

“Buy Domestic” Campaigns and Optimal Tariffs

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This paper attempts to analyze the strategic use of optimal tariffs and to examine the effects of national bias on the optimal trade policy and social welfare in a two-country, two-good, price competition model derived from Neven et al. (1991). The major findings are as follows. (1) If all consumers prefer the domestic good, then “buy domestic” campaigns will decrease the prohibitive tariff rate and increase local welfare. (2) If at least some consumers prefer the foreign good, but not to a great extent, then “buy domestic” campaigns will not change the optimal tariff rate, but may improve local welfare. (3) When all consumers greatly prefer the foreign good, then promotion of “buy domestic” decreases the optimal tariff rate, but it cannot improve social welfare. With this framework, we also prove that “buy domestic” campaigns serve as a substitute for tariffs with respect to a strategic trade policy.

Keywords: product differentiation, ‘buy domestic’ campaigns, optimal tariffs, strategic trade policy.

JEL classification: F12, F13, D11.

1 Introduction

The effect of nation-biased consumer preferences on trade policy has received little attention in trade theory. Neven et al. (1991) pioneer the use of a two-country, two-firm, Bertrand price competition model to analyze effects of national bias on pricing and local welfare. Their framework can be extended to incorporate the optimal trade policy. Inspired by their work, this paper makes further inquiries into the effects of national bias on optimal trade policies such as tariffs.

In trade theory within a framework of imperfect competition, the imposition of tariffs on imports is often seen as a strategic means by

which the importing country's government maximizes its social welfare. There is an abundance of studies in the existing literature on the strategic use of tariffs, e.g., Brander and Spencer (1984), Dixit (1984), Eaton and Grossman (1986), and Collie (1991), yet the factor of national bias has not been incorporated into strategic trade policy studies. Furthermore, since "buy domestic" campaigns tend to protect domestic goods, they can be regarded as a trade policy instrument that implicitly reinforces or serves as a substitute for a tariff. Under the WTO framework, the strategic use of tariffs is severely restricted. One could, then, ask whether the "buy domestic" campaign is an effective substitute for a tariff as a strategic trade policy instrument.

In the U.S., "Buy American" campaigns have been promoted by the government and/or interest groups for a long period of time. Throughout the 20th century, the U.S. has been a major supporter of free trade, while calls for trade protectionism have never ceased. Ever since the *Buy American Act* of 1933, the U.S. government has had a statutory policy of preferring to procure domestically-produced goods over foreign goods. However, trade agreements between the U.S. and many other countries have given rise to many exceptions to the *Buy American Act* and have made it difficult for the U.S. government to apply the act in a straight-forward way (Janik and McConville, 1992; McKenna and Cuneo, L.L.P., 1998). Many U.S.-made products also have labels on them to encourage patriotic consumption behavior, and private advertisements in the mass media also promote the image of U.S. products (Frank, 1999).

The existing literature on marketing has taken note of the national bias factor in consumption decisions. S. Bilkey and Nes (1982) initiated a theoretical study of this issue. Many empirical studies support the theory that national bias is a key factor in consumption decisions. For instance, Johanson and Thorelli (1985) find that U.S. car buyers' behavior is explained not only by the characteristics of cars, but also by the country of origin.

There are two cases where national bias exists. One is the "buy domestic" mentality that implies that consumers prefer domestic goods to foreign goods. The other is the "buy foreign" mentality, implying that consumers prefer foreign goods to domestic goods. We can easily find evidence for these two mentalities in the real world. Bannister and Saunders (1978) find that U.S. consumers usually consider goods made in the U.S. to be the best, while Ashworth et al. (1982) argue that the prices of U.K.-made cars are usually higher than those of Belgium-made cars in the U.K. market, because

of loyalty to British products. Extending beyond patriotism, these “buy domestic” campaigns often serve as protectionist measures designed to safeguard domestic firms’ market shares as well as local job opportunities. In other examples, some consumers subjectively consider foreign goods, such as Japanese or German products, to be very well made. More general is the case that some consumers in a country prefer domestic goods while the other consumers prefer foreign goods.

To our knowledge, the effect of national bias on an optimal trade policy has not been discussed in the existing literature. This paper is an attempt to incorporate the national bias factor into trade policy theory with imperfect competition. We discuss the effects of “buy domestic” and “buy foreign” mentalities on an optimal trade policy. Moreover, we also analyze the effect of promoting a “buy domestic” mentality on the optimal tariff and social welfare.

This paper is organized as follows: Section 2 presents the basic model. We extend the Neven et al. (1991) model in order to analyze the optimal tariff. Section 3 discusses the optimal tariff when consumer preferences differ and when the “buy domestic” campaigns on the optimal tariff and local welfare are taken into account. Section 4 concludes this paper.

2 The Basic Model

Assume there are two countries, the home country (h) and the foreign country (f), where the foreign country exports all of its output to the home country, and each has one firm producing a homogeneous good. Both firms have the following cost functions: $C_i = F_i + m_i Q_i$, $i = h, f$. The notations F_i , m_i , and Q_i represent the fixed cost, marginal cost, and the output quantity of firm i , respectively. Without losing generality, we assume that the two firms have identical production technology and normalize F and m to zero.

We assume that every domestic consumer buys one unit of the good; that is, the reservation price of every consumer will be higher than the equilibrium price of the two firms.¹ This price competition model is

¹ Due to higher income, many home electronics have prices lower than the buyer’s reservation utility. For example, almost every family has a TV set in most developing and developed countries. However, most families have only one TV set since more TV sets will not increase their utilities. Therefore, the assumption that every consumer must exactly buy one unit of the product is valid for many markets.

plausible as international product competition becomes more intense due to the removal of trade barriers under the WTO system. Here, a consumer is concerned with both price and country of origin.

We use the parameter θ to measure the difference in the domestic consumer preferences for domestic and foreign goods. The prices of the domestic and foreign goods are, respectively, p_h and p_f . The utility function of a domestic consumer is as follows:²

$$U = \begin{cases} s - p_h + \theta, & \text{if the consumer buys the domestic good,} \\ s - p_f, & \text{if the consumer buys the foreign good,} \end{cases} \quad (1)$$

where s represents the consumer's utility of consuming a unit good. Here we assume that the preferences for the foreign commodity are the same, but the preferences for the domestic commodity are different. If the consumer buys the domestic good, then it brings the consumer an extra utility θ . If $\theta > (<)0$, then the consumer prefers the domestic (foreign) good to the foreign (domestic) good. Under the same domestic and foreign prices, $p_h = p_f$, the consumer will choose the domestic (foreign) good since it brings him an extra positive (negative) utility.

We assume that θ lies in $[\underline{\theta}, \bar{\theta}]$ and that it follows a uniform distribution; that is, the domestic consumer preferences are between $\underline{\theta}$ and $\bar{\theta}$. The average and the variance of consumer preference demand θ are $\mu = (\bar{\theta} + \underline{\theta})/2$ and $\sigma^2 = (\bar{\theta} - \underline{\theta})^2/12$, respectively. When $\bar{\theta}$ and $\underline{\theta}$ are both positive (negative), all domestic consumers prefer the domestic (foreign) good to the foreign (domestic) good. These two cases are referred to as 'vertical product differentiation' in the existing literature. When $\underline{\theta} \leq 0 \leq \bar{\theta}$, some of the domestic consumers prefer the domestic good and part of them prefer the foreign good. This case is referred to as "horizontal product differentiation".³

2 This type of utility function is widely used in the existing literature, e.g., Neven et al. (1991), Aderson et al. (1992), etc. Another type of utility function is $U = \theta q_h - p_h$ if the consumer buys this product (Wauthy, 1996), where q_h and p_h represent the quality and price of this product respectively and θ is the taste parameter for quality to consumers. However, these two types of utility functions will lead to the same qualitative results.

3 For this definition, please refer to Phlips and Thisse (1982) and Neven (1986).

We define that the consumer with preference type $\hat{\theta}$ is indifferent to either the domestic or the foreign good. Hence, the relationship between the equilibrium prices of domestic and foreign firms is:

$$p_h - \hat{\theta} = p_f \quad \text{or} \quad \hat{\theta} = p_h - p_f. \quad (2)$$

After normalizing the number of domestic consumers to 1, the demands for domestic and foreign goods become:⁴

$$D_h = \frac{\bar{\theta} - \hat{\theta}}{\bar{\theta} - \underline{\theta}}, \quad D_f = \frac{\hat{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}}. \quad (3)$$

Moreover, the home country's government imposes a unit tax t on the foreign goods. The profits of the domestic and foreign firms can be expressed as

$$\pi_h = p_h \frac{\bar{\theta} - \hat{\theta}}{\bar{\theta} - \underline{\theta}} = \frac{p_h}{\bar{\theta} - \underline{\theta}} (\bar{\theta} - p_h + p_f), \quad (4)$$

$$\pi_f = (p_f - t) \frac{\hat{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} = \frac{p_f - t}{\bar{\theta} - \underline{\theta}} (p_h - p_f - \underline{\theta}). \quad (5)$$

The basic model is a two-stage game. In the first stage, the domestic government chooses the optimal tariff. In the second stage, the two firms engage in Bertrand competition. We then use the solution concept of the subgame perfect Nash equilibrium and follow backward induction to solve this game.

The Nash equilibrium price (p_h^*, p_f^*) must satisfy the condition: $\pi_i(p_i^*, p_{-i}^*) \geq \pi_i(p_i, p_{-i}^*)$, $\forall p_i \geq 0$, $i = h, f$. Given the distribution of consumer preferences and the tariff rate, we obtain the Nash equilibrium prices by maximizing the firms' profits. The Nash equilibrium prices are summarized in Table 1.⁵

The tariff rate affects the existence of an interior solution for Bertrand competition: if the tariff rate is too high (low), then the foreign firm may

4 We do not discuss the case under $\bar{\theta} = \underline{\theta}$ in the text that follows. That is, we assume that the preferences of consumers cannot be all the same.

5 In Neven et al. (1991), t is the per unit transportation cost. In this paper, t is the tariff rate. Here the regions for the Nash equilibria are quite similar to those in Neven et al. (1991).

Table 1. Nash equilibrium prices under regions of the tariff rate

Region of the tariff rate	The Nash equilibrium prices of domestic and foreign firms	Market structure
(I) $t \geq \bar{\theta} - 2\underline{\theta}$	$p_h = t + \underline{\theta}$ $p_f = t$	The domestic firm monopolizes the domestic market and the foreign firm is a potential competitor
(II) $\bar{\theta} - 2\underline{\theta} > t > \underline{\theta} - 2\bar{\theta}$	$p_h = \frac{2\bar{\theta} - \underline{\theta} + t}{3}$ $p_f = \frac{\bar{\theta} - 2\underline{\theta} + 2t}{3}$	The domestic market structure is a duopoly of domestic and foreign firms
(III) $\underline{\theta} - 2\bar{\theta} \geq t$	$p_h = 0$ $p_f = -\bar{\theta}$	The foreign firm monopolizes the domestic market and the domestic firm is a potential competitor

exit from (monopolize) the domestic market. With respect to Region (I) in Table 1, the foreign firm's price p_f is equal to the tariff rate t . The profit and output quantity of the foreign firm are both zero and thus it has no incentive to export to the domestic market. Therefore, the value $\bar{\theta} - 2\underline{\theta}$ is a prohibitive tariff rate. Under Region (III) in Table 1, since the profit of the domestic firm is zero, the domestic firm exits the market and the foreign firm becomes a monopoly.⁶ In Region (II) in Table 1, the domestic and foreign firms will form a duopoly in the domestic market.

Since $\mu = (\bar{\theta} + \underline{\theta})/2$ and $\sigma^2 = (\bar{\theta} - \underline{\theta})^2/12$, we have $\bar{\theta} = \mu + \sqrt{3}\sigma$ and $\underline{\theta} = \mu - \sqrt{3}\sigma$. Next we discuss the effect of a consumer-specific evaluation of the good on market structure. To make a comparison with the effect under a positive tariff rate, we first illustrate the case where there is no tariff ($t = 0$).

When $t = 0$, because $\bar{\theta} - 2\underline{\theta} = -\mu + 3\sqrt{3}\sigma$ and $\underline{\theta} - 2\bar{\theta} = -\mu - 3\sqrt{3}\sigma$, we then know from Table 1 that when $\bar{\theta} - 2\underline{\theta} \leq 0$ (i.e.,

⁶ Regardless of whether the foreign or domestic firm monopolizes the market, neither is able to set up the monopoly price. This is because the firm that exits the market becomes a potential entrant.

$\sigma \leq \mu/3\sqrt{3}$) the domestic firm will monopolize the market. Since $\bar{\theta} - 2\underline{\theta} \leq 0$ and $\bar{\theta} > \underline{\theta}$, this situation will only occur if all of the consumers prefer the domestic goods to the foreign goods (i.e., $\underline{\theta} > 0$).

When $\underline{\theta} - 2\bar{\theta} \geq 0$ (i.e., $\sigma \leq -\mu/3\sqrt{3}$), the foreign firm will monopolize the market. Since $\underline{\theta} - 2\bar{\theta} \geq 0$ and $\bar{\theta} > \underline{\theta}$, this situation will occur only if all of the consumers prefer the foreign good to the domestic good (i.e., $\bar{\theta} \leq 0$). Figure 1a describes this market structure, where $D(F)$ indicates the case when the domestic (foreign) firm monopolizes the market and DF indicates the duopoly case. Figure 1b depicts the cases with a positive tariff rate.

“All of the domestic consumers prefer the domestic (foreign) good” is not, however, a sufficient condition for the domestic (foreign) firm to monopolize the domestic market. It is easy to see from Fig. 1a that quadrant I (III) indicates that all consumers prefer the domestic (foreign) good, while quadrant II indicates that some of the consumers prefer the domestic good and the others prefer the foreign good. The domestic and foreign firms can co-exist in the domestic market (as notated by DF) even in quadrant I or III. The imposition of a tariff on the foreign good will not change the basic principles mentioned above, because a tariff increases the cost to the foreign firm and, hence, increases (decreases) the possibility of the domestic (foreign) firm to monopolize the market.

From the above analysis, we know that both domestic and foreign firms can monopolize the market only if the variance of consumer preferences is not too large. When the variance of consumer preferences is very large,

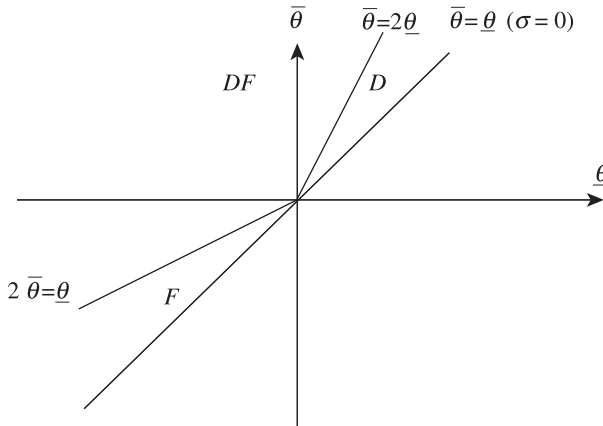


Fig. 1a. The market structure under a zero tariff rate

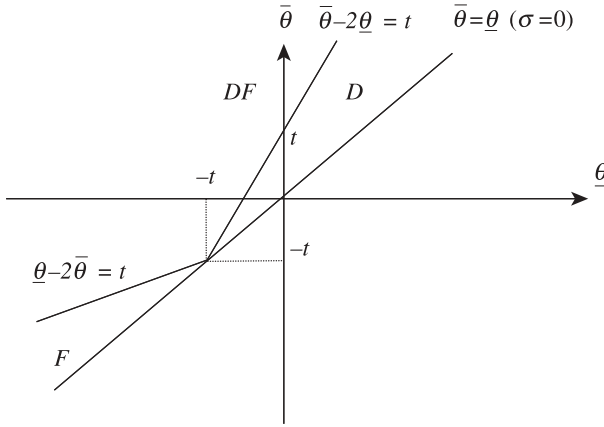


Fig. 1b. The market structure under a positive tariff rate

then even if all consumers prefer the domestic (foreign) good, the domestic (foreign) firm is still not able to monopolize the market, because the difference in consumer preferences results in a product differentiation effect. When the variance in the case for consumer preferences becomes larger (smaller), it is more (less) likely that the two firms will remain in the domestic market.

In summary, whether or not the two firms can co-exist in the domestic market depends not only on the direction of consumer preferences, but also on the variance of consumer preferences. Understanding how the variance of consumer preferences affects market structure can help us analyze optimal tariffs. This will be dealt with in the next section.

3 Optimal Tariffs

In this section, we analyze the first stage of the game, i.e., the optimal tariff chosen by the home country's government. Furthermore, in order to find the effect of "buy domestic" campaigns on the optimal tariff, we explicitly express the optimal tariff in terms of the domestic consumer preferences. With this framework, we will prove that "buy domestic" campaigns serve as a substitute for tariffs with respect to strategic trade policy.

The goal of the home country's government is to seek a tariff rate in order to maximize domestic welfare. The welfare function (W), defined as

the sum of consumers’ surplus arising from consumption of the domestic and foreign goods, the domestic firm’s profit, and the tariff revenue, is

$$W = \left[\int_{\underline{\theta}}^{\hat{\theta}} (s - p_f) \frac{1}{\bar{\theta} - \underline{\theta}} d\theta + \int_{\hat{\theta}}^{\bar{\theta}} (s - p_h + \theta) \frac{1}{\bar{\theta} - \underline{\theta}} d\theta \right] + p_h \frac{\bar{\theta} - \hat{\theta}}{\bar{\theta} - \underline{\theta}} + t \frac{\hat{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}}. \quad (6)$$

In order to solve for the optimal tariff, we assume that the domestic market structure is that of a duopoly as in Case (II) in Table 1. Accordingly, we substitute the Nash equilibrium prices p_h and p_f under Case (II) in Table 1 into the local welfare function W (Eq. (6)). From the first-order condition $\partial W / \partial t = 0$, we have $t = \bar{\theta} - \underline{\theta}$ (see Appendix 1). Since we are dealing with a duopoly, the optimal tariff must satisfy the conditions for Case (II) in Table 1; that is, $\bar{\theta} - 2\underline{\theta} > t > \underline{\theta} - 2\bar{\theta}$. Provided that the optimal tariff does not satisfy Case (II) in Table 1, then the market structure cannot be a duopoly and we must further examine the cases in which either the domestic or the foreign firm is a monopoly.

- (1) When $\bar{\theta} > \underline{\theta} \geq 0$, the condition $\bar{\theta} - 2\underline{\theta} > t = \bar{\theta} - \underline{\theta}$ is contradicted. Here, the domestic firm monopolizes the market since the foreign firm always exits the market whenever the tariff rate is larger than $\bar{\theta} - 2\underline{\theta}$.⁷ It follows from (6) that the welfare is a constant value $s + [(\bar{\theta} + \underline{\theta})/2]$ and, as long as the tariff rate is not so high as to make the market price higher than the consumers’ reserved price, all values of $t > \bar{\theta} - 2\underline{\theta}$ can be considered as an optimal tariff. As a consequence, $\hat{\theta} = \underline{\theta}$, $p_h = t + \underline{\theta} = \pi_h$, $p_f = t$, and $\pi_f = 0$.
- (2) When $\bar{\theta} \geq 0 \geq \underline{\theta}$, the condition for an interior solution, $\bar{\theta} - 2\underline{\theta} > \bar{\theta} - \underline{\theta} \geq \underline{\theta} - 2\bar{\theta}$, must hold. Therefore, the two firms co-exist in the domestic market. In this case, the optimal tariff is $t = \bar{\theta} - \underline{\theta}$; and thus, $\hat{\theta} = 2\underline{\theta}/3 \in [\underline{\theta}, \bar{\theta}]$, $p_h = (3\bar{\theta} - 2\underline{\theta})/3$, and $p_f = (3\bar{\theta} - 4\underline{\theta})/3$.
- (3) When $0 \geq \bar{\theta} > \underline{\theta}$, the condition for an interior solution may or may not hold. If $\underline{\theta} - 2\bar{\theta} \geq \bar{\theta} - \underline{\theta}$ holds, then there is an interior solution.

⁷ Note that the term $\bar{\theta} - 2\underline{\theta}$ can be negative. In this case, the foreign firm will not enter the domestic market even if the home country’s government subsidizes the foreign firm.

The condition $\bar{\theta} - \underline{\theta} \geq \underline{\theta} - 2\bar{\theta}$ can be written as $t = \bar{\theta} - \underline{\theta}$. That is, when $3\bar{\theta} \geq 2\underline{\theta}$, the two firms become a duopoly in the market. In this case the optimal tariff is $t = \bar{\theta} - \underline{\theta}$, and the equilibria are the same as those in Case (2). Otherwise, when $\bar{\theta} - \underline{\theta} < \underline{\theta} - 2\bar{\theta}$ (i.e., $3\bar{\theta} < 2\underline{\theta}$), an interior solution does not exist. The foreign firm monopolizes the market instead. In that case, the domestic welfare is composed of the consumer surplus from consuming the foreign good, $s + \bar{\theta}$, and tariff revenue, t ; that is $W = (s + \bar{\theta}) + t$. As a result, the higher the tariff revenue is, the higher will the welfare level be. However, if the tariff rate goes up to $\underline{\theta} - 2\bar{\theta}$, then the domestic firm will enter the market and the two firms will form a duopoly. The optimal tariff rate in this region is $t = \underline{\theta} - 2\bar{\theta}$; and thus, $\hat{\theta} = \bar{\theta}$, $p_h = 0 = \pi_h$, $p_f = -\bar{\theta}$, and $\pi_f = \bar{\theta} - \underline{\theta} > 0$.

Based on the above discussion, we obtain the following proposition:

Proposition 1: The optimal tariff of the home country's government (t) is: (1) $t =$ any value exceeding $\bar{\theta} - 2\underline{\theta}$, if $\bar{\theta} > \underline{\theta} \geq 0$;
 (2) $t = \bar{\theta} - \underline{\theta}$, if (i) $\bar{\theta} \geq 0 \geq \underline{\theta}$ or (ii) $0 \geq \bar{\theta} > \underline{\theta}$ and $3\bar{\theta} \geq 2\underline{\theta}$;
 (3) $t = \underline{\theta} - 2\bar{\theta}$, if $0 \geq \bar{\theta} > \underline{\theta}$ and $3\bar{\theta} < 2\underline{\theta}$.

Proposition 1 provides us with the following insights.

- (1) Even if all of the consumers prefer the domestic good ($\bar{\theta} \geq \underline{\theta} \geq 0$), then it is still possible for both domestic and foreign firms to co-exist in the market as long as there is no tariff (see Fig. 1a). We find that if the government of the home country should impose a prohibitive tariff $t \geq \bar{\theta} - 2\underline{\theta}$, then the domestic firm monopolizes the market, because consumers will have an extra positive utility from consuming the domestic good. Moreover, by forcing the foreign firm to stay out of the market, the domestic firm's profit will either increase or not change. These two effects dominate the loss in tariff revenue. Therefore, any tariff rate higher than the prohibitive tariff rate is optimal.⁸

⁸ When the tariff rate is higher than the prohibitive tariff, if it goes up, the price of the domestic commodity rises, and the decrease in consumer surplus equals the increase in the domestic firm's profit. Hence, the domestic welfare level remains the same.

- (2) If (i) some of the consumers prefer the domestic good ($\bar{\theta} \geq 0 \geq \underline{\theta}$), or (ii) all of the consumers prefer the foreign good ($0 \geq \bar{\theta} \geq \underline{\theta}$) and the variance of consumer preferences is very large ($3\bar{\theta} > 2\underline{\theta}$), then the optimal tariff is $t = \bar{\theta} - \underline{\theta}$. When the variance in the case of consumer preferences ($\bar{\theta} - \underline{\theta}$ or σ^2) becomes larger, then the optimal tariff will increase. An increase in the variance of consumer preferences reflects an increase in the differentiation of goods and an increase in the market power of firms. Therefore, in order to achieve the effect of profit shifting, the optimal tariff increases with the variance of consumer preferences.
- (3) When all of the consumers prefer the foreign good ($0 \geq \bar{\theta} \geq \underline{\theta}$) and the variance of consumer preferences is not very large ($3\bar{\theta} \leq 2\underline{\theta}$), then the foreign firm will monopolize the market provided there is no tariff. Regardless of whether the home country's government imposes a tariff, in this case the price of the foreign good is always $p_f = -\bar{\theta}$ and is independent of the tariff rate. Therefore, the best response of the home country's government is to increase the tariff rate in order to increase tariff revenue. Nevertheless, when all consumers prefer the foreign good ($\bar{\theta} < 0$), the entry of the domestic firm due to a high tariff rate will decrease the consumer surplus. The optimal tariff is, hence, the critical value that shows that the domestic firm has an incentive to enter the market; that is, $t = \underline{\theta} - 2\bar{\theta}$.

The optimal tariff, indeed, depends crucially on domestic consumer preferences such that the optimal tariff will change when the distribution of domestic consumer preferences changes. If the home country's government and interest groups can promote consumer preferences towards the domestic goods through “buy domestic” campaigns, then the corresponding optimal tariff rate will decrease. The WTO framework restricts the strategic use of a tariff policy, structuring a global trend to reduce tariff rates. “Buy domestic” campaigns can decrease the optimal tariff rate in order to adapt to the international trend of tariff cutting.

We can now discuss the effect of “buy domestic” campaigns on the optimal tariff and on domestic social welfare. Here we treat “buy domestic” campaigns as an exogenous variable and do not incorporate a discussion on why and how the home country's government undertakes such a policy. “Buy domestic” campaigns imply that the home country's government and/or interest groups enhance consumer preferences, that is,

the average consumer preference for the domestic good μ increases with constant variance for the domestic good by means of certain instruments such as advertisements.⁹

Substituting $\bar{\theta} = \mu + \sqrt{3}\sigma$ and $\underline{\theta} = \mu - \sqrt{3}\sigma$ into Proposition 1 gives the optimal tariff in terms of μ and σ as:

Corollary 1: The optimal tariff of the home country's government (t) is:

- (1) t can be any value exceeding $-\mu + 3\sqrt{3}\sigma$, if $\mu > \sqrt{3}\sigma$;
- (2) $t = 2\sqrt{3}\sigma$, if $-5\sqrt{3}\sigma \leq \mu \leq \sqrt{3}\sigma$;
- (3) $t = -\mu - 3\sqrt{3}\sigma$, if $\mu < -5\sqrt{3}\sigma$.

Figure 2 depicts the relationship between the expected domestic consumer preference and the optimal tariff rate. Figure 3 summarizes the relationship between the expected domestic consumer preference and domestic social welfare.

From Figs. 2 and 3, we observe the following results:

- (1) For $\mu > \sqrt{3}\sigma$ (corresponding to Case (1) in Proposition 1), since all consumers prefer the domestic good and the home country's government imposes a prohibitive tariff rate, the domestic firm becomes a monopoly.

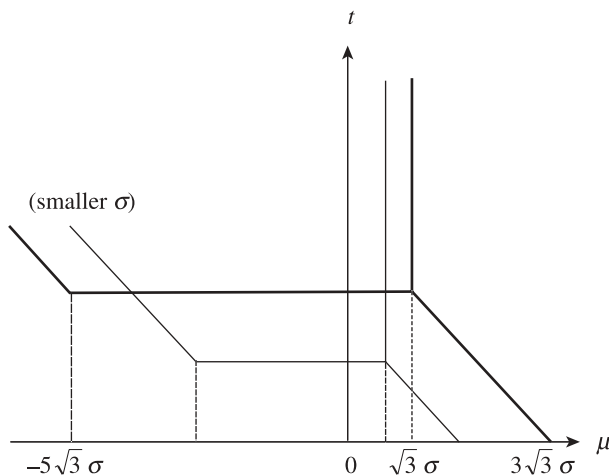


Fig. 2. The expected domestic consumer preference and optimal tariff rate

⁹ By contrast, we can also study the impact of an increase in the variance of the distribution while keeping the mean constant, see Neven et al. (1991, p. 8).

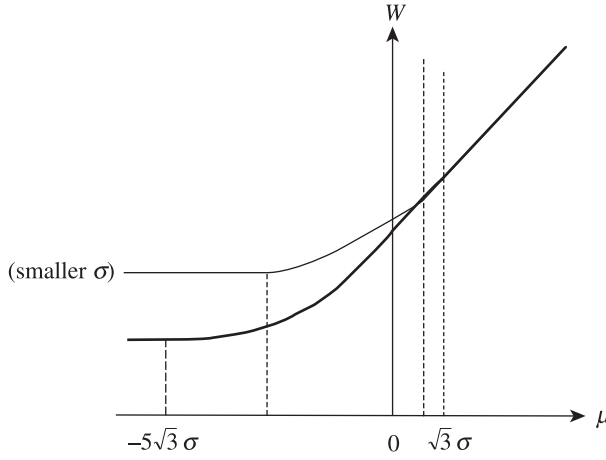


Fig. 3. The expected domestic consumer preference and domestic social welfare

Hence, “buy domestic” campaigns decrease the tariff rate to deter the foreign entrant, i.e., the prohibitive tariff rate becomes lower. Local welfare strictly increases with preferences for the domestic good, implying that even if the tariff rate is lower due to WTO requirements or to a trade agreement, the entry barrier for the foreign firm is still there, as a result of the “buy domestic” mentality.

(2) For $-5\sqrt{3}\sigma \leq \mu \leq \sqrt{3}\sigma$ (Case (2) in Proposition 1), some consumers prefer the foreign good and the domestic market structure is a duopoly. Here, “buy domestic” campaigns will not change the optimal tariff rate, but will increase the domestic firm’s market share and local welfare.

Because the optimal tariff is $2\sqrt{3}\sigma$ and is independent of μ , as long as some of the consumers prefer the foreign good ($\underline{\theta} < 0$; that is, $\mu < \sqrt{3}\sigma$), the optimal tariff will not change even if the average consumer preference for the domestic good (μ) increases. If we express the welfare function $W(\theta)$ in Eq. (6) in terms of μ and σ in order to solve for the optimal tariff rate, then we can explicitly derive four effects of an increase in μ on the optimal tariff rate (see Appendix 2): (i) The marginal “buy domestic” consumer surplus as a result of increasing the tariff rate, remains unchanged with μ ; that is, $d(dCS_h/dt)/d\mu = 0$. (ii) The marginal “buy foreign” consumer surplus by increasing the tariff rate rises with μ , that is, $d(dCS_f/dt)/d\mu = 1/9 > 0$. (iii) The marginal domestic firm’s profit by increasing the tariff rate rises with μ , that is, $d(d\pi_h/dt)/d\mu = 2/9 > 0$.

(iv) The marginal tariff revenue as a result of increasing the tariff rate rises with μ , that is, $d(dR/dt)/d\mu = -1/3 < 0$ where $R \equiv t(\hat{\theta} - \underline{\theta})/(\bar{\theta} - \underline{\theta})$ is the tariff revenue. These four effects counter-balance each other, and, as a result, the domestic welfare does not change with an increase in the average preference for the domestic good.

(3) For $\mu < -5\sqrt{3}\sigma$ (Case (3) in Proposition 1), all consumers prefer the foreign good and the foreign firm monopolizes the domestic market. Thus, “buy domestic” campaigns decrease the optimal tariff rate, but neither the domestic firm’s market share nor local welfare increase.

Note that the result in Case (2) (the optimal tariff rate is independent of μ) is sensitive to the model set-up: If we give unequal weights to the components in the social welfare function, including the consumer surplus, the domestic firm’s profit, and tariff revenue, then the optimal tariff rate will be affected by μ . For example, provided that the government is concerned only with consumer surplus and tariff revenue, the optimal tariff rate is $t = -(\bar{\theta} + \underline{\theta})/5 = -2\mu/5$ ($< \bar{\theta} - \underline{\theta} = 2\sqrt{3}\sigma$), that is, the home country’s government will impose a lower tariff rate if it does not take the domestic firm’s profit into account. On the other hand, provided that the home country’s government is concerned only with the domestic firm’s profit and tariff revenue, the optimal tariff rate is $t = 7\bar{\theta}/4 - 2\underline{\theta} = -(\mu - 45\sqrt{3}\sigma)/4$ ($> -\underline{\theta} = 2\sqrt{3}\sigma$), that is, the home country’s government will impose a higher tariff rate if it does not take the consumer surplus into account. Summarizing, the reason why the optimal tariff rate under Case (2) in Corollary 1 ($t = \bar{\theta} - \underline{\theta} = 2\sqrt{3}\sigma$) is not affected by consumer preferences is due to the offset of multiple forces.

From the above discussion, we arrive at the following proposition:

- Proposition 2:* “Buy domestic” campaigns (1) cannot increase local welfare, when domestic consumers greatly prefer the foreign good ($\mu < -5\sqrt{3}\sigma$);
- (2) increase local welfare to a lesser degree when some consumers prefer the foreign good;
 - (3) increase local welfare to a higher degree when all consumers prefer the domestic good.

Moreover, it is worth further discussing the influence of a change in the consumer preferences’ variance on the optimal tariff. “Buy domestic” campaigns cannot only promote consumer preferences toward domestic

products but also make consumer preferences relatively uniform. We draw a thinner line in Figs. 2 and 3, respectively, to represent the case of relatively uniform consumer preferences (a smaller σ). For example, let us focus on the duopoly case, in which both firms coexist in the domestic market (Case (2) in Proposition 1). As shown in Fig. 2, when “buy domestic” campaigns make consumer preferences relatively uniform (a smaller σ), the optimal tariff rate will drop. Figure 3 then shows that this will definitely increase domestic welfare. Therefore, “buy domestic” campaigns are indeed an effective measure to circumvent WTO pressures.

4 Concluding Remarks

This paper is an attempt to find the effect of national bias on an optimal trade policy and on social welfare in a two-country, two-firm, Bertrand competition model. It also proves that “buy domestic” campaigns serve as a substitute for traditional strategic trade policy instruments, such as tariffs.

The optimal tariff of the importing country has the following properties. (1) When all domestic consumers prefer the domestic good, the optimal tariff is a prohibitive tariff rate and the domestic firm monopolizes the domestic market. (2) When all domestic consumers greatly prefer the foreign good, it is very easy for the foreign firm to monopolize the domestic market. The tariff rate should be as high as possible, but it should not be so high such that the domestic firm has an incentive to enter the market. (3) When at least some domestic consumers prefer the foreign good, but do not greatly prefer it, the optimal tariff will induce the two firms to co-exist in the market. Accordingly, the higher the variance of preferences is, the higher will the optimal tariff be.

The effects of “buy domestic” campaigns on the optimal tariff and the social welfare level are as follows. (1) When all consumers greatly prefer the foreign good, promoting the “buy domestic” mentality decreases the optimal tariff, but it cannot improve social welfare. (2) If at least some consumers prefer the foreign good, but not greatly, then “buy domestic” campaigns will not change the optimal tariff, but may improve local welfare. (3) If all consumers prefer the domestic good, then “buy domestic” campaigns decrease the prohibitive tariff rate and increase local welfare. This implies that even if the tariff rate is lower due to WTO requirements or a trade agreement, then the entry barrier for the foreign firm is still there, because of the “buy domestic” mentality.

If “buy domestic” campaigns could also make consumer preferences more uniform, the optimal tariff rate may drop and domestic welfare may increase. Therefore, “buy domestic” campaigns are, indeed, an effective measure to circumvent WTO pressures.

An immediate extension of this paper would be to consider a Cournot quantity competition model. More trade policy instruments could be considered under a national bias framework, e.g., export subsidies and quotas. A combination of both consumer and firm behavior would make trade theory more complete.

Appendix 1

Substituting p_h, p_f , and $\hat{\theta} = p_h - p_f = (\bar{\theta} + \underline{\theta} - t)/3$ under Region (II) in Table 1 into the domestic welfare function (W) in Eq. (6), we have:

$$\begin{aligned} W &= \frac{1}{\bar{\theta} - \underline{\theta}} \left[\left(s - \frac{2\bar{\theta} - \underline{\theta} + t}{3} \right) \left(\frac{2\bar{\theta} - \underline{\theta} + t}{3} \right) \right. \\ &\quad + \frac{1}{2} \left(\frac{2\bar{\theta} - \underline{\theta} + t}{3} \right) \left(\frac{4\bar{\theta} + \underline{\theta} - t}{3} \right) \\ &\quad + \left(s - \frac{\bar{\theta} - 2\underline{\theta} + 2t}{3} \right) \left(\frac{\bar{\theta} - 2\underline{\theta} - t}{3} \right) \Big] \\ &\quad + \frac{1}{\bar{\theta} - \underline{\theta}} \left(\frac{2\bar{\theta} - \underline{\theta} + t}{3} \right)^2 + \frac{t}{\bar{\theta} - \underline{\theta}} \left(\frac{\bar{\theta} - 2\underline{\theta} - t}{3} \right) \\ &= s + \frac{1}{6(\bar{\theta} - \underline{\theta})} (2\bar{\theta}^2 - 3\underline{\theta}^2 + 2\bar{\theta}\underline{\theta} - t^2 + 2t\bar{\theta} - 2t\underline{\theta}). \end{aligned}$$

The first-order condition for local welfare maximization is

$$\frac{dW}{dt} = \frac{1}{3(\bar{\theta} - \underline{\theta})} (-t + \bar{\theta} - \underline{\theta}) = 0.$$

Therefore, the optimal tariff is $t = \bar{\theta} - \underline{\theta}$. □

Appendix 2

Let us express the domestic welfare function (W) in terms of μ and σ^2 , using the equalities that $\underline{\theta} = \mu - 3\sqrt{3}\sigma$, $\bar{\theta} = \mu + 3\sqrt{3}\sigma$. Therefore, the domestic social welfare function which consists of four parts, is as follows:

$$\begin{aligned}
 W &= CS_h + CS_f + \pi_h + R \\
 &= \int_{\hat{\theta}}^{\bar{\theta}} (s - p_h + \theta) \frac{1}{\bar{\theta} - \underline{\theta}} d\theta \\
 &\quad + \int_{\hat{\theta}}^{\bar{\theta}} (s - p_f) \frac{1}{\bar{\theta} - \underline{\theta}} d\theta + p_f \frac{\bar{\theta} - \hat{\theta}}{\bar{\theta} - \underline{\theta}} + t \frac{\hat{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \\
 &= \left[\frac{1}{3} s \mu + 3\sqrt{3} s \sigma + \frac{1}{6} \mu^2 + \mu \sqrt{3} \sigma - \frac{27}{2} \sigma^2 - 2\sqrt{3} t \sigma + \frac{1}{3} s t - \frac{1}{6} t^2 \right] \\
 &\quad + \left[-\frac{1}{3} s \mu - \frac{1}{9} \mu^2 + 2\mu \sqrt{3} \sigma + \frac{1}{9} t \mu - \frac{1}{3} s t - t \sqrt{3} \sigma - \frac{2}{9} t^2 \right. \\
 &\quad \left. + 3\sqrt{3} s \sigma - 27 \sigma^2 \right] + \left[\frac{1}{3} \mu + 3\sqrt{3} \sigma + \frac{1}{3} t \right]^2 + t \left[-\frac{1}{3} \mu - \frac{1}{3} t + 3\sqrt{3} \sigma \right].
 \end{aligned}$$

Differentiating W with respect to t , we obtain:

$$\begin{aligned}
 \frac{dW}{dt} &= \left[-2\sqrt{3} \sigma + \frac{1}{3} s - \frac{1}{3} t \right] + \left[\frac{1}{9} \mu - \frac{1}{3} s - \sqrt{3} \sigma - \frac{4}{9} t \right] \\
 &\quad + \left[\frac{2}{9} \mu + 2\sqrt{3} \sigma + \frac{2}{9} t \right] + \left[-\frac{1}{3} \mu - \frac{2}{3} t + 3\sqrt{3} \sigma \right].
 \end{aligned}$$

The optimal tariff rate will be independent of μ , because

$$\begin{aligned}
 \frac{d\left(\frac{dW}{dt}\right)}{d\mu} &= \frac{d\left(\frac{dCS_h}{dt}\right)}{d\mu} + \frac{d\left(\frac{dCS_f}{dt}\right)}{d\mu} + \frac{d\left(\frac{d\pi_h}{dt}\right)}{d\mu} + \frac{d\left(\frac{dR}{dt}\right)}{d\mu} \\
 &= 0 + \frac{1}{9} + \frac{2}{9} - \frac{1}{3} = 0.
 \end{aligned}$$

□

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