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真品平行輸入之經濟分析

The Economic Analysis of Parallel Imports

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中英文摘要

1. 中文摘要

本研究計畫探討與真品平行輸入有關的兩個重要議題。一是真品平行輸入對於合法代理商訂價及行銷策略之影響，二是政府對於真品平行輸入之管制如何影響社會福利。本計畫發現，當政府改變對真品平行輸入的管制時，合法代理商行銷支出的變動會受其均衡策略之影響。若均衡時代理商的策略並不杜絕平行輸入之商品，則此時政府放寬對真品平行輸入的管制會使代理商增加其行銷支出。相對的，若均衡時代理商採用限價策略杜絕平行商品的輸入，則政府放寬對真品平行輸入的管制會使代理商減少其行銷支出。在福利政策方面，本計畫發現一般來說，政府放寬對真品平行輸入的管制可能增加也可能減少社會福利。計畫中並討論在哪些情況下放寬對真品平行輸入之管制可以提高社會福利。

關鍵詞：訂價策略、行銷策略、真品平行輸入、福利分析

2. 英文摘要

This project studies two important issues about parallel imports. First, how parallel imports affect pricing and advertising strategies of authorized dealers who sell legitimate items. Second, how regulation on parallel imports will affect social welfare. We find that an authorized dealer may either increase or decrease advertising expenses when the law becomes more favorable to parallel imports; he will increase advertising expenses if there is a gray market in equilibrium, and he will reduce advertising expenses if he engages in limit pricing in equilibrium. We also find that loosening restrictions on parallel imports may either increase or decrease social welfare. Conditions under which loosening restrictions on parallel imports can raise welfare are identified.

Keywords: pricing, advertising, parallel import, welfare analysis

一、報告內容: 前言、研究目的與文獻整理請參考 Introduction 一節。研究方法請參考 The Model 一節。結果分析與討論請參考 The Analysis of the Model、Welfare Analysis、An Example 與 Concluding Remarks 等四節。

1. Introduction

Parallel imports, or gray market products, are not counterfeit. They are legitimately-produced items intended by the manufacturer for another territory. This paper studies two important issues about parallel imports. First, how parallel imports affect pricing and advertising strategies of authorized dealers who sell legitimate products. Authorized dealers often claim that parallel imports reduce their incentives to advertise. They also want the public to believe that they will not lower the prices of the legitimate items as a response to the competition of gray items. For example, in 1998, Australia relaxed its laws against parallel imports. Reebok responded by warning that it would reduce its advertising and sports sponsorship. It said: “We're not going to continue to market a brand for someone else to benefit from.” At the same time, the recorded music industry in Australia warned: “the price of retail CDs in Australia will not fall if parallel imports are permitted”. We will verify whether these claims hold under a general setting.

The second issue we investigate is how parallel imports should be regulated. It seems that different countries have different regulation on parallel imports. In 1998, the U.S. Supreme Court held that, under the first sale doctrine, parallel imports could not be restrained under copyright law. It is argued that, by the first sale doctrine, a manufacturer that sells an item cannot restrict the buyer from re-selling it except in a few specific ways. However, in the same year, the European Court of Justice held that parallel imports could be restrained under the European Trade Mark Directive. To see which kinds of policy can result in higher welfare, this paper studies the welfare effects of the regulation on parallel imports.

As to the literature, most papers that discuss parallel imports considered pricing and advertising decisions separately. One stream of research focused on the conditions under which price discrimination through parallel imports would raise the manufacturer's profit and social welfare (Malueg and Schwartz 1994; Papadopoulos 2000; and Ahmadi and Yang 2000). The other stream of research considered the free-riding by parallel imports on the authorized dealer's advertising and how the authorized dealer should respond (Tan et.al. 1997; and Lee et.al. 2000). Kek and Yong (1999) did consider both the issues of price and advertising. They showed that, in deciding the legal status of parallel imports, society should trade off decreased advertising by the authorized dealer against lower prices arising from increased competition. However, in their model, the authorized dealer's advertising does not

benefit consumers of the parallel imports, hence the free-rider problem does not really arise.

In this paper, we analyze a model of parallel imports where an authorized dealer competes against gray market products. The gray item provides proportionately less benefit than the legitimate product. The authorized dealer's decision variables are the price of the legitimate product and advertising expenses. His advertising benefits consumers of both legitimate and gray items. Let ϵ denote the probability that a gray item can be successfully sold in the market. Obviously, the stricter the law is against parallel imports, the smaller ϵ is. We show the following results.

First, the relationship between the authorized dealer's advertising expenses and ϵ is not monotonic. In case the dealer engages in limit pricing in equilibrium, an increase in ϵ will reduce his advertising expenses. On the other hand, in case there is a gray market in equilibrium, the dealer will increase his advertising expenses as ϵ increases.

Second, an increase in ϵ may either increase or decrease social welfare. We will document factors that contribute to the welfare effects of ϵ .

Third, we conjecture that, when the size of the gray market is relatively large compared with the market for the legitimate product, increasing ϵ is likely to raise welfare.

Finally, if ϵ is determined by the government, then the optimal ϵ may be affected by the effectiveness of law enforcement. We conjecture that, if the government is not very effective in law enforcement, it should lift restrictions on parallel imports.

The rest of the paper is organized as follows. Section 2 states the model. Section 3 analyzes the model and demonstrates comparative static. Section 4 discusses the welfare effects of the regulation on parallel imports. Section 5 provides an example that illustrates some interesting policy implications. Section 6 concludes.

2. The Model

Consider an item that is legitimately marketed by a single profit-maximizing authorized dealer in competition with a parallel import available in a gray market. The authorized dealer sets a price, p , and advertising, a , for the legitimate product. The variable a could represent any element of marketing strategy, including advertising and promotion, that increases the benefit a potential consumer derives from both the legitimate and gray versions of the product. The advertising cost, $K(a)$, is increasing, convex, and satisfies $K(0) = 0$ and $K'(0) = 0$. Let w denote the marginal cost of providing a unit of legitimate item; w may be the wholesale price set by the global manufacturer on a worldwide basis.

The price of the gray item is p_f . Each potential consumer chooses among buying the legitimate product, buying the gray item, or not consuming the item at all. The

legitimate product provides a benefit, $\hat{a} v$. The gray item provides a benefit, $(I - \hat{a}) \hat{a} v$, which is proportionately lower by the quality differential \hat{a} owing to reasons that possibly include differences in packaging, labeling, and warranty service. Note that, under this setting, retailers of the gray items also benefit from the authorized dealer's advertising expenses. Therefore, a free-riding problem exists.

For simplicity, assume that a consumer chooses to buy the legitimate product when she is indifferent between buying the legitimate and gray versions; moreover, she chooses to buy when she is indifferent between buying the legitimate or gray versions and not consuming the product. All potential consumers are risk neutral. The benefit v is assumed to be uniformly distributed between 0 and I , which means the demand curve is linear.

The price of the gray item, p_i , depends on the law on parallel imports. Suppose that a gray item will be sold successfully in the market with probability $\hat{\epsilon}$; and will be blocked and destroyed by the government with probability $I - \hat{\epsilon}$. Intuitively, $\hat{\epsilon}$ will be high if the law favors parallel imports, and will be low if the law is hostile toward parallel imports.

Given the above assumptions, the expected profit of a retailer who sells gray items is $\hat{\epsilon} p_i - w$. Since there is no entry barrier for selling gray items, a gray retailer's expected profit should be zero, therefore we have

$$p_i = \frac{w}{\hat{\epsilon}}. \quad \dots (1)$$

3. The Analysis of the Model

In this section, we will first analyze consumers' behavior. We will then study the authorized dealer's pricing and advertising strategies. If a potential consumer with value v buys the legitimate product, she will receive a net benefit of $\hat{a} v - p_l$. On the other hand, if she buys the gray item, her net benefit is $(I - \hat{a}) \hat{a} v - w/\hat{\epsilon}$. Finally, if the potential consumer does not consume the product, her net benefit will be 0 .

Define

$$v_0 \equiv \frac{p_l}{\hat{a}}, \quad \dots (2)$$

$$v_1 \equiv \frac{w}{(I - \hat{a}) \hat{a} \hat{\epsilon}}, \quad \dots (3)$$

$$v_2 \equiv \frac{p_l - \frac{w}{\hat{\epsilon}}}{\hat{a} \hat{\epsilon}}. \quad \dots (4)$$

The following lemma documents a potential consumer's choice.¹

¹ The proofs of all the lemmas and propositions are available from the author upon request.

Lemma 1. A consumer with value v will buy the legitimate product if $v \geq \max\{v_0, v_2\}$, will buy the gray market product if $v_1 \leq v < v_2$, and will not consume any product otherwise.

From Lemma 1, a gray market exists if and only if $v_1 < v_2$, or equivalently,

$$p_l > \frac{p_i}{1-s} = \frac{w}{(1-s)\beta}. \quad \dots\dots (5)$$

Intuitively, a gray market exists only when the price for the legitimate item is relatively high compared with the price of the gray item. It can be verified that $v_2 > v_0 > v_1$ if (5) holds, and $v_2 = v_0 = v_1$ if (5) is violated. Therefore, if (5) holds, consumers with $v \geq v_2$ buy the legitimate product, consumers with $v_1 \leq v < v_2$ buy the gray product, and consumers with $v < v_1$ do not consume any product. On the other hand, if (5) is violated, consumers with $v \geq v_0$ buy the legitimate product and the remaining consumers do not consume.

We now turn to the authorized dealer's behavior. From the discussions about consumers, the dealer's pricing and marketing strategies must fit into one of the three cases.

- (i) Gray Market. In this case, $p_l > w / [(1-\hat{a})\beta]$ and a gray market exists.
- (ii) Limit Pricing. In this case, $p_l = w / [(1-\hat{a})\beta]$ and no consumer buys the gray item.
- (iii) No Gray Market Threat. In this case, $p_l < w / [(1-\hat{a})\beta]$ and no consumer buys the gray item.

Since the optimal p_l and \hat{a} in different cases are different, these three cases will be analyzed separately.

3.1 Gray Market

First consider the gray market case. The authorized dealer chooses p_l and \hat{a} to maximize

$$\Pi_G \equiv (p_l - w)(1 - v_2) - K(r), \quad \dots\dots (6)$$

subject to (5) and the non-negative constraints for p_l and \hat{a} . The first-order conditions are

$$\frac{\partial \Pi_G}{\partial p_l} = (1 - v_2) - \frac{p_l - w}{s r} = 0. \quad \dots\dots (7)$$

$$\frac{\partial \Pi_G}{\partial r} = (p_l - w) \frac{p_l - w}{s r^2} - K'(r) = 0. \quad \dots\dots (8)$$

Using (7) and (8), we can get the following results.

Proposition 1. Suppose a gray market exists in equilibrium.

- (a) The advertising, \hat{a} , is increasing in \hat{e} and \hat{d} , and is decreasing in w .
 (b) The price for the legitimate product, p_l , is increasing in \hat{d} . It is decreasing in \hat{e} if and only if

$$K''(r) > \frac{1}{sr^3}(p_l - w)\left(\frac{w}{\beta} - w\right). \quad \dots (9)$$

It is increasing in w if and only if

$$K''(r) > \frac{p_l}{sr^3}\left(\frac{w}{\beta} - w\right)\frac{1 - \beta}{1 + \beta}. \quad \dots (10)$$

Part (a) of Proposition 1 says that the authorized dealer will increase advertising expenses when the law becomes more favorable to parallel imports, when the quality difference between the legitimate and the gray products is greater, and when the marginal cost of a legitimate product is lower. The result that \hat{a} is increasing in \hat{e} is interesting because it contradicts Reebok Australia's claim that Reebok should reduce advertising and sports sponsorship upon the change in copyright law to allow parallel imports. The intuition of this result can be explained as follows. In this model, advertising not only raises the demand for both the legitimate product and parallel imports, it also enhances the differentiation between the two. Because of the latter effect, the authorized dealer should increase rather than reduce advertising and promotion when the law becomes more favorable to parallel imports. Also, the higher the \hat{d} , the more significant the latter effect is, so the authorized dealer has a stronger incentive to advertise when \hat{d} increases. By (8), an increase in w has a negative effect on $d\hat{a}/d\hat{d}$, so will lead to a lower \hat{a} .

From part (b) of Proposition 1, as \hat{d} increases, the threat from the gray product becomes less serious, so the authorized dealer will raise p_l . It is also shown that p_l may be either increasing or decreasing in \hat{e} . An increase in \hat{e} has two effects on the optimal p_l . First, when \hat{e} increases, the authorized dealer faces more fierce competition from gray items, so he should reduce p_l as a result. On the other hand, note that p_l and \hat{d} are complements (that is, $\frac{\partial \Pi_G^2}{\partial r \partial p_l} > 0$), and \hat{d} is increasing in \hat{e} .

Therefore, an increase in \hat{e} might indirectly raise p_l through increasing \hat{d} . The sign of $d p_l / d \hat{e}$ would depend on the tradeoff of these two effects.² The sign of $d p_l / d w$ can be explained in a similar way.

3.2 Limit Pricing

² However, in all examples we construct, $d p_l / d \hat{e} > 0$, which is consistent with the impression that more fierce competition resulting from an increase in \hat{e} will force the authorized dealer to reduce p_l .

Now turn to the case of limit pricing. In this case, the authorized dealer engages in limit pricing. It sets the price p_l just low enough to choke off the gray market. Therefore, we know that (5) will bind. Let p_{ll} denote the p_l that makes (5) binding. We have

$$p_{ll} = \frac{w}{(1-s)\beta}. \quad \dots (11)$$

In this case,

$$v_1 = v_2 = \frac{w}{(1-s)\beta r}.$$

The authorized dealer's maximization problem can be written as

$$\text{Max}_r \Pi_{lp} \equiv (p_{ll} - w) \left(1 - \frac{w}{(1-s)\beta r}\right) - K(r). \quad \dots (12)$$

By (12), the authorized dealer only determines \hat{a} in this case. Note that in this case, potential consumers with $v = w / [(1-\hat{a})\beta\hat{a}]$ will buy the legitimate item, while the remaining consumers will not consume any product. This means there is no gray market in this case. It is easy to show that Π_{lp} is concave in \hat{a} , so the optimal \hat{a} is determined by the following first-order condition.

$$\frac{\partial \Pi_{lp}}{\partial r} = \left(\frac{1}{(1-s)\beta} - 1\right) \frac{w^2}{(1-s)\beta r^2} - K'(r) = 0. \quad \dots (13)$$

Condition (13) equates the marginal benefit and marginal cost of advertising. The following proposition reports comparative static results.

Proposition 2. Suppose that the authorized dealer engages in limit pricing. The price of the legitimate item, p_l , is decreasing in β , and is increasing in w and \hat{a} . Also, the advertising, \hat{a} , is decreasing in β , and is increasing in w and \hat{a} .

A striking difference between the cases of a gray market and limit pricing is that, when the authorized dealer engages in limit pricing, an increase in β leads to a reduction in advertising. The reason is that, by (13), obviously (p_l / \hat{a}) is decreasing in \hat{a} . This means the marginal benefit of advertising is reduced as the legal status become more favorable to parallel imports. Therefore, when β increases, \hat{a} will decrease. On the other hand, (p_l / \hat{a}) is increasing in both \hat{a} and w . This result is intuitive. When the quality or cost differences between legitimate and gray items are more significant, advertising becomes more effective marginally, so the authorized dealer will increase advertising expenses. The comparative static results about p_l follow from (11) and the fact that $p_l = p_{ll}$ in the limit pricing case.

3.3 No Gray Market Threat

In this case, the authorized dealer sets p_l and \hat{a} like a textbook monopoly. From the previous discussion, the marginal consumer will receive benefit p_l/\hat{a} . The authorized dealer chooses price and advertising to maximize:

$$\Pi_N \equiv (p_l - w)(1 - \frac{p_l}{r}) - K(r). \quad \dots (14)$$

The first-order conditions imply

$$p_l = \frac{w + r}{2}. \quad \dots (15)$$

$$(p_l - w) \frac{p_l}{r^2} = K'(r). \quad \dots (16)$$

The following proposition documents the comparative static results.

Proposition 3. Suppose there is no gray market threat in equilibrium. The price of the legitimate product, p_l , is increasing in w if and only if

$$K''(r) > \frac{p_l w}{r^3}. \quad \dots (17)$$

The advertising expenses, \hat{a} , is decreasing in w . Moreover, both p_l and \hat{a} are independent of ϵ and \hat{a} .

3.4 Overall Profit Maximum

The above subsections discuss the three possible equilibrium pricing and advertising strategies that the authorized dealer may use. Now we briefly describe how the dealer chooses among allowing a gray market, limit pricing, or having no gray market. Let p_{ln} and \hat{a}_{ln} denote the p_l and \hat{a} that satisfy (15) and (16). If $p_{ln} < w/[1 - \hat{a}] \epsilon$ (so that (5) is violated), then there is no gray market threat in equilibrium and p_{ln} and \hat{a}_{ln} are the optimal p_l and \hat{a} .

On the other hand, suppose that $p_{ln} > w/[1 - \hat{a}] \epsilon$, then the gray item is a real threat. Let p_{lg} and \hat{a}_{lg} denote the p_l and \hat{a} that satisfy (7) and (8). In this case, if $p_{lg} > w/[1 - \hat{a}] \epsilon$, then there is a gray market in equilibrium, and p_{lg} and \hat{a}_{lg} are the optimal p_l and \hat{a} . Otherwise, the authorized dealer will use the limit pricing strategy.

4. Welfare Analysis

We define social welfare as the sum of consumer surpluses and seller profits within the country. This measure ignores the welfare of people in other countries. Since there are three possible kinds of optimal strategy for the authorized dealer, we analyze welfare effects in these three cases separately.

4.1 Gray Market

When there is a gray market, social welfare is

$$W_G \equiv \int_{v=v_1}^{v_2} [(1-s)r\nu - \frac{w}{\beta}] dv + \int_{v=v_2}^1 [r\nu - w] dv - K(r) . \quad \dots (18)$$

We will focus on how a change in \tilde{e} affects welfare. Totally differentiate W_G with respect to \tilde{e} , we have

$$\frac{dW_G}{d\tilde{e}} = - \left(s r v_2 + \frac{w}{\beta} - w \right) \frac{dv_2}{d\tilde{e}} - K'(r) \frac{dr}{d\tilde{e}} + \left\{ \int_{v=v_1}^{v_2} [(1-s)v \frac{dr}{d\tilde{e}} + \frac{w}{\beta^2}] dv + \int_{v=v_2}^1 v \frac{dr}{d\tilde{e}} dv \right\} . \quad \dots (19)$$

It can be shown that $dv_2/d\tilde{e} > 0$,³ which implies that some consumers shift from legitimate to gray items as \tilde{e} increases. Moreover, from Proposition 1 we know that $d\hat{a}/d\tilde{e} > 0$. Equation (19) demonstrates the ways in which an increase in \tilde{e} changes welfare.

First, when \tilde{e} increases, some consumers will shift from legitimate to gray items. Such a shift reduces welfare because (i) the gray product gives consumers less benefits than the legitimate product ($(I - \hat{a}) \hat{a} v$ rather than $\hat{a} v$), and (ii) the marginal cost of the gray product is higher than that of the legitimate product (w/\tilde{e} rather than w). This effect is reflected in the first item in the RHS (right hand side) of (19).

Second, because \hat{a} is increasing in \tilde{e} , the authorized dealer will spend more in advertising when \tilde{e} increases. This effect is reflected in the second item in the RHS of (19).

Third, an increase in \tilde{e} raises welfare in two ways. (i) When \tilde{e} increases, \hat{a} becomes higher. As a result, consumers of both the legitimate and the gray products enjoy higher benefits. (ii) An increase in \tilde{e} lowers the marginal cost of the gray product. These two effects are captured in the third item in the RHS of (19).

Since the first two effects are negative and the last one is positive, $dW_G/d\tilde{e}$ may be either positive or negative. We have worked out some numerical examples, and find that welfare is not always monotonic in \tilde{e} when there is a gray market in equilibrium. The following lemma presents some results in special cases.

Lemma 2. Suppose there is a gray market in equilibrium.

- (a) When (9) holds, $dW_G/d\tilde{e} > 0$ if the size of the gray market is greater than that of the market for the legitimate product (that is, $v_2 - v_1 > I - v_2$).
- (b) When $\tilde{e} = 1$, a decrease in \tilde{e} will reduce welfare if and only if $v_2 - v_1 > 0.5(I - v_2)$.

³ The proof is available upon request from the author.

Lemma 2 states that an increase in \bar{e} is likely to raise welfare when the size of the gray market is large relative to the market for the legitimate product. This result is intuitive. By (19), when \bar{e} increases, consumers who buy gray items not only get more benefits from the product (because \hat{a} increases), but also pay less for the product (because w/\bar{e} decreases). Therefore, an increase in \bar{e} is welfare enhancing if the fraction of consumers who buy gray items is not small.

4.2 Limit Pricing

In the limit pricing case, social welfare is

$$W_L \equiv \int_{v=w/(1-s)r}^1 [rv-w] dv - K(r) . \quad \dots\dots (20)$$

Analyzing the welfare impact of a change in \bar{e} , we have

$$\frac{dW_L}{d\bar{e}} = \frac{w^2}{(1-s)r\bar{e}^2} \left(\frac{1}{(1-s)\bar{e}} - 1 \right) + \left\{ \frac{w^2}{(1-s)r^2\bar{e}} \left(\frac{1}{(1-s)\bar{e}} - 1 \right) + \int_{v=w/(1-s)r}^1 v dv - K'(r) \right\} \frac{dr}{d\bar{e}} \quad \dots\dots (21)$$

By (21), an increase in \bar{e} changes welfare in two ways. First, it lowers the price for the legitimate product ($w/[(1-\hat{a})\bar{e}]$), which will induce more consumers to buy the legitimate product. This effect is reflected in the first item in the RHS of (21). Second, by Proposition 2, an increase in \bar{e} reduces \hat{a} in the limit pricing case. A decrease in \hat{a} may reduce welfare by (i) inducing some consumers not to consume the product, and (ii) lowering the benefit of the legitimate product to consumers. On the other hand, a decrease in \hat{a} reduces the authorized dealer's advertising expenses, which will raise welfare. The welfare effects of \bar{e} through affecting \hat{a} are reflected in the second item in the RHS of (21). Again, as in the gray market case, the welfare effects of \bar{e} in the limit pricing case are ambiguous.

4.3 No Gray Market Threat

When the gray product is not a threat to the authorized dealer, social welfare is

$$W_N \equiv \int_{v=w/r}^1 [rv-w] dv - K(r) . \quad \dots\dots (22)$$

Obviously, by (22), a change in \bar{e} will not affect welfare in this case.

4.4 The Optimal Policy

If the government knows the demand function and the cost function of the authorized dealer, it should choose a \bar{e} to maximize social welfare. However, from the above

analysis, the welfare effects of \tilde{e} are quite complicated. This complexity arises because \tilde{e} affects not only the price for the gray product, but also the authorized dealer's pricing and advertising strategies. As a result, the welfare effects can be ambiguous. The contribution of this paper is to point out the ways that the legal status of parallel imports may change welfare. It suggests that, when the government designs policies related to parallel imports, it should properly evaluate all the benefits and costs of the policies.

5. An Example

In this section, we develop a simple example to show how \tilde{e} affects the authorized dealer's strategies and social welfare. For simplicity, we assume that \tilde{a} is a constant and $\tilde{a} > 1$. Although this assumption is quite strong, it greatly simplifies analysis. Such an example provides the foundation for analyzing a more general model where \tilde{a} is not a constant. For this example, we get the following results.

Proposition 4. Suppose that \tilde{a} is a constant and $\tilde{a} > 1$. Denote

$$\tilde{e}_1 = \frac{2w}{(1-s)(w+r)}. \quad \dots\dots (23)$$

$$\tilde{e}_2 = \frac{w(1+s)}{(1-s)(w+rs)}. \quad \dots\dots (24)$$

(a) If $\tilde{e} > \tilde{e}_2$, then there is a gray market in equilibrium. In this case, the optimal p_I is $\frac{sr+w+w/\beta}{2}$, and the authorized dealer's profit is $\frac{(w/\beta-w+rs)^2}{4rs} - K(r)$.

(b) If $\tilde{e}_1 < \tilde{e} < \tilde{e}_2$, the authorized dealer will engage in limit pricing. In this case, the optimal p_I is $\frac{w/\beta}{1-s}$, and the authorized dealer's profit is

$$\frac{[r(1-s)-w/\beta][w/\beta-r(1-s)]}{r(1-s)^2} - K(r).$$

(c) If $\tilde{e} < \tilde{e}_1$, then the gray product is not a threat to the authorized dealer. In this case, the optimal p_I is $\frac{r+w}{2}$, and the authorized dealer's profit is $\frac{(r-w)^2}{4r} - K(r)$.

(d) Social welfare is independent of \tilde{e} if $\tilde{e} < \tilde{e}_1$, is increasing in \tilde{e} if $\tilde{e}_1 < \tilde{e} < \tilde{e}_2$, and is convex in \tilde{e} if $\tilde{e} > \tilde{e}_2$. This implies that the optimal \tilde{e} is either \tilde{e}_1 or \tilde{e}_2 .

Proposition 4 demonstrates that there is a gray market if \tilde{e} is large, the authorized dealer will engage in limit pricing if \tilde{e} is in the medium range, and the gray product is not a threat if \tilde{e} is small. This result is quite intuitive and general.⁴ Proposition 4 also

⁴ This result holds in all other examples we construct. In these examples, \tilde{a} is not a constant.

sheds light on the optimal policy on parallel imports. When α is a constant, a change in $\bar{\epsilon}$ does not affect the authorized dealer's advertising expenses. Therefore, by (21), social welfare is increasing in $\bar{\epsilon}$ in the limit pricing case. This result implies that the government should never set $\bar{\epsilon}$ so low that the gray product is not a threat to the authorized dealer. The result that welfare is convex in $\bar{\epsilon}$ when there is a gray market also has an interesting policy implication, which is documented in the following corollary.

Corollary. Suppose α is a constant and $\alpha < 1$. Moreover, $dW_G/d\bar{\epsilon} > 0$ when $\bar{\epsilon} = 1$. In this case, there exists a $\lambda \in (0,1)$ such that the optimal $\bar{\epsilon} = 1$ if the government cannot choose any $\bar{\epsilon}$ smaller than λ .

The above corollary means that, if $dW_G/d\bar{\epsilon} > 0$ when $\bar{\epsilon} = 1$ and the government cannot enforce strict restrictions on parallel imports (that is, all the feasible $\bar{\epsilon}$ s are greater than λ), then it should not regulate parallel imports at all. For many countries, law enforcement is poor. The corollary suggests that these countries should not impose any restriction on gray products.

6. Concluding Remarks

In this paper, we develop a model to study issues related to parallel imports. We analyze the pricing and advertising strategies of authorized dealers who sell legitimate products. We also investigate welfare effects of the regulation on parallel imports. We find that the authorized dealers may increase rather than decrease their advertising expenses when the law becomes more favorable to parallel imports. In addition, we find that the welfare effects of parallel import regulation may be ambiguous. We identify several conditions under which loosening restrictions on parallel imports will increase social welfare.

Two assumptions in our model deserve discussions. First, we implicitly assume that the costs of supplying the legitimate item and the parallel import are identical. Realistically, the costs may differ. For instance, the authorized dealer may incur costs to provide warranty service for the legitimate product. On the other hand, parallel importers may be too small to benefit from economies of scale. These cost differences will affect the welfare analysis in an obvious way.

Second, we assume that the seller sets the same price to all potential consumers. However, in the real world authorized dealers can effect price discrimination. An obvious response to the gray market is for the authorized dealer to target a lower price at the individuals who are more likely to buy the gray version, that is, those who receive relatively low benefit from the product. Price discrimination will allow

authorized dealers to increase their profits and to reduce the threat of gray items. Taking the possibility of price discrimination into account will be a promising way to extend our model.

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三、記畫成果自評

This project has achieved the goals it plans to accomplish. In this project, a theoretical model is built to investigate issues related to parallel imports. The model analyzes the authorized dealers' behavior when they face the threat of parallel imports. It also discusses the welfare effects of loosening restrictions on parallel imports. This project enhances our understanding on parallel imports. It also has interesting policy implications.