How a Luxury Monopolist Might Benefit from
a Stringent Counterfeit Monitoring Regime

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Abstract

Most studies in the intellectual property rights literature claim that the presence of counterfeit products hurts monopolists. This paper shows that this is not always true in a market with Veblen effects where a counterfeit monitoring regime is enforced. This paper finds an effect due to intellectual property rights enforcement that may be strong enough to produce a selling price that is higher than the price chosen without counterfeiting. Consequently, the monopolist may obtain greater profits in the presence of counterfeiting than in its absence.

Key words: intellectual property rights; counterfeiting; Veblen effects

JEL Classification: D42; K42; L43

1. Introduction

Counterfeiting is an important issue to study. An OECD report (OECD, 1998) showed that counterfeiting has grown into an international phenomenon accounting for between 5% and 7% of world trade, or about $200 to $300 billion in lost revenue. In a 2003 study, the International Chamber of Commerce (ICC) projected the counterfeit market would soon exceed $500 billion per year (ICC, 2003). Statistics published by the European Commission in February 2005 showed a significant increase in the number of counterfeit and pirated articles seized at the EU's external borders in 2003. Customs officials seized almost 100 million of such articles in 2003 compared with 85 million in 2002, with an estimated value of €1 billion (see press release IP/05/147, MEMO/05/40, and Commissioner Kovacs' speech delivered at a press conference held on February 8, 2005).

In order to combat counterfeiting, the Commission of the European Communities proposed four possible instruments in their Green Paper (see Commission of the European Communities, 1998): (i) monitoring by the private sector, (ii) sanctions and other means of enforcing intellectual property rights, (iii)

the use of technical devices, and (iv) administrative cooperation between competent authorities. Among these four, monitoring and sanctions are the most widely used in practice. Although they may not be the most effective instruments for combating counterfeiting, they require less information concerning technology and demand.

Even though counterfeiting is an important issue to study, few have analyzed it on economic theory grounds, except for the contributions of Higgins and Rubin (1986) and Grossman and Shapiro (1988a, b). In particular, Grossman and Shapiro (1988b) examined markets for status goods under a counterfeit policing regime. They assumed that the government destroys the counterfeit goods if they are detected and confiscated. This assumption is reasonable because confiscation may yield revenue for the government if the illicit goods that are seized by the government are sold at auction; otherwise, the government would itself become a purveyor of counterfeits (Grossman and Shapiro, 1988b).

Aside from confiscation, imposing fines on counterfeiters is also a common enforcement tool to combat counterfeiting. Yao (2005) recently studied the welfare effect of adopting a counterfeit monitoring regime characterized with a fine penalty. He found that if the degree to which the genuine product is imitated is low, then counterfeit products might be allowed to exist in such a market. He suggested that the enforcement intellectual property right (IPR) laws should be flexible enough to recognize a product's inherent attributes as pertaining to the difficulty in imitating the original products.

Because fines imposed on counterfeiters often constitute a sizeable portion of monitoring agencies' extra revenue (the agency may be the government or a legitimate firm), any meaningful analysis of optimal penalties cannot be based solely on crime deterrence considerations (see Saha and Poole, 2000). One must also consider the likely side effect of the penalty levels on the agencies' revenue and on the market competition mechanism. Furthermore, the likely side effect from penalty levels should be given more attention since the enforcement of IPR laws is increasingly severe.

For example, a stricter IPR law against counterfeiting is now enforced in the UK, based on the 2002 Act that came into force on November 20, 2002. The 2002 Act (which amends the Copyright, Designs and Patents Act of 1988 and the Trade Marks Act of 1994) tightens the regulation of copyright and trademark infringement in an effort to reduce the losses being sustained by British businesses as a consequence of counterfeiting and piracy. The new maximum penalty for these offenses for conviction on indictment is an unlimited fine and/or up to 10 years in prison to reflect the seriousness of these crimes (see The Patent Office, 2002). In the US, the Trademark Counterfeiting Act of 1984 (18 U.S.C. §2320) makes counterfeiting a criminal offense with long jail terms for individuals and multi-million dollar fines for businesses. The Act (15 U.S.C. §1116(d)) also allows for the seizure of counterfeit goods. Proposed legislation is currently under discussion in the US House of Representatives that would provide for the mandatory destruction of equipment used to produce counterfeit articles and certain additional penalties (Barnett, 2005).

The trend toward stricter IPR enforcement can also be seen in the history of copyright protection. In the US, a series of congressional acts have repeatedly increased the time length of a copyright. The original Copyright Act of 1790 granted authors copyright protection for 14 years with a renewal period of 14 years. Major revisions to the act were implemented in 1831, 1870, 1909, and 1976, whereby the initial term was extended to 50 years (75 years for joint works) and copyright renewal became automatic. In 1998 the Sonny Bono Copyright Term Extension Act established protection for the life of the author plus an additional 70 years. In the past 20 years the Berne Convention and the Uruguay Round Agreements have also served to coordinate US copyright protection with international principals. (This information is summarized by the "Copyright Timeline," available at http://www.arl.org/info/frn/copy/timeline.html. See also Baker and Cunningham, 2006.)

Although counterfeiting hits every sector, it notably influences the luxury industries. Some consumers buying fake luxury items do so knowingly and are not prepared to pay the price of the genuine item. "Significant evidence of this (counterfeiting) trend came to light when UK customs officials smashed a £4.25 million racket in 1997 involving 100,000 counterfeit designer labels. The batches included labels for Ralph Lauren, Calvin Klein and Timberland, among others. The labels would most likely have been sewn into cheap fashion garments such as shirts, jeans, and T-shirts made in the UK" (OECD, 1998). In South Korea, for example, according to the Samsung Fashion Research Institute, in a 2002 survey of 500 female university students majoring in fashion, 54% said they had bought copied brands at least once. Regardless of age or class, copied goods are popular among those who desire luxury goods but lack the money. Copied goods are distributed at prices around one-third or one-tenth of genuine goods. This disparity lead many luxury goods makers to ask the South Korean government to crack down on the illegal reproduction in order to avoid a big loss in revenue. The European Union Chamber of Commerce in Korea also recommended that South Korean authorities intensify their crackdown on infringements by being more persistent (Korea Times, 2002).

Counterfeiting differs from patents and copyright infringements in regards to the ranking of qualities and market channels. The effective quality of products with a patent infringement may be higher than that of the legitimate product since they are sometimes embedded with advanced technology that is "stolen" from other firms. Consumers may even unknowingly purchase them in legal outlets due to the difficulties in judging whether the product is involved with patent infringement. As for the related issue of copying, people can copy some valuable articles or useful software by themselves with do-it-yourself copying technology such as copy machines or internet archives. In other words, copying usually exists in terms of home production where its effective quality is close to the original one via modern copying processes. In contrast to patents and copyright infringements, counterfeit products by construct are generally inferior to authentic goods. In addition, they are usually sold in an "underground" submarket due to their illegality.

This paper studies the phenomenon of counterfeiting in a luxury market by setting up a vertical product-differentiated model. In the luxury industries, price often enhances consumption utility, as the price tag of the luxury product can signal one's wealth and prestige. That price can enhance utility is called the Veblen effect in the literature; see, for example, Leibenstein (1950) and Bagwell and Bernheim (1996). In this paper, we consider luxury markets where Veblen effects prevail.

This study investigates the likely side effect of penalty levels on agencies' revenue and on the market competition mechanism. The monitoring rate to detect counterfeits is suggested as an indicator of the strength of IPR enforcement. The impact of Veblen effects on the incentives of the monopolist to innovate is analyzed. A special issue that we focus on is the relationship between IPR enforcement and the monopoly price under a counterfeit monitoring regime. Analytical results shows that strictly enforcing IPR laws may cause a side effect in the luxury industries: the price of the luxury good may exceed that in the absence of counterfeit products.

2. The Model

2.1 The Setup

Consider a market where a monopolist sells a genuine luxury product, and assume that counterfeiters illegally copy the product without the approval of the monopolist. Suppose that the counterfeiters can enter and exit the market freely. For convenience, the monopolist and counterfeiters are denoted with the subscripts *m* and *c*, respectively.

On the supply side, suppose that producing a luxury product with quality $s_m \in R_+$ requires high upfront fixed costs. Once it is designed, making copies of it does not cost extra (for example, the design of a fashionable dress). Thus, the burden of quality improvement is assumed to fall on the monopolist's fixed costs, which are given by $F(s_m) = k s_m^2$ with $k > 0$. The marginal cost of production is assumed to be zero without loss of generality.

Suppose that the counterfeit products are all identical while their quality s_c is inferior to that of the genuine item, i.e., $s_c < s_m$. In order to emphasize the advantage of being a free rider for copying, no production costs of counterfeiting are assumed. However, counterfeiters must bear extra expenses associated with the potential risk of being caught by authorities due to illegally mimicking the genuine goods.

Let p_m and p_c represent the prices of the genuine product and the counterfeit product, respectively. The risk of being caught by the authorities each counterfeiter faces is represented by the counterfeit monitoring (to detect counterfeits) rate ϕ, which we view as an indicator of the strength of IPR enforcement. If a counterfeiter sells a fake product without being monitored, then the counterfeiter receives a gain of p_c per unit. However, if the authorities detect the sale of the counterfeit product, the probability of being caught is 1 and the counterfeiter must pay a fine to the authorities. The volume of the fine is t times

the genuine product's price p_m, where parameter t is specified by IPR law. Therefore, total fines tp_m are pegged to the price of the genuine product, where t is termed the pegged ratio hereafter.

A pegged-fine counterfeit monitoring regime can be found in several countries. For example, the US Anti-Counterfeiting Consumer Protection Act of 1996, §1136, provides civil fines pegged to the value of the genuine goods. Fines for repeat offences are limited to not more than twice the domestic value of the merchandise as if it had been genuine, based on the manufacturer's suggested retail price of the merchandise at the time of seizure. Another example is in Taiwan where the pegged ratio of fines ranges from 500 to 1500 (Taiwan Trademark Act of 1997, Article 66). In order to obtain a meaningful result, however, the pegged ratio in the current model is normalized to be between 0 and 1.

On the demand side, demand is generated from a unit mass of consumers indexed by a type parameter θ, which is uniformly distributed over the interval of $[0, \bar{\theta}]$. Each consumer demands at most one unit of the product and knows when he/she is purchasing a counterfeit. Nevertheless, counterfeit products might be mistaken as well-known branded products due to imperfect information among casual observers. This market phenomenon is coined non-deceptive counterfeiting by Grossman and Shapiro (1988a, b). Non-deceptive counterfeiting most likely happens in luxury-brand goods and fashion clothes because the design of these products is often exclusive and the channels of distribution are quite different, so that buyers can easily distinguish that the source of the products is legal or illegal.

Consider a situation specific to the demand of a luxury good. Here, the incentive to purchase a luxury good cannot simply be assumed by the reason that the good is only bought for its "functional alibi" value; the consumption of a luxury good tends to have a "conspicuous" symbolic meaning. Jewelry is probably the best example of a luxury good. What individuals really feel about jewelry is the effect that it can advertise about the owner's wealth and can express his or her values. This implies that when consumers place a symbolic value on name-brand luxury merchandise, counterfeit products serve to unbundle the quality and conspicuous attributes of branded products.

In this context, consumer utility can be separated into two parts: the functional subutility $u(s_i, \theta)$ and the conspicuous subutility $V(p_m, i)$, $i = m, c$. A consumer of type θ who purchases a good of quality s_i at price p_i enjoys the following (net) utility:

$$U_i = u(s_i, \theta) + V(p_m, i) - p_i, \ \ 0 < \frac{\partial V}{\partial p_m} < 1, \ \ 0 < \frac{\partial u}{\partial s_i}, \ \ 0 < \frac{\partial u}{\partial \theta}, \ \ 0 < \frac{\partial^2 u}{\partial s_i \partial \theta}. \quad (1)$$

This utility structure is revised from the intrinsic utility of conspicuous consumption in Bagwell and Bernheim (1996).

Some comments on (1) are required. First, $\partial V / \partial p_m > 0$ means that Veblenian consumers (i.e., luxury consumers) attach a greater importance to price as an indicator of social status because their primary objective is to signal being wealthy

and to impress others. However, this signal effect is restricted by $\partial V/\partial p_m < 1$, representing that the value stemming from the product's Veblen effects is not over the genuine item's price. Second, since counterfeit products are illegally labeled with a luxury logo, the owners of them "steal" the genuine item's conspicuous appeal. Because of this "stealing," the Veblen effects of consuming a counterfeiting product are assumed to be less than that of consuming a genuine luxury good, i.e., $V(p_m, c) < V(p_m, m)$. The inequality $\partial u/\partial s_i > 0$ means that consuming a higher level of quality of a product generates a higher level of consumption utility. Finally, $\partial^2 u/\partial s_i \partial \theta > 0$ combined with $\partial u/\partial \theta > 0$ implies that a higher value of θ represents a greater marginal utility for quality.

In order to facilitate the analysis and to obtain a meaningful result, the utility function in (1) is given a specific form. Assume that $u(s_i, \theta) = \theta s_i$ following Mussa and Rosen (1978). This choice reflects the assumption that higher values of θ mean a greater marginal utility for quality. The Veblen subutility for the genuine item is set to $V(p_m, m) = v p_m$ with $0 < v < 1$. The relationship between $V(p_m, c)$ and $V(p_m, m)$ is linear with $V(p_m, c) = b V(p_m, m)$, $0 < b < 1$, thereby leading to the result $V(p_m, c) = b v p_m$. Here, the constraint $0 < b < 1$ implies that the perceived conspicuous appeal of counterfeits is inferior to that of the genuine item. Realizing these assumptions, one can rewrite (1): consumer θ gains net utility $U_m = \theta s_m + v p_m - p_m$ from a genuine item but only $U_c = \theta s_c + b v p_m - p_c$ from a counterfeit product.

2.2 Equilibrium Results

The current model is a quality-then-price model where IPR laws have been set up to facilitate the investigation and prohibition of counterfeiting. As usual, the equilibrium is obtained by backward induction. We first solve the price-setting problem at the second stage (the price-setting stage) and then solve the quality-choice problem at the first stage (the quality-setting stage).

At the price-setting stage, counterfeiters care only about the seriousness of the penalty in terms of monetary fines that might be imposed due to the illegal activity of counterfeiting. Since the counterfeiter's illegal behavior may be detected and caught with probability ϕ, the expected cost incurred is $\phi t p_m$ per unit. If the counterfeiter is not caught, the expected revenue received is $(1-\phi) p_c$. Following the long-run zero-profit equilibrium assumption proposed by Grossman and Shapiro (1988b), the net expected payoff due to counterfeiting is zero in equilibrium, i.e., $(1-\phi) p_c - \phi t p_m = 0$. This is because counterfeiters can enter the market freely to supply counterfeit products up to the point where the expected price equals the expected marginal cost. The equilibrium in the counterfeit market provides the price reaction function of a counterfeiter as follows:

$$p_c = \frac{t\phi p_m}{1-\phi}. \tag{2}$$

From (2), one can see that $\partial p_c / \partial p_m > 0$, $\partial p_c / \partial \phi > 0$, and $\partial p_c / \partial t > 0$. In other

words, the price of a counterfeit product increases both with the price of the genuine item and with the monitoring rate (or fines) as p_c increases either in p_m or in ϕ (or in t).

Let the market sizes of the genuine item and of the counterfeit products be D_m and D_c, respectively. The total expected fines collected can be calculated as:

$$\psi = \phi t p_m D_c . \tag{3}$$

Since fines are supposed to be pocketed by the monopolist, the monopolist's profit function is:

$$\pi_m = (p_m D_m - k s_m^2) + \phi t p_m D_c, \quad 0 \le t \le 1 . \tag{4}$$

A specific feature of (4) is that an increase in the counterfeit market size D_c may benefit the monopolist since fines contribute to profits. The monopolist must consider how to choose p_m and to produce s_m in response to the enforcement of IPR laws with a counterfeit monitoring regime.

In the model the pegged ratio of fines is constrained by $0 \le t \le 1$, which gives Assumption 1.

Assumption 1: $0 \le t \le 1$.

This assumption is necessary since, if $t > 1$ is allowed, the IPR fines imposed on the counterfeiters may be too stringent, so that no counterfeiters can exist in the market. This point is easily verified from (2) where the price p_c may be higher than p_m if $t > 1$. See also (9) below. In this situation, how the presence of counterfeiting affects the monopolist's profit is intractable.

This paper assumes that the market is covered. That is, the utility of consuming a product for each consumer is positive and each person always purchases one unit of the product in question. In order to obtain the demand functions both for the monopolist and for the counterfeiters, we must identify the taste types of marginal consumers. A potential consumer θ receives a positive net utility from purchasing a counterfeit product if $U_c = \theta s_c + b v p_m - p_c > 0$ or $\theta > \hat{\theta}_c \equiv (p_c - b v p_m)/s_c$, whereby $\hat{\theta}_c$ indexes the marginal consumer who is indifferent towards buying a fake or not buying at all. The consumer prefers buying a luxury item to a counterfeit item if $U_m = \theta s_m + v p_m - p_m > \theta s_c + b v p_m - p_c = U_c$ —equivalently, provided that $\theta > \hat{\theta}_m \equiv [p_m - p_c - v(1-b)p_m]/(s_m - s_c)$.

Since a higher value of θ represents a greater marginal utility for quality, one can suppose that $\hat{\theta}_c \le \hat{\theta}_m$. Furthermore, the assumption of market coverage means that $\hat{\theta}_c < 0$ in equilibrium. Figure 1 illustrates the market, where the marginal consumer $\hat{\theta}_c$ is to the left of $\theta = 0$, implying that consumers with $\theta \in [0, \hat{\theta}_m]$ purchase from the counterfeiters and those with $\theta \in [\hat{\theta}_m, \overline{\theta}]$ buy from the monopolist. Thus, the market is covered.
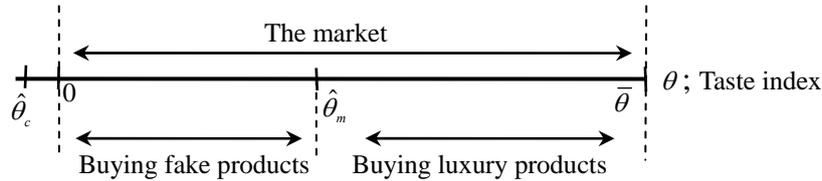
Figure 1: A covered market

The conditions to sustain a covered market are easily verified. Plugging (2) into $\hat{\theta}_c = (p_c - bvp_m)/s_c$ and then considering $\hat{\theta}_c \leq 0$ yields the following result:

$$\hat{\theta}_c = \frac{p_m(\phi bv + \phi t - bv)}{s_c(1-\phi)} \leq 0 .$$

This inequality implies that $\phi \leq bv/(t+bv)$ since p_m and s_m are positive and $0 \leq \phi \leq 1$. Thus, we have Assumption 2 which states the condition necessary to sustain a covered market.

Assumption 2: $0 < \phi \leq \bar{\phi}$, where $\bar{\phi} \equiv bv/(t+bv)$.

The critical value $\bar{\phi}$ in Assumption 2 falls as t increases, which we explain as follows. A rise in t improves the monopolist's fine revenue through (4), thereby increasing the incentive to increase the product price p_m. This can be clearly seen from (3) where $\partial\psi/\partial p_m = \phi t D_c > 0$, implying that a higher t creates a greater marginal profit from fines if the monopolist raises p_m. However, raising p_m increases the counterfeiters' price p_c through (2). Consequently, the low-taste consumers who originally purchased from the counterfeiters may no longer buy from them because of the higher p_c. In this situation, market coverage cannot be achieved. Hence, we make Assumption 2, where the range of sustainable market coverage shrinks as t increases.

Note that combining Assumptions 1 and 2 ensures that in equilibrium the quality level of the product in question is positive, and the counterfeit's price p_c does not exceed the genuine item's price p_m.

Due to the assumption of market coverage, demand functions for the monopolist and for the counterfeiters can be derived respectively as:

$$D_m = \bar{\theta} - \hat{\theta}_m = \bar{\theta} - \frac{p_m - p_c - v(1-b)p_m}{s_m - s_c}, \tag{5}$$

$$D_c = \hat{\theta}_m - 0 = \frac{p_m - p_c - v(1-b)p_m}{s_m - s_c} - \frac{p_c - bvp_m}{s_c} . \tag{6}$$

Substituting (2) into (5) and (6) and then plugging (5) and (6) into the monopolist's profit function of π_m in (4), the price solution for maximizing π_m is:

$$p_m = \frac{1}{2} \frac{\overline{\theta}(1-\phi)(s_m - s_c)}{(1-\phi t)(bv - bv\phi - \phi t + (1-\phi)(1-v))} \,. \tag{7}$$

At the quality-setting stage, since the counterfeit quality s_c is inferior to the genuine one, it is assumed that $s_c = \beta s_m$ with $0 < \beta < 1$. Recall that s_m is by construction the higher quality, which allows us to conduct this transformation. This transformation also reflects the "proper product differentiation" property in the literature of vertical product differentiation (see Choi and Shin, 1992). The parameter β here is an imitation rate, representing that counterfeiters can just imitate the monopolist and produce a fraction β of the genuine item's quality. With such a setting, the degree of imitation is not itself affected by the degree of IPR enforcement, which makes sense as a copy of a Rolex watch infringes irrespective of its effective quality.

In reality, both the legitimate producer and counterfeiters may produce nearly identical products; that is, the value of β may be close to 1. For instance, this is true in the software industry, where the cost of creating software is generally great, while the cost of copying is negligible. In another case reported by OECD (1988, p. 12), "Counterfeit clothing, particularly from Italy, is becoming very difficult to combat. … Very often the fakes are made by the same manufacturer that is contracted to produce the original items. The copies are therefore indistinguishable from the genuine item, but are sold for less than half the price. These 'over-runs', as they are called, are difficult to stop for the trademark owner."

Plugging both equations $s_c = \beta s_m$ and (7) back into (4), the equilibrium quality s_m^* can be computed by solving the first-order condition of π_m with respect to s_m:

$$s_m^* = \frac{1}{8} \frac{\overline{\theta}^2 (1-\phi)(1-\beta)}{k(1-\phi t)(bv - bv\phi - \phi t + (1-\phi)(1-v))} \,.$$

The second-order condition is satisfied. In order to facilitate the analysis, define $H = bv - bv\phi - \phi t + (1-\phi)(1-v)$. Thus, s_m^* can be rewritten as:

$$s_m^* = \frac{1}{8} \frac{\overline{\theta}^2 (1-\phi)(1-\beta)}{k(1-\phi t)H} \,. \tag{8}$$

Here, $H > 0$ because $bv - bv\phi - \phi t > 0$ from Assumption 2, implying that $s_m^* > 0$. The related equilibrium results can be subsequently obtained as follows:

$$\hat{\theta}_m^* = \frac{1}{2} \frac{\overline{\theta}}{1-\phi t} \quad \text{and} \quad \hat{\theta}_c^* = \frac{1}{2} \frac{\overline{\theta}(1-\beta)(bv\phi - bv + \phi t)}{\beta(1-\phi t)H} \,, \tag{9}$$

$$p_m^* = \frac{1}{16} \frac{\overline{\theta}^3 (1-\phi)^2 (1-\beta)^2}{k(1-\phi t)^2 H^2} = \frac{4k}{\overline{\theta}} (s_m^*)^2 \,, \tag{10}$$

$$\pi_m^* = \frac{1}{64} \frac{\overline{\theta}^4 (1-\phi)^2 (1-\beta)^2}{k(1-\phi t)^2 H^2} = k(s_m^*)^2 . \tag{11}$$

The values of s_m^*, p_m^*, and π_m^* are positive under Assumptions 1 and 2. The price p_m^* is termed *the competitive-fringe monopoly price* hereafter, since it is an equilibrium monopoly price when the monopoly firm faces a competitive fringe due to the threat of free entry by counterfeiters.

    Proposition 1 is now can formulated, which concludes that strictly enforcing IPR laws benefits the luxury monopolist.

Proposition 1: Under the market coverage assumption, stricter enforcement of IPR laws (increasing ϕ) raises the genuine item's quality and price, thereby increasing the luxury monopolist's profits.

Proof: We have

$$\frac{\partial s_m^*}{\partial \phi} = \frac{\overline{\theta}^2 t(1-\beta)\left\{2B + (1-bv)(1-2\phi) + 2\phi v(1-b) + (1-v)(1+\phi^2) + v\phi^2(1+b)\right\}}{8k(1-\phi t)^2 H^2},$$

where $B = bv - bv\phi - \phi t$. Because Assumptions 1 and 2 imply that $bv - bv\phi - \phi t > 0$ and $0 \le \phi \le 1/2$ and because $0 < \beta < 1$, $0 < b < 1$, and $0 < v < 1$ from the model setting, one obtains that $\partial s_m^*/\partial \phi > 0$. Applying $\partial s_m^*/\partial \phi > 0$ to (10) where $p_m^* = 4k(s_m^*)^2/\theta$ and to (11) where $\pi_m^* = k(s_m^*)^2$, the inequalities $\partial p_m^*/\partial \phi > 0$ and $\partial \pi_m^*/\partial \phi > 0$ follow.

    The impact of Veblen effects on the monopolist can be easily shown. The results are $\partial s_m^*/\partial v > 0$, $\partial p_m^*/\partial v > 0$, and $\partial \pi_m^*/\partial v > 0$, implying that the existence of Veblen effects also raises the genuine item's quality and price and the monopolist's profits.

    Proposition 2 states the relationship between the volume of the fines and the competitive-fringe monopoly price.

Proposition 2: Raising the fine income to the monopolist improves the product quality and increases the monopoly price, thereby enlarging the monopolist's profits.

Proof: We have

$$\frac{\partial s_m^*}{\partial t} = \frac{\overline{\theta}^2 t(1-\beta)(1-\phi)\phi\left\{2B + (1-v) + v\phi(1-b) + (1-2\phi)(1-bv) + \phi\right\}}{8k(1-\phi t)^2 H^2},$$

where $B = bv - bv\phi - \phi t$. Since $bv - bv\phi - \phi t > 0$, $0 \le \phi \le 1/2$, $0 < b < 1$, $0 < v < 1$, and $0 < \beta < 1$, the result $\partial s_m^*/\partial t > 0$ follows. Applying $\partial s_m^*/\partial t > 0$ to (10) where $p_m^* = 4k(s_m^*)^2/\theta$ and to (11) where $\pi_m^* = k(s_m^*)^2$, the results $\partial p_m^*/\partial t > 0$ and $\partial \pi_m^*/\partial t > 0$ are derived.

    The interesting thing in Proposition 2 is that the linkage of the penalty to the monopolist's price causes a price-up effect: if the value of t in the law code is raised, then it increases the monopolist's incentive to set a higher price since

$\partial p_m^* / \partial t > 0$. Whether this effect can ever be strong enough to yield a price higher than the price chosen without counterfeiting is investigated below.

3. Comparison with a Sole Monopoly Case

To understand the impact of IPR law enforcement on the monopoly price, it is worthwhile to provide a sole monopoly case as a benchmark, whereby a sole monopolist offers a luxury good when counterfeiting is *not feasible*. Since consumer θ wanting to satisfy $U_m \geq 0$, i.e., $\theta \geq \theta_m' \equiv (1-v)p_m/s_m$, has no other choice except to purchase the monopolist's product, the demand function for the monopolist is $D_m = \theta - \theta_m' = \theta - (1-v)p_m/s_m$. Plugging this demand function and fixed product costs $F = ks_m^2$ into the monopolist's profit function $\pi_m = p_m D_m - F$, one can see that $\pi_m = p_m(\theta - (1-v)p_m/s_m) - ks_m^2$. The equilibrium price $\bar{p}_m^*$, quality $\bar{s}_m^*$, and profit $\bar{\pi}_m^*$ are then obtained as $\bar{p}_m^* = \bar{\theta}^3 / (16k(1-v)^2)$, $\bar{s}_m^* = \bar{\theta}^2 / (8k(1-v))$, and $\bar{\pi}_m^* = \bar{\theta}^4 / (64k(1-v)^2)$.

Now define $f \equiv p_m^* / \bar{p}_m^*$, which is the ratio of the competitive-fringe monopoly price p_m^* to the sole monopoly price $\bar{p}_m^*$. If $f > 1$, then $p_m^* > \bar{p}_m^*$, indicating that the competitive-fringe monopoly price p_m^* is higher than that of the sole monopoly case under the counterfeit monitoring regime. The function f is calculated as:

$$f(t,\phi) \equiv \frac{p_m^*}{\bar{p}_m^*} = \left(\frac{(1-\phi)(1-\beta)(1-v)}{(1-\phi t)(bv - bv\phi - \phi t + (1-\phi)(1-v))} \right)^2. \tag{12}$$

Recall that the fine income to the monopolist is assumed to be $t \in [0,1]$. We can now discuss the two extreme cases of $t = 0$ (representing no fine sanctions against counterfeiters) and $t = 1$ (representing full fine sanctions on counterfeiters). Propositions 3 and 4 summarize the results.

***Proposition 3*:** In the situation where Veblen effects prevail in the market but there is no sanction in terms of fines against counterfeiters ($t = 0$), the competitive-fringe monopoly price p_m^* is lower than the sole monopoly price $\bar{p}_m^*$; that is, $p_m^* < \bar{p}_m^*$.

***Proof*:** Recall that $0 < \beta < 1$, $0 < b < 1$, and $0 < v < 1$. If $t = 0$, then (12) becomes

$$f(0,\phi) \equiv \frac{p_m^*}{\bar{p}_m^*} = \left(\frac{(1-\beta)(1-v)}{bv + 1 - v} \right)^2 = \left(1 - \frac{bv + \beta(1-v)}{bv + (1-v)} \right)^2 < 1. \tag{13}$$

Therefore, $p_m^* < \bar{p}_m^*$.

Proposition 4 is novel as it specifies the condition to sustain a supranormal monopoly price in the presence of counterfeiting.

***Proposition 4*:** Let $\phi_1 = (bv - \beta v + \beta)/(bv - v + 2)$ and $\bar{\phi}' = vb/(1+bv)$. When

Veblen effects prevail in the market and upon imposing maximum fines on counterfeiters ($t=1$), the competitive-fringe monopoly price p_m^* is: (i) a normal monopoly price with $p_m^* < \bar{p}_m^*$ if the counterfeit monitoring rate ϕ satisfies $0 < \phi < \phi_1 < \bar{\phi}'$ or (ii) a supranormal monopoly price with $p_m^* \geq \bar{p}_m^*$ if ϕ satisfies $\phi_1 \leq \phi < \bar{\phi}'$.

Proof: If $t=1$, then (12) becomes

$$f(1,\phi) \equiv \frac{p_m^*}{\bar{p}_m^*} = \left(1 - \frac{(bv - \beta v + \beta) - \phi(bv - v + 2)}{H'}\right)^2, \tag{14}$$

where $H' = bv - bv\phi - \phi + (1-\phi)(1-v) > 0$ as $bv - bv\phi - \phi > 0$ (from Assumption 2 by setting $t=1$). Whether $f(1,\phi) \geq 1$ holds depends on the condition $\phi \geq (bv - \beta v + \beta)/(bv - v + 2) = \phi_1$, and this condition must be constrained by Assumption 2 where $0 < \phi < vb/(1+bv) = \phi'$ (by setting $t=1$). Comparing ϕ_1 and $\bar{\phi}'$ shows that $\phi_1 - \phi' = \{(1-v)(\beta + \beta bv - bv)\}/\{(1+bv)(bv+2-v)\} < 0$ if and only if $\beta < \bar{\phi}'$. If $\beta < \bar{\phi}'$, one can conclude that (i) if $0 < \phi < \phi_1$, then $f(1,\phi) < 1$, i.e., $p_m^* < \bar{p}_m^*$, and (ii) if $\phi_1 \leq \phi < \bar{\phi}'$, then $f(1,\phi) \geq 1$, i.e., $p_m^* \geq \bar{p}_m^*$.

Propositions 3 and 4(i) are trivial, as a firm in a competitive environment sets a lower price than under the sole monopoly case. The novel aspect is in Proposition 4(ii) where $p_m^* \geq \bar{p}_m^*$, which describes a surprising situation in that when enforcement is too strict (when ϕ is over the critical value of ϕ_1), the monopolist raises its price up to the point where p_m^* is greater than or equal to $\bar{p}_m^*$. Figure 2 indicates that stringent IPR enforcement with $\phi \in [\phi_1, \phi']$ can sustain such a supranormal monopoly price. This is because the monopolist benefits more from a greater amount of fine income due to the increase in ϕ when $t=1$.
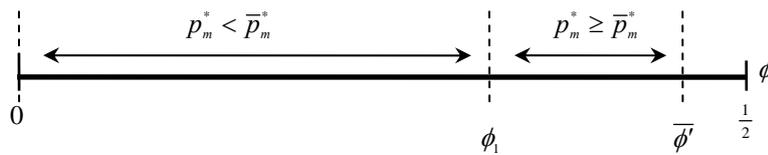
Figure 2: Price comparisons under the condition $\phi_1 < \bar{\phi}'$ (or $\beta < \bar{\phi}'$) when $t=1$

We have so far limited ourselves to the extreme cases of $t=0$ and $t=1$. Ideally, the analysis should be developed for any t where $0 \leq t \leq 1$, but this turns out to be cumbersome and adds little insight to the problem we are concerned with. In a generalized case of t where $0 \leq t \leq 1$, one can still find the values of ϕ that sustain a supranormal monopoly price, if t is above a certain critical value. A brief discussion of this generalized case is available from the author on request.

The main finding is clear. Counterfeiting may push up the price of the original product, which conflicts with intuition. However, this is not hard to understand: as counterfeiters' effective marginal costs are increasing in the price of the original

product due to the pegged-price relation shown in (2), the monopolist has an incentive to set its price higher because it raises competitor's (i.e., counterfeiter's) costs and enhances fine revenue. In particular, luxury goods differ from many frequently purchased goods in an important way: they satisfy not just material needs but also social needs such as prestige (Belk, 1988). This difference has important implications for how such goods are marketed: they should not price their product too low since they could sell less at a lower price (Amaldoss and Jain, 2005). Therefore, a high selling price is a common phenomenon in the luxury industry.

Although Proposition 4 has not been tested empirically to date, some related data confirmation certainly merits attention. The Economist (2004) estimates that high-fashion brands enjoy gross margins of 50% to 60% on clothes and 80% on leather goods. Gross margins on Louis Vuitton, Gucci, and Cartier products are around 70% and operating margins are over 20% (The Economist, 2002). Analysts believe that Cartier jewelry sells at a market premium of possibly 40% (The Economist, 1992). Consumers are willing to pay premiums of up to 10 times "conventional price levels" for luxury items (Financial News, 2002). These observations show that luxury producers charge consumers substantial above-cost premia, even when there are numerous alternative goods having objectively similar product characteristics. This indirectly suggests that the luxury monopolist has an incentive to charge a supranormal price in markets with counterfeiting.

Because $\pi_m^* = (\overline{\theta}/4)p_m^*$ and $\overline{\pi}_m^* = (\overline{\theta}/4)\overline{p}_m^*$, Proposition 4(ii) implies Corollary 1.

Corollary 1: Under the counterfeit monitoring regime with the condition $\phi_1 \leq \phi < \overline{\phi}'$, the monopolist obtains greater or equal profits from the existence of counterfeiting than that in the absence of counterfeiting.

The intuition behind Corollary 1 is readily explained. Although the existence of counterfeit products erodes the monopolist's profits, it also secures a premium $\phi t p_m^*$ per unit sold on the counterfeit market under the counterfeit monitoring regime. In this situation, the monopolist is helped by counterfeiting when the government strictly enforces IPR laws with a relatively high value of ϕ. Consequently, the firm's profits may be higher in the presence of counterfeiting than otherwise.

Proposition 3 (where $t = 0$) implies that the existence of Veblen effects is not enough to sustain a supranormal monopoly price in the luxury market. The support of a supranormal price further requires the imposition of a sanction on counterfeiters in terms of fines whereby $t \neq 0$ (see Proposition 4). Since the luxury market we consider assumes Veblen effects, we cannot isolate Veblen effects from the current model. Once Veblen effects are dropped, the model loses this special feature relative to other models of IPR infringements.

The finding of a supranormal luxury price is compelling but nevertheless hinges on three conditions: (i) IPR enforcement is strong, (ii) a monetary penalty is imposed on counterfeiters,. (iii) the Veblen effect prevails. Casual observation demonstrates that counterfeiting persists in settings where these conditions hold. Compared with other countries, IPR statutes in the US are more complete and IPR

protection is stronger. However, Barnett (2005) states that in New York:

> On Manhattan's Canal Street, a large number of vendors operate stalls and more permanent establishments that offer consumers a wide range of imitations of high-end handbags and other luxury goods, all at drastically reduced prices relative to the original and almost all at varying levels of fairly obvious inferiority relative to the original. … Ironically, Canal Street forms the southern border of Manhattan's trendy Soho neighborhood, where many high-end luxury designers maintain stores that purvey the original versions of the items for which the Canal Street shoppers are either unwilling or unable to pay the high price.

This observation suggests that the Soho designer boutiques enjoy a vigorous level of business and regularly introduce new items. This is a close geographic juxtaposition of original fashion items being sold at high prices and unauthorized imitations being sold at substantially reduced prices with little apparent effect on the flow of new items into the full-price market segment. This "poses a conundrum for the fashion industry which appears to sustain the existence of counterfeiting" (Barnett, 2005) even while facing widespread unauthorized imitation and even while facing a increasingly pervasive IPR enforcement in the US.

It is worth noting that, in our model, the fine transfer to the monopolist is critical to the results proposed in Propositions 3 and 4—that is, the penalty scheme influences the critical value that decides whether $p_m^* \geq \bar{p}_m^*$. One can expect that when most of the fines are transferred to the legitimate monopolist, even if the government retains a fraction, the monopolist still has a strong incentive to set a high price. In this situation, the results are similar to those in Propositions 3 and 4.

4. Conclusion

This paper sets up a vertical product-differentiated counterfeiting model, whereby the monitoring rate to detect counterfeits is taken as an indicator of the strength of IPR enforcement. We focus on a luxury market where Veblen effects prevail. The results show that strict IPR enforcement and strong Veblen effects benefit the monopolist and enhance its incentives to improve the product quality and raise prices.

Most studies in the IPR literature claim that the presence of counterfeit products erodes monopolist profits. We argue that this is not always true in a market with Veblen effects. Instead, we find an effect due to IPR enforcement that can even be strong enough to raise the original product's selling price (called the competitive-fringe monopoly price) that is higher than the price chosen in the absence of counterfeiting. This is because penalties under IPR enforcement are often civil fines, which tend to be claimed by the IPR holder rather than by the government. Such a fine transfer scheme increases the IPR-holder's incentives to set a high selling price, as a high price means more income from successful enforcement.

The fine transfer scheme enables a legitimate producer to capture a portion of the counterfeiter's revenues. Consequently, the producer may obtain greater profits in the presence of counterfeiting than in its absence. This results implies that the monopolist may tolerate counterfeiting to some extent out of profit-maximizing considerations. It is also worth noting that, in the model we propose, the existence of Veblen effects is not enough to sustain a supranormal monopoly price in the luxury market. Maintaining the supranormal price also requires this fine transfer scheme, which reinforces the monopolist's incentive to raise product prices.

The policy implication is that proper IPR law and enforcement must consider how legitimate producers will adjust their prices in response to policy. In this paper, the competitive-fringe monopoly price increases with the fines pegged to the price of the genuine product, indicating that an increase of the pegged value in the law may also push the monopolist price above the no-counterfeiting price. Such a high price generally creates deadweight losses, which is in contrast to the classic Beckerian conclusion about an optimal penalty: "social welfare is strictly increasing in magnitude of the fine and, as a result, extreme penalties are socially optimal" (Saha and Poole, 2000). We find instead that heavier fines may imply higher prices of the genuine products, which is not socially desirable. From this viewpoint, the application of the Beckerian argument to the luxury market is not appropriate.

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