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Trade Policy Reform: How to win wide-ranging support?

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Abstract

This article analyzes the effects of international trade policies on an imperfect competitive domestic market, taking into account not only consumers but also upstream and downstream firms. We first study the impact of a classic import tax decrease and we find that upstream firms are harmed and domestic fiscal revenues may decrease with such a policy. We then look at the effect of an increase in non-tariff barriers, seen as the lowest degree of substitutability between the domestic good and the imported good. The result is an improvement in each agent's situation, since international competition becomes less fierce. Last, we show that market conditions may exist such that a coupled policy (import tax decrease and non-tariff barrier increase) makes every agent better off. This can explain why we observe a proliferation of domestic standards at national level in order to back up lower tariff negotiations by governments.

JEL Classification: L14; F12; L20; F13.

Keywords: Tariff, Manufacturers, Retailers, Trade Policy, Non-Tariff Barriers.

1. Introduction

Over the last few decades we have observed two developments in trade policy that at first sight seem contradictory to the goals assigned to the World Trade Organization (see WTO, [13]). According to Yu [14]:

> "One of the most striking features of the trade policies of many industrialized nations is the apparent substitution of non-tariff barriers (NTBs) for tariffs. During the past three decades, tariffs have undergone continuous reduction while, at the same time, various NTBs have been adopted."

Indeed, Beghin [3] obverses lower tariffs (3% in high-income countries) on the one hand whereas there is a proliferation of non-tariff barriers (NTBs) on the other. Common NTBs include market-specific trade and domestic policies such as rules of origin and domestic content requirement schemes (for example labeling and certification policies such as the European Union Geographic Indication system) that are specifically classified as technical barriers to trade (TBT). Labeling that communicates the origin of products is becoming prominent in the agrofood sector (Anders and Caswell, [1]).

The use of NTBs, other than quantity-price controls and finance measures, increased from 55% of all NTB measures in 1994 to 85% in 2004. The use of TBTs almost doubled, from 32% to 59% of affected tariff lines over the same period (Beghin, [4]). The evolution of the NTBs is more qualitative because it is difficult to translate its effects in terms of tax equivalent. It is indeed crucial to assess welfare losses imputable to implementation of NTBs. For this reason, the OECD [8] discussed the different methods that have been used to quantify the impact of product standards on trade, and more precisely on welfare.

The general opinion about trade policy is that the decrease in tariffs has led to more exchanges between countries, and has thus improved social welfare. This is based on the classic Ricardo and Hecksher-Ohlin models which assume perfect competition in both countries trading their goods. However, it is important to relax this assumption and analyze the trade policy reform taking into account imperfect competition as well as market structure. According to Krugman-Obstfled [5], governments prefer to negotiate tariff decreases rather than non-tariff decreases. This suggests that their effects are not the same on the domestic economy, notably on agent's surplus.

The second point is that imperfect competition has an impact on trade policy implementation. Regarding vertical structures (upstream and downstream firms), economic analysis has focused on the foreclosure issue. Domestic upstream firms can evict new suppliers coming from abroad by adapting their contracts with the downstream firms, especially when local anti-trust authorities are lenient, as in Avenel & Barlet [2] or Spencer & Jones [11, 12].

In this article, we focus on the effect of trade policy reform, taking into account a simple vertical structure composed of a manufacturer and a retailer. In order to analyze trade policy correctly, tariff and non-tariff barriers are disentangled. The tariff is assumed to be an import tax rate that the retailer pays when he buys from the World Market, whereas we model the non-tariff barriers as a proxy for the degree of substitutability between the domestic good and the imported good.

We first find that a trade reform only aimed at decreasing the import tax rate is not accepted by all agents, especially upstream firms. However, any increase in NTBs is accepted

by everyone since domestic competition between goods is reduced. The main conclusion is that an implementation of NTBs can overcome the reluctance of agents harmed by a lower tariff, so that everyone is better off. This can explain stylized facts where we observe a proliferation of domestic standards (TBTs) at national level in order to back up lower tariffs resulting from governments' negotiations.

Our article is a positive economic paper in the sense that it tries to explain the conflicts of interests in a simple economy that arises from the trade policy reform, distinguishing trade obstacles by nature (tariff barriers and non-tariff barriers) as well as market structure complexity (upstream and downstream conflict of interests).

Section 2 presents the framework we use to analyze the trade policy reform. Section 3 exhibits the market equilibrium with a producer-retailer vertical structure and section 4 analyzes the consequence of various trade policy reforms. Section 5 concludes.

2. The framework

We consider a vertical structure composed of a manufacturer and a retailer. Manufacturer M produces a good domestically with a quadratic cost function: $c(q) = \frac{c}{2}q^2$, where q is the quantity level and c a cost parameter. His production can be sold on two markets. First, he sells part of his production (q^D) to a domestic retailer R.[1] The retailer incurs no cost for his activities and sells the good to final consumers at price p^D. We assume a two-part tariff contract between the manufacturer and the retailer, where the wholesale price w^D and the franchise fee F^D are fixed according to a Nash Axiomatic framework.[2] The parameter γ denotes the manufacturer's bargaining power, and $(1-\gamma)$ that of the retailer. Second, the manufacturer can also sell part of his production (q^X) on the "World Market". This supranational market is assumed to be perfectly competitive. This implies that the manufacturer is anonymous on this market and not big enough to influence the World equilibrium price. He therefore acts as a price-taker agent. In this framework, we suppose there are no exportation taxes. Assuming the world price is exogenous and equal to w, the manufacturer can export as many quantities as he wants (completely inelastic world demand); his revenues will thus be $w \cdot q^X$.

In the same way, the retailer has two supply sources. He can either buy from the domestic manufacturer, paying him the unit wholesale price w^D and the franchise fee F^D, or buy from the World market at the unit price w. When importing, the retailer faces an *ad-valorem* import tax set to t by the domestic State. Therefore, the final unit price paid by the retailer to import is $w(1+t)$. The price charged to the consumers for the imported good is p^I.

Consumers do not consider the domestic good and the imported good as perfect substitutes. This can be justified by the fact that when the good is sold by the retailer from the manufacturer's domestic production, it can fulfill domestic standard requirements and be labeled differently from the imported good.[3] Because the World market is supplied by many countries, the imported product may differ from the domestic good. The label allows consumers to distinguish the imported good from the domestic one.

[1] All variables relative to the domestic market will be denoted with a D superscript, the ones relative to the imported good will be denoted with the I subscript, and X will denote the variable relative to the exportation.

[2] See the book by Osborne & Rubinstein [9] for a detailed presentation of the Nash negotiation game and its topological characteristics.

[3] The cost of presenting the domestic production to the Domestic Standard Agency delivering the label is not formalized.

Demands for the domestic good (denoted $q^D(p^D, p^I)$) and for the imported good (denoted $q^I(p^D, p^I)$) are derived from a quasi-linear and quadratic utility of a representative consumer.[4] They are given by:

$$(1) \qquad \begin{cases} q^D(p^D, p^I) = \frac{1+\alpha}{1+\beta} - \frac{1}{1-\beta^2} \cdot p^D + \frac{\beta}{1-\beta^2} \cdot p^I \\ q^I(p^D, p^I) = \frac{1+\alpha}{1+\beta} + \frac{\beta}{1-\beta^2} \cdot p^D - \frac{1}{1-\beta^2} \cdot p^I \end{cases}$$

The parameter α is a measure of the market size for the total demand.[5] The parameter β summarizes the NTBs by reflecting the degree of differentiation between the two goods: when $\beta \to 0$, goods are independent: the demand for the domestic good (resp. imported good) depends only on its own price, and when $\beta \to 1$ goods tend to be considered as perfect substitutes by consumers.[6] This parameter can also be interpreted as the strength of the standard for consumers. If the standard obtained by the domestic good is not relevant for consumers, they will consider the two goods as close substitutes. Conversely, when consumers care about the domestic label, the two goods are independent. One can also think of compatibility issues where the domestic good and the imported good may not be fully compatible to be used on a given device (see Régibeau and Rocketty, [10]).

The framework is summarized in Figure 1.

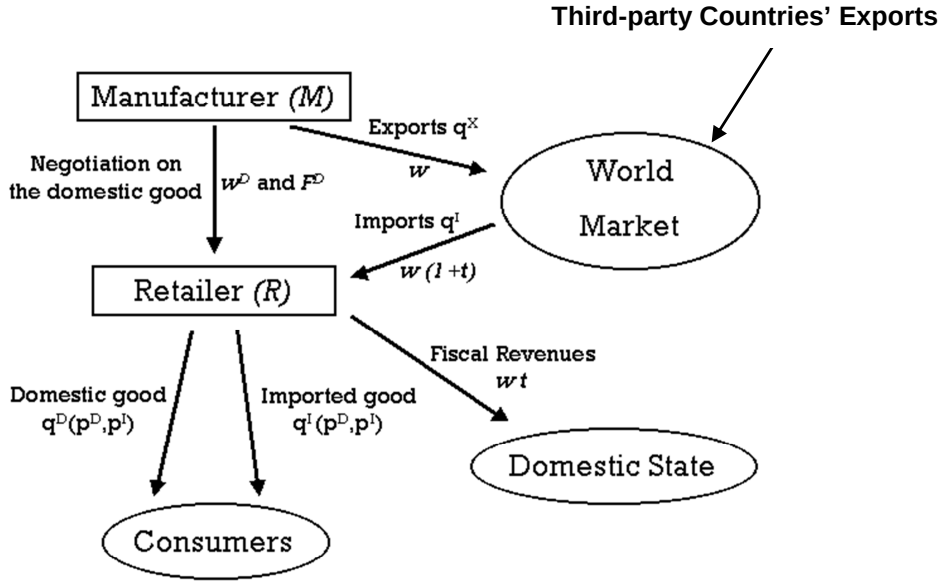

Figure 1: The economic framework with vertical structure.

We now turn to the negotiation process and solve the equilibrium wholesale price and franchise fee between the manufacturer and the retailer.

4 The consumer's utility function is assumed to take the form: $U(q^0, q^D, q^I) = (1+\alpha)q^D + (1+\alpha)q^I - \frac{1}{2}\left(q^{D^2} + \beta q^D q^I + q^{I^2}\right) + q^0$ where q^0 is the Hicksian composite commodity with a price normalized to 1.

5 The interpretation of α as the market size parameter in the comparative static analysis has to be considered for a given level of β, see Irmen [6] for more details.

6 For example, country-of-origin labeling (COOL) is a horizontal product characteristic.

3. Market equilibrium with the vertical structure

The manufacturer and the retailer negotiate the level of the domestic product's wholesale price and the associated franchise fee. As we assumed this negotiation was taking place according to a Nash Axiomatic framework, we first need to consider the disagreement equilibrium. It constitutes the threat points of the negotiation and gives the profit each agent will make if the negotiation on the domestic product fails.

We first define each agent's reservation profit in the case where the manufacturer and the retailer do not reach an agreement (see Appendix A for more details of the resolution). The manufacturer sells all his production to the World market (pure exportations) while the retailer buys exclusively from the World market and pays import tariff. The reservation profits are:

$$(2) \quad \begin{cases} \underline{\pi}^M = \frac{w^2}{2c} \\ \underline{\pi}^R = \frac{1}{4}(1+\alpha-w(1+t))^2 \end{cases}$$

We now turn to the case where the retailer and the manufacturer negotiate in order to find an agreement for selling the domestic product. The gross surplus (GS) of the two products is thus defined by (see Appendix B for more details of the resolution):

$$(3) \quad GS(\beta,t) = (p^I - w(1+t)) \cdot q^I(p^D,p^I) + p^D \cdot q^D(p^D,p^I) + w \cdot q^X - c\frac{(q^X+q^D(p^D,p^I))^2}{2}$$

The net surplus (NS) necessary to find an agreement takes into account each firm's threat point, that is:

$$(4) \quad NS^*(\beta,t) = GS(\beta,t) - \underline{\pi}^M - \underline{\pi}^R = \frac{((1+\alpha)(1-\beta)+w(1+t)\beta-w)^2}{4(1-\beta^2)} > 0$$

The wholesale price is set to the equilibrium marginal cost $w^{D*} = w$ and the franchise fee is only used to split the net surplus between each agent according to their bargaining power parameter: $\pi^{M*}(\beta,t)=\gamma\cdot NS^*(\beta,t)+\underline{\pi}^M$ and $\pi^{R*}(\beta,t)=(1-\gamma)\cdot NS^*(\beta,t)+\underline{\pi}^R$.
At the end, each one gets:

$$(5) \quad \begin{cases} \pi^{M*}(\beta,t) = \gamma\frac{((1+\alpha)(1-\beta)+w(1+t)\beta-w)^2}{4(1-\beta^2)} + \frac{w^2}{2c} \\ \pi^{R*}(\beta,t) = (1-\gamma)\frac{((1+\alpha)(1-\beta)+w(1+t)\beta-w)^2}{4(1-\beta^2)} + \frac{1}{4}(1+\alpha-w(1+t))^2 \end{cases}$$

The equilibrium outcome values for prices are:

$$(6) \quad \begin{cases} p^{I*}(t) = \frac{1}{2}(1+\alpha+w(1+t)) \\ p^{D*}(t) = \frac{1}{2}(1+\alpha+w) \end{cases}$$

The equilibrium outcome values in quantities are:

$$(7) \quad \begin{cases} q^{I*}(\beta,t) = \frac{(1+\alpha)(1-\beta)-w(1-\beta)-wt}{2(1-\beta^2)} \\ q^{D*}(\beta,t) = \frac{(1+\alpha)(1-\beta)-w(1-\beta)+w\beta t}{2(1-\beta^2)} \\ q^{X*}(\beta,t) = \frac{1}{4}\left[\frac{4w}{c} - \frac{wt}{1-\beta} + \frac{w(2+t)-2(1+\alpha)}{1+\beta}\right] \end{cases}$$

The domestic government, when both goods are sold, benefits from fiscal revenues up-to:

(8) $G^*(\beta, t) = wtq^{I*}(p^{I*}) = \frac{wt[(1+\alpha)(1-\beta)-w(1+t-\beta)]}{2(1-\beta^2)}$

The first remark concerns the fiscal revenues of the domestic government. The import tax needs to be not too high in order to have positive fiscal revenues. The limit tax value is thus defined by:[7]

(9) $G^*(\beta, \bar{t}) = 0 \Rightarrow \bar{t}(\beta) = \frac{(1+\alpha-w)(1-\beta)}{w} > 0$

The second remark is that the domestic sales are greater than the imported ones. This is quite trivial as the retailer pays $w^{D*} = w$ for each domestic unit whereas he pays $w(1+t)$ for the imported ones.

The third remark is that the total quantity produced by the manufacturer does not depend on the import taxes: $q^{D*} + q^{X*} = \frac{w}{c}$. This is due to the equilibrium wholesale price set to $w^{D*} = w$. The manufacturer earns the same unit revenue from export and from domestic sales. Therefore, the total quantity produced is decided according to marginal cost, which depends on the opportunity cost of the world market price.

The equilibrium strategies for the manufacturer and the retailer are to find an agreement in order to be able to sell both goods on the domestic market and enjoy the monopoly outcome. This monopoly outcome is then split between them in the vertical structure according to their respective bargaining strength. Note here that an agreement is always found as the net surplus to be split is strictly positive. Therefore, the disagreement outcome where the manufacturer only exports and the retailer only imports is not implemented at the equilibrium. It is only a threat point for each agent in the negotiation, allowing them to secure some minimal profit.

We now analyze the effects of a trade policy reform on the domestic economy. According to observed facts, such a policy consists in lowering the import tax and/or in increasing the non-tariff barriers, translating into less substitutatibility between products. The next section will consider the impact of the trade policy reforms on the market, and its consequences on the agents' profits.

4. The effects of trade policy reforms

We first analyze the effects of a decrease in the import tax on each agent's surplus. We then turn to the analysis of the impact of a modification of label requirements affecting the substitution parameter. Last, we look at how these different trade policy tools may be combined to create a broad consensus among economic actors.

4.1 Import tariff reform

A decrease in the tax translates into a lower domestic good production and an increase in the quantity of the imported good. However, total quantity sold on the market rises because of a less harmful deadweight loss created by the taxation.

[7] Note that demands are positive as soon as $t < \bar{t}(\beta)$.

Trade liberalization by lowering the import tariff has often been judged as welfare improving. This is beneficial because it stimulates competition across firms and thus international trade may achieve an efficient allocation of production across countries. Besides, trade liberalization favors product diversity for consumers. However, in our framework, lowering the import tariff does not benefit the vertical structure surplus.

Proposition 1. *Lowering the import tariff decreases the net surplus to be split in the negotiation between the manufacturer and the retailer. The manufacturer will not benefit from a tariff decrease, whereas the retailer's profit will increase.*

Proof:

The derivative of the net surplus of the negotiation (eq. 4) according to t leads to:

$$\frac{\partial NS^*(\beta,t)}{\partial t} = \frac{w\beta((1+\alpha)(1-\beta)+w(1+t)\beta-w)}{2(1-\beta^2)} > 0$$

This derivative is always positive, indicating that the net surplus decreases when t is reduced.

As the manufacturer's profit is defined by $\pi^{M*}(\beta,t) = \gamma NS^*(\beta,t) + \frac{w^2}{2c}$, and $NS^*(\beta,t)$ is decreasing when t decreases, $\pi^{M*}(\beta,t)$ also decreases whatever his bargaining power.

The retailer's profit is: $\pi^{R*}(t) = (1-\gamma)NS^*(t) + \frac{1}{4}(1+\alpha-w(1+t))^2$. So:

$\frac{\partial \pi^{R*}(\beta,t)}{\partial t} < 0 \quad \text{for} \quad t < \frac{(1+\alpha-w)(1-\beta)(1+\beta\gamma)}{w(1-\beta^2\gamma)}$

As t is only relevant in $[0,\bar{t}]$ and because $\frac{1+\beta\gamma}{1-\beta^2\gamma} > 1$, we have $\frac{(1+\alpha-w)(1-\beta)(1+\beta\gamma)}{w(1-\beta^2\gamma)} > \bar{t}$. Therefore, the retailer's profit is always increasing as long as t decreases in $[0,\bar{t}]$.

■

Equation (10) summarizes the different effects of a tariff decrease in the vertical structure net surplus.

$$(10) \quad \underbrace{NS(t)}_{\downarrow} = \underbrace{[p^I - w(1+t)]q^I}_{\uparrow} + \underbrace{p^D q^D}_{\downarrow} + \underbrace{wq^X}_{\uparrow} - \underbrace{c\frac{(q^D+q^X)^2}{2}}_{\sim} - \underbrace{\pi^M}_{\sim} - \underbrace{\pi^R}_{\uparrow}$$

The import tariff decrease lowers the price of the imported good and its demand rises. But since the price decreases at a lower rate than the cost of the imported good (see eq. (6)), the retailer's margin on the imported good thus increases. Therefore, the retailer's profit earned on the imported good increases.[8] Regarding the domestic product, a decrease in t makes the domestic quantities sold by the manufacturer fall, and as the final price does not change, domestic sales decrease (see eq. (6) and (7)). Besides, as the manufacturer keeps his total production constant, the quantities he exports to the World market increase due to the loss in domestic demand. The last effect of the tariff decrease concerns the threat points of the manufacturer and the retailer, given in equation (2). Whereas the manufacturer's reservation profit remains constant, the retailer has a higher disagreement pay-off as the imported good becomes cheaper.

The retailer's profit increases because the gain on his outside option overrides the lower share he gets from the vertical structure splitting. Indeed, the imported good becomes

[8]Profit on the imported good is defined by $(p^I - w(1+t)) \cdot q^I$.

cheaper and this plays to his advantage in the negotiation with the manufacturer. Conversely, the manufacturer's loss is not compensated for by any modification of his reservation profit, and the reform therefore directly translates into a fall in the producer's profits.

This conflict of interest in the vertical structure can shed some light on why producers are often reluctant about trade policy reform. In fact, their own incentives are clearly against trade liberalization as the retailer becomes more independent from their domestic production. This forces manufacturers to leave them more rents in order to find an agreement on the commercialization of the domestic good. Additionally, the trade policy reform fails to provide these two partners with a larger *cake* to split.

The domestic government may benefit or not from the trade policy reform, depending on the goal it wants to achieve. Its fiscal revenues $G^*(t)$ are maximum for a level $\tilde{t} = \frac{(1+\alpha-w)(1-\beta)}{2w} < \bar{t}$. Therefore, if the initial tax rate is above $\tilde{t}$, the decrease in the import tariff makes fiscal revenues higher, but if the initial tax rate is below $\tilde{t}$ the domestic government loses on fiscal entries. Depending on the initial tax rate level, a government attentive to fiscal revenues may be reluctant to ratify a trade policy reform despite the increase in social welfare.

4.2 Effect of non-tariff barriers

In previous decades, governments used to negotiate substantial import tax reductions whereas now, trade policy reforms mainly focus on the removal of 'non-tariff barriers. For instance, we can argue that the standard obtained by the domestic good (such as a geographical indication) or weak compatibility between the domestic and the imported good is a *non-tariff barrier* as advocated by Marette and Beghin [7]. This standard allows the domestic good not to be considered at the same competition level as the imported one by consumers. In our framework, when the horizontal differentiation parameter (β) decreases, the two goods become less and less of a substitute for the consumers. This can be interpreted as the result of higher consumer loyalty to the domestic standard.

Proposition 2. *When non tariff barriers increase, it results in a higher net surplus to be split in the vertical structure. The profits of the manufacturer and the retailer increase.*

Proof:

The derivative of the net surplus to be split between M and R is:

$$\frac{\partial NS^*(\beta,t)}{\partial \beta} = \frac{w(t-\bar{t})(t\,\beta+\bar{t})}{2(1-\beta^2)^2} < 0 \quad when \quad 0 < t < \bar{t}$$

As the substitution parameter does not play a part in the reservation profits, it is straightforward that both π^{M*} and π^{R*} decrease with respect to β. ■

Equation (11) summarizes the different effects of an increase in NTBs (β decreases) in the vertical structure net surplus.

$$(11) \qquad \underbrace{NS(\beta)}_{\uparrow} = \underbrace{[p^I - w(1+t)]q^I}_{\uparrow} + \underbrace{\underbrace{p^D q^D}_{\uparrow \text{ if } t<\check{t}} + \underbrace{wq^X}_{\downarrow \text{ if } t<\check{t}}}_{\uparrow \text{ if } t<\check{t}} - \underbrace{c\frac{(q^D+q^X)^2}{2}}_{=} - \underbrace{\pi^M}_{=} - \underbrace{\pi^R}_{=} \text{ where } \check{t} = \frac{1-\beta}{1+\beta^2}\,\bar{t} < \bar{t}$$

When the two products become more differentiated, the net surplus to be split in the vertical structure is greater. Both agents in the vertical structure are thus inclined to strengthen *non-tariff barriers*. The reduced competition between goods resulting from the domestic standard enforcement drives up the retailer's profits on the imported good. The

revenue effect of total production (domestic and exports) depends on the level of the import tax.

The domestic government gains on fiscal revenues as q^{I*} increases with NTBs. A policy aimed at the proliferation of NTBs is a way for the government to increase fiscal revenues all the easier since all agents in the economy will benefit from it. This result could explain why we observe the implementation of an increasing number of NTBs at national levels in high-income countries (see Beghin, [4] or Anders and Caswell, [1]).

4.3 Coupled trade policy reform

In previous decades, trade policy reform consisted, principally, in negotiating inter-state agreements on reducing tariff import taxes. However, this policy was not supported by local manufacturers, whereas the increase in NTBs benefits everyone in the economy. Therefore, this may explain why governments reinforce NTBs in order to back up a targeted decrease in import taxes. The remaining question is to know whether there exists a coupled trade policy reform that makes everyone better off?

Proposition 3. *There exist market conditions such that an import tax decrease and an increase in NTBs are supported by every agent.*

Proof: The following table summarizes each agent's profit variation according to the trade policy tool used.

Agent	**Decrease in the import tax**	**Increase in NTBs**	**Decrease in import tax and increase in NTBs ($\mathbf{t}\downarrow$ and $\boldsymbol{\beta}\downarrow$)**
Manufacturer	↘	↗	↗ if $\frac{\partial \mathrm{t}}{\partial \beta} > \frac{\bar{t}-t}{\beta\,(1-\beta^2)}$
Retailer	↗	↗	↗
Consumers	↗	↗	↗
Domestic State	↘ if initial tax $< \tilde{t}$ ↗ if initial tax $> \tilde{t}$	↗	↗ if $\frac{\partial \mathrm{t}}{\partial \beta} > \frac{t((1-\beta)\bar{t}+\beta t)}{(1-\beta^2)(\bar{t}-t)}$
Social Welfare	↗	↗	↗

Table 1. Variation in agents' profits with respect to t and β.

One can see that if $\frac{\partial \mathrm{t}}{\partial \beta} > Max\left\{\frac{\bar{t}-t}{\beta\,(1-\beta^2)}; \frac{t((1-\beta)\bar{t}+\beta t)}{(1-\beta^2)(\bar{t}-t)}\right\}$, then a coupled trade policy is Pareto-improving since reluctance about the decrease in tariffs can always be compensated for by higher *non-tariff barriers* in order to please the domestic State and the manufacturer. ■

5. Conclusion

This model reveals the potential conflict of interest between upstream and downstream firms by taking into account the vertical structure which would have remained in the shadow otherwise. A trade policy aiming to decrease the import tax will favor the reserve profit the retailer secures in his negotiation with the manufacturer on the domestic good. Moreover, the development of NTBs has mainly been justified by the improvement in market efficiency such as increased information on products in the case of labeling. Our model stresses the fact that, by strengthening the domestic standard, NTBs increase each agent's interest.

Another conclusion is that governments wanting to implement targeted tariff decreases may also increase NTBs in order to gain manufacturers' support and create a broad consensus within political forces.

There are however limits to this article's conclusions. One of them concerns downstream competition. In our framework, the retailer has a monopoly on both goods sold to consumers. This absence of competition makes the NTBs increase, resulting in a higher consumers' surplus since the retailer perfectly internalizes interbrand substitutatibility (prices unchanged). Taking into account retailers' competition could lead to higher prices when goods become less of a substitute, and thus to lower social welfare. It could jeopardize the broad consensus on the coupled policy trade reform. Moreover, it could also be thought that fiscal revenues may be used to pay for costly label implementation. A modification of the substitution parameter between products due to a strengthening of the domestic label may also impact on manufacturers' production costs, making them reluctant to support an increase in NTBs.

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APPENDIX A

Determination of the reservation profits

When the manufacturer and the retailer do not find an agreement on the wholesale price and the franchise fee, the retailer only proposes the imported good to consumers. In this case, the demand for the imported good is given by:[9]

$$q^I(+\infty, p^I) = (1+\alpha) - p^I$$

The manufacturer produces in order to equal marginal revenue to marginal cost, that is such that:

$$c'(q^*) = w \Leftrightarrow q^* = \frac{w}{c}$$

This production gives him a reservation profit equal to:

$$\underline{\pi}^M = \frac{w^2}{2c}$$

The retailer maximizes his profit:

$$\pi^R(p^I) = (p^I - w(1+t)) \cdot q^I(+\infty, p^I)$$

This leads him to set the price of the imported good to:

$$p^I(t) = \frac{1}{2}(1+\alpha+w(1+t))$$

achieving a reservation profit of $\underline{\pi}^R = \frac{1}{4}(1+\alpha-w(1+t))^2$.

The domestic government, recovering the import taxes, gets a fiscal revenue equal to:

$$\underline{G} = w \cdot t \cdot q^I = \frac{1}{2}wt(1+\alpha-w(1+t))$$

This fiscal revenue is positive as long as $w < \frac{1+\alpha}{1+t}$.

[9] The ∞ symbol is used to denote the absence of the domestic good, as if the domestic good price was so high that no consumer would buy it. This demand is found by replacing in (1) the price p^D by the limit price cancelling the q^D domestic demand: $p^D\text{lim} = (1-\beta)(1+\alpha) + \beta p^I$.

APPENDIX B

Cooperative Nash negotiation resolution

The joint objective function to be maximized is the one of an axiomatic Nash framework, that is, the gross surplus removed from the retailer and manufacturer's reserve profits. The net surplus to be maximized jointly is thus the one computed using equations (9) and (10). The program is:

$$\underset{p^I,p^D,q^X,q^D,q^I}{\text{Max}} = \left(p^I - w(1+t)\right)\cdot q^I(p^I,p^D) + p^D \cdot q^D(p^I,p^D)$$
$$-\frac{1}{4}(1+\alpha-w(1+t))^2 + w\cdot q^X - \frac{c}{2}[q^D(p^I,p^D)+q^X]^2 - \frac{w^2}{2c}$$

This leads to the following equilibrium:

$$p^{I*}(t) = \frac{1}{2}(1+\alpha+w(1+t)) \quad \text{and} \quad q^{I*}(\beta,t) = \frac{(1+\alpha)(1-\beta)-w(1+t-\beta)}{2(1-\beta^2)}$$
$$p^{D*}(t) = \frac{1}{2}(1+\alpha+w) \quad \text{and} \quad q^{D*}(\beta,t) = \frac{(1+\alpha)(1-\beta)-w\left(1-\beta(1+t)\right)}{2(1-\beta^2)}$$
$$q^{X*}(\beta,t) = \frac{1}{4}\left[\frac{4w}{c} - \frac{wt}{1-\beta} + \frac{w(2+t)-2(1+\alpha)}{1+\beta}\right]$$

The wholesale domestic price set by the manufacturer is fixed to the marginal cost, in order to avoid any quantity distortion within the domestic vertical structure. The total production of the manufacturer is given by $q^{D*}+q^{X*} = \frac{w}{c}$. Due to the manufacturer's quadratic cost structure, the marginal cost of the domestic product is, at the equilibrium:

$$w^{D*} = \frac{\partial c\cdot(q^D+q^{X*})}{\partial q^D} = c\cdot(q^D+q^{X*}) = w$$

The franchise fee F^D, paid by the retailer to the manufacturer, is then set to split the maximal equilibrium net surplus according to each agent bargaining power. It is defined such that:

$$(p^I - w(1+t))\cdot q^I(p^I,p^D) + (p^D-w^D)\cdot q^D(p^I,p^D) - F^D = (1-\gamma)\cdot NS^*(\beta,t) + \frac{1}{4}(1+\alpha-w(1+t))^2$$

where $NS^*(\beta,t) = \frac{(w+(1+\alpha)(1-\beta)+w(1+t)\beta)^2}{4(1-\beta^2)}$.