf{d}\tau_1<0$

We also immediately obtain the result of this reform as follows. From (22) and (21), we obtain:

$$\mathrm{d}G = \frac{11\alpha - 22T - 8\tau_1}{18\beta}\mathrm{d}\tau_1, \tag{28}$$

$$\mathrm{d}W = \frac{\alpha - 6\tau_1 - 5T}{24\beta}\mathrm{d}\tau_1, \quad if\ \delta = 1 \tag{29}$$

and

$$\mathrm{d}W = \frac{5\alpha - 14\tau_1 - 9T}{24\beta}\mathrm{d}\tau_1 \quad if\ \delta = 0. \tag{30}$$

From (28) to (30), we obtain following proposition.

Proposition 2 *If α is sufficiently small, the government increases both the welfare of the importing country and government revenue with a tariff reduction.*

The intuition of this proposition is as follows.

$$\begin{aligned}\mathrm{d}G &= q_{21}\mathrm{d}\tau_1 + T\frac{\partial q_{11}}{\partial \tau_1}\mathrm{d}\tau_1 + T\underbrace{\frac{\partial q_{21}}{\partial \tau_1}}\mathrm{d}\tau_1 + \tau_1\underbrace{\frac{\partial q_{21}}{\partial \tau_1}}\mathrm{d}\tau_1 \\ &= q_{21}\mathrm{d}\tau_1 + \underbrace{T\left(\frac{\partial q_{11}}{\partial \tau_1} + \frac{\partial q_{21}}{\partial \tau_1}\right)}\mathrm{d}\tau_1 + \tau_1\underbrace{\frac{\partial q_{21}}{\partial \tau_1}}\mathrm{d}\tau_1.\end{aligned} \tag{31}$$

The first term of (31) is the direct effect of the tariff reduction on government revenue. This term is negative with regard to government revenue. The second term increases government revenue, because the reduction of the import tariff increases the amount of total consumption of the final-good. This increases the revenue from the commodity tax. The last term also increases government revenue, because tariff reduction increases the amount of imports. Thus, government revenue increases. The smaller the market size, the smaller is the effect of the first term. As a result, the total effect of the tariff reduction increases country 1's welfare.

The effects on the welfare can be divided as follows:

$$\mathrm{d}W = \left(\underset{-}{\frac{\partial CS}{\partial \tau_1}} + \underset{+}{\frac{\partial \pi_1}{\partial \tau_1}} + \delta \underset{-}{\frac{\partial \Pi}{\partial \tau_1}} + \underset{?}{\frac{\partial G}{\partial \tau_1}} \right) \underset{-}{\mathrm{d}\tau_1}. \tag{32}$$

As a consequence of the tariff reduction, the consumers' surplus and the profit of the international transportation firm increase the welfare. On the other hand, the profit of the final-good firm decreases country 1's welfare. The total effect of the tariff reduction is to increase the welfare of the importing country if the market size is sufficiently small.

3. Tariff Reduction, Commodity Tax Increases: $\mathbf{d}T = -\mathbf{d}\tau_1$

Finally, following Keen and Ligthart (2002) and Keen and Ligthart (2005), we set a policy in which the tariff reduction is at the same level as the tax increase, that is $\mathrm{d}T = -\mathrm{d}\tau_1$. By using this condition, we obtain:

$$\begin{aligned} \mathrm{d}G &= \underset{+}{q_{11}}\,\underset{+}{\mathrm{d}T} + T\left[\left(\underset{-}{\frac{\partial q_{11}}{\partial T}} + \underset{-}{\frac{\partial q_{21}}{\partial T}} \right) - \left(\underset{+}{\frac{\partial q_{11}}{\partial \tau_1}} + \underset{-}{\frac{\partial q_{21}}{\partial \tau_1}} \right) \right] \underset{+}{\mathrm{d}T} + \tau_1 \left(\underset{-}{\frac{\partial q_{21}}{\partial T}} - \underset{-}{\frac{\partial q_{21}}{\partial \tau_1}} \right) \underset{+}{\mathrm{d}T} \\ &= \frac{5\alpha + 4\tau_1 - 10T}{12\beta} \underset{+}{\mathrm{d}T}, \end{aligned} \tag{33}$$

$$\begin{aligned} \mathrm{d}W &= \left(\underset{-}{\frac{\partial CS}{\partial T}} - \underset{-}{\frac{\partial CS}{\partial \tau_1}} \right) \underset{+}{\mathrm{d}T} + \left(\underset{-}{\frac{\partial \pi_1}{\partial T}} - \underset{+}{\frac{\partial \pi_1}{\partial \tau_1}} \right) \underset{+}{\mathrm{d}T} + \left(\underset{-}{\frac{\partial \Pi}{\partial T}} - \underset{-}{\frac{\partial \Pi}{\partial \tau_1}} \right) \underset{+}{\mathrm{d}T} + \left(\underset{?}{\frac{\partial G}{\partial T}} - \underset{?}{\frac{\partial G}{\partial \tau_1}} \right) \underset{+}{\mathrm{d}T} \\ &= -\frac{11\alpha - 2\tau_1 + 9T}{48\beta} \underset{+}{\mathrm{d}T}, \quad \textit{if } \delta = 1, \end{aligned} \tag{34}$$

and

$$\begin{aligned} \mathrm{d}W &= \underset{-}{\left(\frac{\partial CS}{\partial T}-\frac{\partial CS}{\partial \tau_1}\right)}\underset{+}{\mathrm{d}T}+\underset{-}{\left(\frac{\partial \pi_1}{\partial T}-\frac{\partial \pi_1}{\partial \tau_1}\right)}\underset{+}{\mathrm{d}T}+\underset{?}{\left(\frac{\partial G}{\partial T}-\frac{\partial G}{\partial \tau_1}\right)}\underset{+}{\mathrm{d}T} \\ &= -\frac{15\alpha-10\tau_1+5T}{48\beta}\underset{+}{\mathrm{d}T}, \quad \textit{if } \delta=0. \end{aligned} \tag{35}$$

From (33) to (35), we obtain following proposition.

Proposition 3 *Tariff and tax reform with* $\mathrm{d}T=-\mathrm{d}\tau_1$ *always reduces welfare. Government revenue increases if* $\alpha>\left(-4\tau_1+10T\right)/5$.

Proof. From (33), we obtain the condition that the reform increases government revenue as $\left(-4\tau_1+10T\right)/5<\alpha$. At first, we consider the case where $\delta=1$. Using (34), we obtain the condition for increased welfare as $\alpha_1\equiv 1/11\left(2\tau_1-9T\right)>\alpha$. The condition that (13) becomes positive is $\alpha_2\equiv 2\tau_1+T<\alpha$. Then, $\alpha_1>\alpha_2\Leftrightarrow\tau_1<-T$. This is a contradiction, since we are assuming both tariff and commodity tax are positive.

In the case of $\delta=0$, using (35), we obtain $dW>0\Leftrightarrow\alpha_3\equiv\left(2\tau_1-T\right)/3>\alpha$. Then, $\alpha_3>\alpha_2\Leftrightarrow\tau_1<-T$. This is also a contradiction of our assumption. Q.E.D.

The implications of propositions 1-3 are as follows. It is clear that a policy in which tariff reductions are at exactly the same level as tax increases is not a suitable reform, because it may reduce country 1's welfare and/or government revenue. To avoid a reduction in welfare and government revenue, the government raises the commodity tax, but not by the same level as the tariff reduction. Alternatively, to obtain a policy that can increase welfare and government revenue, the government may introduce different types of taxation, for example, income tax or corporate tax.

4. Concluding Remarks

This analysis supports the argument that governments lost revenue through trade liberalization, even though a commodity tax was introduced. Our results have the following policy implications. First, desirable tariff and tax reform may be achieved when tariff reduction, with a constant commodity tax, increases both welfare and government revenue if the market size is sufficiently small. Second, our analysis shows that a rise in the commodity tax by the same level as a tariff reduction causes the government to lose revenue. This result suggests that the government should attempt to raise the commodity tax, but not by the same level as a given tariff reduction. Finally, the government could introduce different kinds of tax policies, that is, income tax and corporate tax, to compensate for its tax revenue reduction.

We should extend this approach in the following ways. This model uses the specific demand function. The result from the general demand function might produce interesting results. Depending on the country, the number of transportation firms is not equal to one; thus, we extend the number of transportation firms. Finally, we only consider a commodity tax as a domestic policy option. We also need to take into account income tax and corporate tax. These are my future tasks.

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References

Abe, Kenzo, Keisuke Hattori and Yoshitaka Kawagoshi, "Trade Liberalization and Environmental Regulation on International Transportation," Japanese Economic Review 65 no.4 (2014): 468-82.

Abe, Kenzo and Yoshitaka Kawagoshi, "Trade and Environmental Policies with Domestic and International Transportation," mimeo.

Chen, Yongmin, Jota Ishikawa, and Zihao Yu, "Trade liberalization and Strategic Outsourcing," Journal of International Economics 63 No.2 (2004): 419-36.

Fujiwara, Kenji, "A win-win-win tariff-tax reform under imperfect competition," Review of International Economics 21 No.5 (2013): 857-67.

Fujiwara, Kenji and Ryoma Kitamura, "A tariff-tax reform under oligopoly and free entry," Discussion Paper Series 88 (2012), School of Economics, Kwansei Gakuin University.

Fujiwara, Kenji and Ryoma Kitamura, "A trade and domestic tax reform in imperfectly competitive markets," Journal of International Trade & Economic Development 23 No.6 (2014): 785-95.

Higashida, Keisaku, "Container Linear Shipping Alliances, Excess Investment and Antitrust Immunity," mimeo.

Hummels, David. "Transportation Costs and International Trade in the Second Era of Globalization," Journal of Economic Perspective 21 No.3 (2007): 131-54.

Ishikawa, Jota and Barbara Spencer, "Rent-shifting Export Subsidies with an Imported Intermediate Product," Journal of International Economics 48 No.1 (1999): 199-232.

Ishikawa, J. and Ki-Dong Lee, "Backfiring Tariffs in Vertically Related Markets," Journal of International Economics 42 No. 3-4 (1997): 395-423.

Ishikawa, J., Nori Tarui, "Backfiring with backhaul problems," mimeo.

Keen, Michael and Jenny E. Ligthart, “Coordinating tariff reduction and domestic tax reform,” Journal of International Economics 56 No.2 (2002): 489-507.

Keen, Michael and Jenny E. Ligthart “Coordinating tariff reduction and domestic tax reform,” Review of International Economics 13 No.2 (2005): 385-98.

Naito, Takumi and Kenzo Abe, “Welfare- and revenue-enhancing tariff and tax reform under imperfect competition,” Journal of Public Economic Theory 10 (2008): 1085-94.

Takarada, Yasuhiro, Takeshi Ogawa, and Weijia Dong, “Trade, Transportation, and the Environment: Welfare Effects of Emissions Reductions and International Emissions Trading,” mimeo.