The strategy of raising counterfeiters' costs in luxury markets

Insaf Bekir · Sana El Harbi · Gilles Grolleau

Abstract   A luxury monopolist can prefer increasing its net profits by raising the costs of a competitive fringe of counterfeiters compared to a situation where it can completely drive them out of the market. The mechanism underpinning this outcome results from the fact that counterfeiters can generate net revenues for the luxury monopolist because (1) sanctions imposed to counterfeiters are shaped and pocketed by the luxury monopolist under cover of deterrence (2) costs and profit loss due to counterfeiters and incurred by the luxury monopolist can be less than what is usually assumed. Moreover, the presence of counterfeits can be considered as promotional devices that signal the true luxury cachet, increases the snob value of the counterfeited brand and rewards high-end designers in a non-monetary way. In short, counterfeiting is like the light of the sun: it can burn the genuine firm but living without can be more harmful for the genuine firm.

Keywords   Counterfeiting · Fines · Intellectual property rights ·
Raising rivals' costs

JEL Classifications   D21 · D23 · D42

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1 Introduction

Unauthorized imitation is frequently described as detrimental for the genuine producers in creative industries by depriving them of a legitimate income leading to an under-innovation outcome (e.g., Arrow 1962; Grossman and Shapiro 1988). Consequently, the fight against counterfeiters is traditionally justified by the need to promote innovation. For example, the European Commission has recently strengthened its regulatory arsenal to 'eradicate' counterfeiting and piracy, which cause huge losses to the European economy. Nevertheless, luxury products and their unauthorized imitations frequently coexist, sometimes in close geographic proximity as in Manhattan where Soho high-end designers neighbour Canal Street vendors of counterfeited items (Barnett 2005; De Castro et al. 2008). On one side, the conventional view cites budget-constraints to account for otherwise puzzling situation, that is original producers cannot eliminate substantial levels of unauthorized imitation as a result of low infraction costs on the part of imitators and high detection and enforcement costs on the part of innovators. On the other side, several rationales have been developed to show how piracy can increase the profit of pirated firms, especially for digital goods.[1] Most arguments relate to either network effects (e.g., Conner and Rumelt 1991; Slive and Bernhardt 1998) or the sampling and exposure effects (e.g., Liebowitz 2005), or the learning by doing effect (e.g., Chaves and Deroian 2004), or the possibility of enhancing a monopolist's pricing power by allowing it to overcome Coase's time-inconsistency (e.g., Takeyama 1997).

Unlike the previous arguments developed in the digital goods context, we consider luxury goods that are mainly consumed for their status conveying properties (Corneo and Jeanne 1997). Regarding the fashion and luxury world, some authors argued that some kinds of counterfeiting can create a flattery effect that increases the snob value of originals (Barnett 2005) or speeds up the fashion cycle by destroying the status value of the original, thereby generating demand for new items from the original producer (Raustiala and Sprigman 2006) or can inspire high-end designers of counterfeited firms in new directions that were not explored before (Grolleau and El Harbi 2008). Interestingly, Yao (2005) demonstrates that when fines imposed to counterfeiters are pegged to the price of genuine items, the luxury monopolist can find counterfeiting profitable by raising its selling price under a stringent counterfeit monitoring regime. Our contribution offers a related argument to explain this otherwise surprisingly less-than-vigorous enforcement. We consider a luxury monopolist and a competitive fringe of counterfeiters operating in a market with Veblen effects [2] (Veblen 1899 [1994]; Barnett 2005). We show that the luxury monopolist can be better off by raising the production costs of its competitive fringe of counterfeiters compared to a situation where it can drive them out of the market. The underpinning mechanism borrows from Yao (2005) by allowing the monopolist to pocket sanctions imposed to counterfeiters (as practiced in several countries) but

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[1] Digital goods include goods for which the marginal cost of duplication is close to zero with copied products having a similar quality to original ones.

[2] Veblen effects refer to anomalies in the general theory of demand where the individual's preference for buying a good increases with its price. Veblen effect are related to conspicuous consumption where individuals flaunt their acquisition of a good in anticipation of social status it will generate.

without requiring sanctions pegged to the price of genuine items. Our study considers as well some collateral benefits related to the flattery effect generated by the presence of counterfeiting (Barnett 2005) that makes the mechanism more likely to engender the expected results. The analysis is also supported by the fact that being counterfeited and fighting counterfeiting up to a certain level can also serve as 'free' signals of true luxury (de Castro et al. 2008).

The originality of this contribution is at least threefold. First, from a theoretical viewpoint, we apply the raising rivals' costs theory (RRC) to a new domain, counterfeiting. Actions that raise rivals' costs are generally likely to increase the instigating dominant firm's own costs. This strategy is profitable if, by raising rivals' costs, the dominant firm can raise the market price at the current level of output by more than the firm raises its average cost (keeping output constant) (Salop and Scheffman 1983). In the case of counterfeiting, raising counterfeiters' costs increases the revenue from selling originals by adding to the profit of the genuine firm the net sanction taken on counterfeiters (without requiring any change in the quantity of originals sold). This mechanism to get higher revenues differs from those usually used in RRC strategies.

Second, we show that legal rules can be strategically manipulated under cover of deterrence to increase the genuine firm profit. The genuine firm strategy combines the manipulation of legal rules that increases the price of counterfeited items and generates a relative decrease of the demand addressed to the counterfeiters. Rather than seeking the complete deterrence of counterfeiters, the genuine firm seeks to regulate the quantity of fakes released on the market both to pocket fines as an additional source of revenue but also to other benefits resulting from the presence of a limited quantity of counterfeited products.

Third, despite the fact that the modelling does not completely 'capture' the collateral benefits, these indirect effects make the mechanism more likely to generate the expected results. Indeed, the presence of counterfeit items and reactions of counterfeited brands can generate other less immediately visible benefits such as proving the true luxury character, increasing the snob value of the counterfeited brands which can ultimately increase the desirability, the willingness to pay and the demand of the genuine items (Barnett 2005).[3] For example, Stuart Whitwell, joint managing director of Intangible Business, argues that '[luxury] brands which are not faked are considered too weak to generate consumer demand and are consequently not produced. In the same vein, Ritson (2007) argues that counterfeit products 'are often the first signal of a luxury brand's renaissance (when copies appear) or of the final nail in the coffin (when they do not)'. Even, a leading designer, Giorgio Armani, on a recent trip to Shanghai, purchased a fake Armani watch for $22 instead of the £710 his authentic watches retail for. He said: 'It was an identical copy of an Emporio Armani watch…it's flattering to be copied. If you are copied, you are doing the right thing' (Reported in Whitwell 2006). Moreover, counterfeiting can generate non-monetary rewards that stimulate high-end designers. As

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[3] Although the 'endogeneity issue' is beyond the scope of this contribution, it would be very interesting to investigate whether successful luxury brands are more counterfeited or whether more counterfeits of a given brand (up to a threshold) contribute to its luxury cachet.

stated by Marc Jacobs, 'one of the most well-known and closely watched designers in the world, helming his own signature label, a diffusion line, and the French luxury brand Louis Vuitton': (…) 'To me, it's the greatest compliment. Even when I see a copy, something that's inspired by something I've done, it's a rewarding feeling (emphasis added). Because that's why I do what I do. It was never my desire to revolutionize fashion, to make clothes that could be in a museum. I want to create clothes that have a certain style, but I want to see them used. I want to see people enjoy the things I've made' (Teen Vogue 2009). In sum, designers can also benefit from counterfeiting at the individual level. At the same time, these positive effects require that the quantity and quality of counterfeits released are not too important. Indeed, if some 'thresholds' are exceeded, the positive effects of counterfeits' presence will be more than offset by conventional negative effects of counterfeit items.

Our objective is not to support counterfeiting, but to expose an original mechanism by which the genuine firm can take advantage from being counterfeited. By raising the costs of counterfeiters (Salop and Scheffman 1983; Poddar 2005) and pocketing the sanctions imposed on counterfeiters, the genuine firm can increase its profit compared to a situation where all counterfeiters are eliminated. We show that even when the genuine producer can shape the 'rules of the game' (namely, the amount of sanctions imposed on counterfeiters), he will not necessarily seek to eliminate all counterfeiters. Moreover, the genuine firm can benefit from 'collateral' effects, such as increasing the snob value of the brand or rewarding high-end designers in a non-monetary way. Interestingly, our findings are consistent with other contributions arguing that a genuine producer can benefit from the presence of counterfeiters (Yao 2005; Barnett, forthcoming; Raustiala and Sprigman 2006).

The remainder of the contribution is organized as follow. Section 2 provides the set-up of the model. Section 3 delivers the main analysis and derives the main results. Section 4 concludes the paper and suggests some extensions.

2 The model

Let us consider a market where a luxury monopolist sells a genuine product protected by conventional intellectual property rights laws. However, counterfeiters illegally copy and sell the product without the permission of the monopolist. Interestingly, given that the illegal counterfeiting has already taken place, the analysed situation corresponds to a particular case of ex post deterrence situation, also called desistance. Once the information about the fine level is released, counterfeiters integrate it in their decision making. We assume that the original producer can undertake some actions to drive its competitive fringe of counterfeiters out of the market namely through lobbying to improve the enforcement of IPR laws so that the counterfeiters are actually deterred. Interestingly, the economic analysis of law has devoted considerable attention to how to achieve optimal deterrence notably by adjusting the tradeoff between the probability of detection and magnitude of fines (Becker 1968; Polinsky and Shavell 1979; see also Kaplow 1992). The basic insight of Becker's seminal contribution is that potential offenders

respond to the probability of detection and the severity of punishment. Consequently deterrence can be achieved either by raising the penalty or by increasing the probability of detection. The model leads to an efficient level of infractions whereby the marginal cost of enforcement is equated to the marginal social benefit of the offenses reduced per unit of enforcement. Given that raising the probability of detection is costly for the government, Becker (1968) suggests playing mainly on the penalty level and argues in favor of high fine-low probability tradeoff. However, this strategy can be difficult because of political reasons or wealth constraints of offenders (Polinsky and Shavell 1979). Unlike this literature focusing on optimal deterrence, we assume that the original producer can strategically shape the 'rules of the game' and set the sanction or fine level,[4] not simply to reach the efficient level of offenses but especially to regulate quantities offered by counterfeiters and maximize its profits.

2.1 Consumers

The demand for luxury products comes from a continuum of consumers indexed by a parameter θ, which is uniformly distributed over the interval [0, 1]. The taste parameter θ can be interpreted as the valuation that the consumer gives to the good. Genuine and counterfeited products are denoted, respectively with subscripts g and c. Each consumer has a completely inelastic demand, which means that every individual demands either one unit of the good or nothing. The utility function of the consumers is given by:

$$\begin{cases} \theta - p_g & \text{if buys the genuine product} \\ \alpha\theta - p_c & \text{if buys the fake product} \\ 0 & \text{if buys none} \end{cases} \tag{1}$$

where p_g and p_c are respectively the price of the genuine and fake products. As genuine and counterfeited products are imperfect substitutes and vertically differentiated, the valuation of a fake product is lower than the valuation of an original item. Indeed, the quality of fakes and the Veblen effect expected from them are lower than those expected from genuine products (Yao 2005, 2007).

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[4] In law and economics, the 'fines' are public sanctions imposed by a court or other public authority with a view on deterrence and exceeding the amount of the damages suffered in order to outweigh a low probability of detection while 'compensations' are imposed to compensate damage done as a result of perfectly detected counterfeiting. In traditional deterrence model, what matters is not how the sanction is labelled and who is the recipient of the payment made by offenders (e.g., fines, compensations), but the insight that increasing the cost of an activity will necessarily decrease the rate at which it occurs. This hypothesis has been recently challenged by empirical evidence showing (1) that an increase in sanction can lead to an increase in the undesirable activity (Gneezy and Rustichini 2000) and (2) how the sanction is framed (and not only its amount) and the identity of recipients matter (Feldman and Teichman 2008). In our contribution, given the role played by the sanctions, they do not fit well the conventional meaning of terms used in law and economics literature. Indeed, we deal with all payments imposed on perpetrators of undesirable activities, regardless of their 'labels' which are strategically used under cover of deterrence or tort damages to maximize revenue of genuine firms. Consequently, we use the terms 'sanctions' and 'fines' interchangeably, but not in their conventional meanings.

Consequently, the valuation of a fake compared to the valuation of a genuine item is discounted by the factor α with $0 \le \alpha \le 1$.

2.2 Producers

On the supply side we consider a monopolist selling genuine items and a competitive fringe selling fakes. We suppose that each counterfeiter incurs no production cost, except if it is caught and forced to pay a fine (f) proportional to the quantity sold (CEIPI 2004). As practiced in some countries, we assume that the fines are pocketed by the genuine firm (Yao 2005). For example, in June 2008, a French court "ordered e-Bay to pay \$63 million in damages to units of the Paris-based luxury goods mammoth LVMH, after agreeing that the site had facilitated the sale of counterfeit versions of its high-end products, particularly Louis Vuitton luggage" (Crumley 2008). Moreover, a recent French law (Law # 2007-1544, October, 29, 2007) substantially reinforces the compensations that can be imposed on counter-feiters (Grall and Laur-Pouédras 2008; see also the propositions in CEIPI 2004). For Chicago-oriented scholars, the identity of recipients does not matter, except if the transfer beneficiates the offender. Nevertheless, recent quasi-experimental evidence shows that the identity of recipients by distinguishing payment made to the state or to the injured party matters (Feldman and Teichman 2008). As practiced in some countries, we assume that the sanctions are pocketed by the a priori main injured party, the genuine firm (Yao 2005). The probability of being caught is ϕ with $0 < \phi < 1$ and the anticipated cost incurred per counterfeiter is $\phi f D_c$, where D_c is the demand addressed to the counterfeiter. We do not consider the polar cases when ϕ is nil (no enforcement at all) or when ϕ is equal to one (perfect enforcement). The counterfeiter profit is then:

$$\pi_c = ((1 - \phi)p_c - \phi f)D_c. \tag{2}$$

Obviously, this expression decreases with the fine level which is the only cost incurred by the counterfeiter. As stressed above, we assume that the luxury monopolist can shape the level of sanctions and consequently the cost incurred by its competitive fringe. We focus more on the fine level rather than on the probability of detection because we assume that it less costly for public authorities to increase the fine level compared to the cost of increasing the probability of detection (Becker 1968). Consequently, it is intuitively easier for genuine firms to influence public decisions on the fine amount level. At the same time, genuine firms can also devote resources in increasing the detection rate, notably through private initiatives. For example, 70 French luxury firms sponsor the Comité Colbert (http://www.comitecolbert.com/) in charge of lobbying among public authorities at the national and international levels to get better protection for copyright holders (Allérès 1998).

Without loss of generality, we also assume that the luxury monopolist only incurs a fixed cost k, corresponding to expenditures related to stronger enforcement of their intellectual property rights. It is well known that luxury sector seeks to get better protection against (some) counterfeiters and use different methods such as lobbying for higher sanctions, training 'private' control teams, producing statistics and anecdotal evidence on the negative impact of counterfeiting. Laurenson (2005)

reports that the 'clothing brand Lacoste, for example, spends 3 m euros a year on fighting fakes. Vuitton, whose distinctive LV label leather goods must be among the most distinctive—and most copied—in the world, spends 15 m euros'. Several reports provide alarming data on the problem size and are widely used to justify changes in intellectual property rights regime (Verma 1996). Consequently, the monopolist profit is expressed as follows:

$$\pi_g = p_g D_g + \phi f D_c - k \tag{3}$$

where D_g is the demand addressed to the genuine manufacturer.

3 Analysis of conditions under which counterfeiting can be desirable

Let us compare a world without counterfeiting that serves as a benchmark with a world where counterfeiters co-exist with the luxury monopolist.

3.1 The world without counterfeiting

Let $\hat{\theta}$ indexes the marginal consumer who is indifferent towards buying a genuine item or not buying at all. The consumer θ willing to receive a positive net utility $\theta - p_g \geq 0$ or $\theta \geq \hat{\theta} = p_g$, has no other choice but to purchase the genuine product. Thus, the demand addressed to the monopolist is expressed as follows:

$$D_g = \int_{\hat{\theta}}^{1} d\theta = 1 - \hat{\theta} = 1 - p_g \tag{4}$$

Since the objective function of the luxury monopolist is given by $\pi = p_g(1 - p_g)$, the first order condition of profit maximization implies that:

$$p_g^d* = \frac{1}{2}, \ D_g^d* = \frac{1}{2} \text{ and } \pi_g^d* = \frac{1}{4} \tag{5}$$

where the superscript d corresponds to the full-deterrence model.

3.2 The world with counterfeiting

Let us examine now a more realistic situation in which the luxury monopolist co-exists with a competitive fringe of counterfeiters. The original producer fights against counterfeiting, which leads to an increase of the real penalty amount incurred by counterfeiters. Indeed, by increasing either the detection rate or the formal fine level or both, the luxury monopolist increases the marginal cost of counterfeiters. Above a certain fine level, counterfeiting can be completely deterred because this activity becomes unprofitable. While this end result can be reached either by increasing the probability of detection or by increasing the fine level, the latter is likely to be preferred because it economizes on resources devoted to enforcement (Becker 1968). Accordingly, we consider that the luxury monopolist

only shapes the fine level. Following the Grossman and Shapiro model (1988), we assume that the net expected payoff due to counterfeiting is zero in equilibrium and compute the price reaction function of a counterfeiter:

$$p_c^* = \frac{\phi f}{1 - \phi} \tag{6}$$

Equation 6 shows that the price of a counterfeit product increases with either the fine level $\frac{\partial p_c}{\partial f} > 0$ and the probability of being caught $\frac{\partial p_c}{\partial \phi} > 0$. As indicated above, each individual purchases either one unit of the product (fake or genuine) or nothing. Consequently, we can characterize two marginal consumers: (1) the consumer indexed by

$$\hat{\theta}_c = \frac{p_c}{\alpha} \tag{7}$$

who is indifferent towards buying a fake or not buying at all (2). The consumer indexed by

$$\hat{\theta}_g = \frac{p_g - p_c}{1 - \alpha} \tag{8}$$

who is indifferent between buying the counterfeit product or the original one. The Fig. 1 depicts the distribution of buyers.

Thus, the demand functions for the original producer and for the counterfeiters are respectively given by:

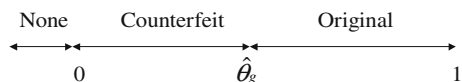$$D_c = \int_{\hat{\theta}_c}^{\hat{\theta}_g} 1 d\theta = \frac{\alpha p_g - p_c}{\alpha(1 - \alpha)} \tag{9}$$

$$D_g = \int_{\hat{\theta}_g}^{1} 1 d\theta = \frac{1 - \alpha - p_g + p_c}{1 - \alpha} \tag{10}$$

Substituting Eq. 3 into Eqs. 8 and 9 and then plugging Eqs. 8 and 9 into the monopolist's profit function in Eq. 4, the first order condition of profit maximization implies that:

$$p_g* = \frac{(1 - \phi)(1 - \alpha) + \Phi(2 - \phi)f}{2(1 - \phi)} \tag{11}$$

$$\hat{\theta}_g* = \frac{(1 - \phi)(1 - \alpha) - \phi^2 f}{2(1 - \alpha)(1 - \phi)} \tag{12}$$

Fig. 1 Distribution of buyers

None   Counterfeit   Original

0                    $\hat{\theta}_g$ 1

$$\hat{\theta}_g^* = \frac{\phi f}{\alpha(1-\phi)} \tag{13}$$

$$D_c^* = \frac{\alpha(1-\alpha)(1-\phi) - [2(1-\alpha) + \alpha\phi]\phi f}{2\alpha(1-\alpha)(1-\phi)} \tag{14}$$

$$D_g^* = \frac{(1-\phi)(1-\alpha) + \phi^2 f}{2(1-\alpha)(1-\phi)} \tag{15}$$

π_g^*

$$= \frac{\alpha(1-\alpha)^2(1-\phi)^2 + 2\alpha(1-\alpha)(1-\phi)(2-\phi)\phi f + [\alpha(2-\phi)^2 - 4(1-\phi)]\phi^2 f^2}{4\alpha(1-\alpha)(1-\phi)^2} - k$$

$$\tag{16}$$

It is realistic to assume that the original producer remains motivated to fight counterfeiting, so we assume that π_g* is positive. Formally, we assume that the following condition is satisfied.[5]

Assumption 1:

$$k < \frac{\alpha(1-\alpha)^2(1-\phi)^2 + 2\alpha(1-\alpha)(1-\phi)(2-\phi)\phi f + [\alpha(2-\phi)^2 - 4(1-\phi)]\phi^2 f^2}{4\alpha(1-\alpha)(1-\phi)^2}.$$

This condition implies that k must remain sufficiently low so that the income from selling the product, pocketing the fines and reaping other collateral benefits largely over-compensates the cost of fighting counterfeiters.

To ensure the existence of some buyers of both the original and the fake items we should have $\theta c \leq \hat{\theta}g \leq 1$, which implies restriction on the values of the fine level.

Lemma 1: *The necessary and sufficient condition for the existence of some buyers for both the original and the fake items is $0 \leq f < \bar{f}$ with $\bar{f} = \frac{\alpha(1-\alpha)(1-\phi)}{\phi[2(1-\alpha)+\alpha\phi]}$*

Proof: Assuming the existence of some buyers of the original item means that $\hat{\theta}_g* < 1$. From Eq. 12, that is $(1-\alpha)(1-\phi) + \phi^2 f > 0$ which is always true. Assuming the existence of some buyers of the fake product means that $\hat{\theta}_c < \hat{\theta}_g$. From Eqs. 12 and 13, the following inequality $\frac{\phi f}{\alpha(1-\phi)} < \frac{(1-\phi)(1-\alpha) - \phi^2 f}{2(1-\alpha)(1-\phi)}$ implies that $f < \frac{\alpha(1-\alpha)(1-\phi)}{\phi[2(1-\alpha)+\alpha\phi]}$.

3.3 The condition for the counterfeiters' presence

Since counterfeiters operate in a perfectly competitive market, each counterfeiter earns zero economic profits in equilibrium. Then, a counterfeiter will remain in

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[5] The positive sign of the first term of expression 17, will be verified in Sect. 3.4.

business as long as demand for fakes remains positive, which sets an upper bound restriction on fines. Equating $D_c* = 0$,[6] we get:

$$\hat{f} = \frac{\alpha(1-\alpha)(1-\phi)}{\phi[2(1-\alpha)+\alpha\phi]} \tag{17}$$

Thus for all $f \geq \hat{f}$, the demand for counterfeit products is nil, counterfeiting is deterred and the monopolist does not pocket any revenue from fines. The mechanism underpinning the deterrence in our analysis implies that the counterfeiters are deterred because no more positive demand is addressed to them. Indeed, with a positive probability of being caught, the competitive market will adjust the demand at a level that shapes in turn the quantity of counterfeit offered. Ultimately, when $f > \hat{f}$, the price of counterfeits will increase until there is no demand for the fake items and counterfeiters will simply be deterred. Nevertheless, such a deterrence also implies that positive collateral effects from counterfeiting will not occur which can in turn affect negatively the brand which was previously counterfeited.

Lemma 2:   If $f = \hat{f} = \frac{\alpha(1-\alpha)(1-\phi)}{\phi[2(1-\alpha)+\alpha\phi]}$, then counterfeiters are deterred and driven out of the market and the model becomes similar to the world without counterfeiting. The necessary and sufficient condition for the existence of counterfeiters is $0 \leq f < \hat{f}$.

Proof: From Eq. 14 if $f = \hat{f} = \frac{\alpha(1-\alpha)(1-\phi)}{\phi[2(1-\alpha)+\alpha\phi]}$ then $D_c* = 0$ and plugging $f = \hat{f} = \frac{\alpha(1-\alpha)(1-\phi)}{\phi[2(1-\alpha)+\alpha\phi]}$ into Eqs. 11–16 and considering $\alpha = \phi = 0$ yields the results $p_g^* = \frac{1}{2}$, $D_g* = \frac{1}{2}$ and $\pi_g^* = \frac{1}{4}$, which corresponds to the results obtained in the world without counterfeiting. Moreover, the condition guaranteeing the existence of some buyers of both the original and the fake products (Lemma 1) is compatible with the one ensuring the existence of counterfeiting $(f < \hat{f})$ as $\overline{f} = \hat{f}$.

The following propositions describe the effects of an increase of (1) intellectual property rights (IPR) enforcement and (2) the substitutability between the genuine and the fake products on the existence of counterfeiters.

Proposition 1:   Stricter IPR enforcement decreases the fine level the counterfeiter can tolerate.

Proof: $\frac{\partial \hat{f}}{\partial \phi} = \frac{-\alpha(1-\alpha)[2(1-\alpha)+\alpha\phi(2-\phi)]}{\phi^2[2(1-\alpha)+\alpha\phi]^2} < 0$ which means that stricter enforcement of IPR laws decreases the fine level that the counterfeiter can tolerate. This result is consistent with Becker's insight (1968) on the substitutability between the fine level and the detection rate.

Noteworthy, the sign of $\frac{\partial \hat{f}}{\partial \alpha} = \frac{(1-\phi)[(2-\phi)\alpha^2-4\alpha+2]}{\phi[2(1-\alpha)+\alpha\phi]^2}$ is identical with the sign of the following polynomial $P(\alpha) = (2-\phi)\alpha^2 - 4\alpha + 2$, which has a non constant sign.

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[6] Note that the demand addressed to counterfeiters decreases as the fine level increases: $\frac{\partial D_c*}{\partial f} = \frac{-[2(1-\alpha)+\alpha\phi]\phi}{2\alpha(1-\alpha)(1-\phi)} < 0$

Proposition 2:   *The counterfeiter tolerance regarding the monopolist deterrence policy* $(\hat{f})$ *increases as* α *increases when* $0<\alpha<\frac{2-\sqrt{2\phi}}{2-\phi}$ *and decreases when* $\frac{2-\sqrt{2\phi}}{2-\phi}<\alpha<1$.

Proof: See "Appendix".

Proposition 2 shows that the resistance of the counterfeiter towards the deterrence actions relatively to α is not monotonous. If $0<\alpha<\frac{2-\sqrt{2\phi}}{2-\phi}$, greater substitutability between the original good and the fake product (α) leads to tighter fighting between the monopolist and its fringe of competitors. Over a certain threshold, $\alpha=\frac{2-\sqrt{2\phi}}{2-\phi}$ the resistance of the counterfeiter decreases.

The intuition behind this result is that the monopolist can tolerate a certain level of substitution between the fake and genuine products up to a given level. If the substitution is high, then the genuine producer increases the severity of the fight against counterfeiting by imposing higher sanction levels,[7] so the counterfeiter resistance will tumble down. Interestingly, this result can explain why genuine producers fight strongly high quality fakes while they seem relatively tolerant with low quality fakes. Indeed, low-quality fakes essentially imitate the famous logos of well-known brands and signal their luxury cachet. They did not threaten the snob market of the luxury brands whereas careful counterfeits affect the market position of genuine producers.

3.4 The decision of the genuine producer regarding the counterfeiters presence

Now, let us consider the fine level preferred by the original firm. It is the one that maximizes its profit in Eq. 16 with respect to f.

$$\frac{\partial \pi_g *}{\partial f} = \frac{2\alpha(1-\alpha)(1-\phi)(2-\phi)\phi + 2[\alpha(2-\phi)^2 - 4(1-\phi)]\phi^2 f}{4\alpha(1-\alpha)(1-\phi)^2} \qquad (18)$$

The sign of expression 18 depends on the numerator's second term: $\alpha(2-\phi)^2 - 4(1-\phi)$. Consequently we analyse the behaviour of the genuine producer by comparing the value of α relatively to $\frac{4(1-\phi)}{(2-\phi)^2}$. Since by definition $0<\alpha<1$ and $0<\phi<1$, we can depict different cases in Fig. 2.

Figure 2 describes the combinations of α and ϕ insuring that $\alpha=\frac{4(1-\phi)}{(2-\phi)^2}$. The area above the curve represents the combinations of the values that make the profit strictly increasing with f. There is obviously no maximum with respect to f. For the values that lie in the area under the curve the fine level preferred by the original firm is given by $f^* > 0$.

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[7] We do not address in our contribution the problem resulting from insolvency of counterfeiters if the optimal fine is higher than the counterfeiter's wealth, which can require as pointed by Shavell (1985) costly non-monetary sanctions.
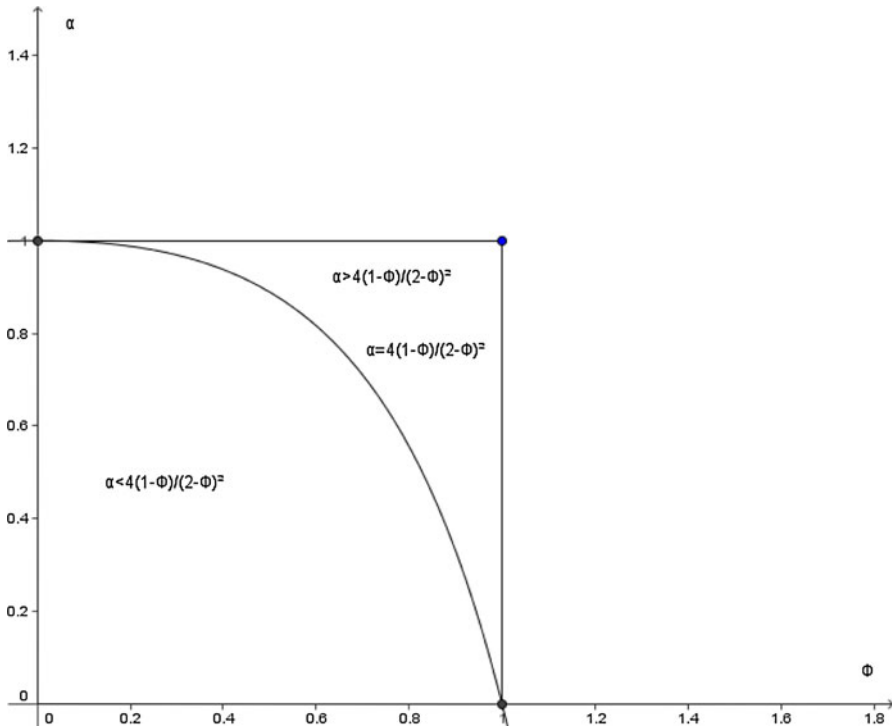
Fig. 2 The monopolist profit behaviour in the (α, ϕ) space

Case 1:

$$\alpha > \frac{4(1-\phi)}{(2-\phi)^2} \tag{19}$$

Given that the profit of the original producer is strictly increasing with (f) there is obviously no maximum with respect to f. Nevertheless, if fines are set too high, namely at a level superior to $\hat{f}$, then the counterfeiters are driven out of the market and the profit of the monopolist coincides with condition 5 characterizing the world without counterfeiting. Consequently, the genuine firm's profit can be written as follows:

$$\begin{cases} \pi = \pi_g^* & \text{if } f < \hat{f} \\ \pi = \pi_g^{d*} & \text{if } f > \hat{f} \end{cases}$$

Figure 3 shows that the fine level has to be set at exactly $\hat{f}$, otherwise the monopolist's profit falls to π_g^d corresponding to the world without counterfeiting.[8] In these conditions the monopolist can either lobby to eliminate counterfeiting by setting the fine at a level beyond $\hat{f}$, or tolerate some counterfeiting by setting the fine

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[8] The curve is convex because $\frac{\partial^2 \pi_g^*}{\partial f^2} = \frac{[\alpha(2-\phi)^2 - 4(1-\phi)]\phi^2}{2\alpha(1-\alpha)(1-\phi)^2} > 0.$
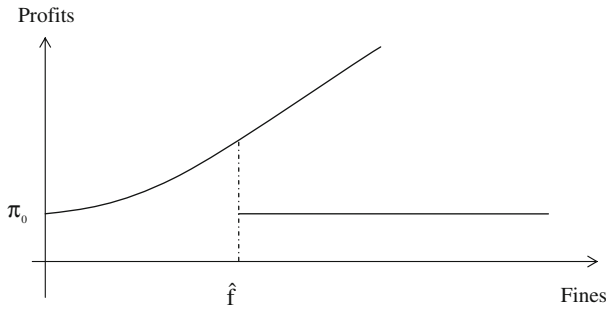
Fig. 3 The profit level of the monopolist (case 1)

at a level lower than $\hat{f}$.[9] Obviously, a profit maximisation strategy implies that the monopolist will choose the second option where it benefits from pocketed fines, but also from other effects such as the exposure and signal effects (De Castro et al. 2008). Interestingly, there is anecdotal evidence that people 'exposed' to pirated or counterfeit goods exhibit a higher willingness to purchase the original rather than the counterfeit (Jenkins 2004; Lee and Yoo 2005; Barnett 2005). For example, in China, the exposure to fake luxury watches increased the desirability of getting genuine luxury watches, especially among newly wealthy consumers who want to distinguish themselves from the masses who must content themselves with fakes (Anonymous 2004). Another astonishing example relates to the luxury cell phone brand of Nokia, Vertu, which provides "visitors with a copy of counterfeiters' advertisements as a certificate of true luxury" (Calixte 2007). Interestingly, Fred Nuovo, the designer of the Nokia luxury brand, Vertu recognized that the idea of creating the brand was inspired by pirates who were selling "counterfeit Nokia phones with diamonds (…) for tens thousands of dollars to a responsive circle of Asian businessmen and Middle Eastern sheikhs' reception and would, in time, fall out of their casings" (Levine 2002; Calixte 2007).

Corollary 1:   *When $\alpha > \frac{4(1-\phi)}{(2-\phi)^2}$ the monopolist can completely deter counterfeiters by setting a fine level over $\hat{f}$, but will not do that.*

Case 2:

$$\alpha \le \frac{4(1-\phi)}{(2-\phi)^2} \tag{20}$$

In this case, the fine level preferred by the original firm is the one that maximizes its profit (Eq. 16) with respect to the fine level.[10] It is:

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[9] We consider that only genuine producers can make pressure on government whereas counterfeiters, as illegitimate producers cannot behave similarly. A natural extension is to analyse the case where both genuine producers and counterfeiters lobby, which is consistent with the situation in several developing countries where there is a huge informal sector exclusively dedicated to counterfeited items.

[10] We verify that $f*$ is positive and that the second order condition are verified.

$$\frac{\partial \pi_g *}{\partial f} = O \Rightarrow f* = \frac{\alpha(1-\alpha)(1-\phi)(2-\phi)}{\phi[4(1-\phi)-\alpha(2-\phi)^2]}\mathbb{S} \qquad (21)$$

Note that if $\phi = 1$, which corresponds to a perfect monitoring regime, there is no counterfeiters and no fines are pocketed ($f* = 0$). The same result is also obtained ($f* = 0$) when the additional utility gain associated with buying a genuine item instead of getting the fake product is nil ($\alpha = 1$), the market is not longer characterised by vertical differentiation. Given the fact that when $f = \hat{f}$ the counterfeiters are deterred, the actual optimal level of fines is given by $\min(f*, \hat{f})$. Comparing $f*$ and $\hat{f}$ we get:

$$f* - \hat{f} = \frac{2\alpha\phi(1-\alpha)(1-\phi)}{\phi[4(1-\phi)-\alpha(2-\phi)^2][2(1-\alpha)+\alpha\phi]} \qquad (22)$$

Given Eq. 20 this difference is positive that is $f* > \hat{f}$. Consequently, the original firm can successfully stop counterfeiting, but does this strategy constitute its best option?

Figure 4 shows that in this second case, the monopolist's profit is increasing at a decreasing rate until $f*$ but before reaching this value and as $f* > \hat{f}$, the counterfeiters are driven out of the market and the monopolist's profit coincides with the one found in the full-deterrence model (condition 5). Hence, the genuine firm's profit can be developed as:

$$\begin{cases} \pi = \pi_g^* & \text{if } f < \hat{f} \\ \pi = \pi_g^{d*} & \text{if } f > \hat{f} \end{cases}$$

Interestingly, the profit never reaches its negative decreasing part. Consequently, the profit remains always positive (see footnote 6).

Corollary 2: *When $\alpha \leq \frac{4(1-\phi)}{(2-\phi)^2}$ the monopolist can deter counterfeiters by setting a fine level over $\hat{f}$ but he will not do that.* We are now ready to state our main result:
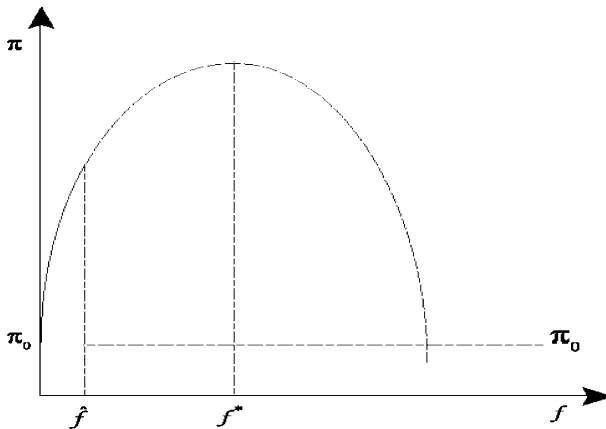

Fig. 4 The profit of the monopolist (case 2)

Result 1: Even if the monopolist can completely eliminate counterfeiting thanks to an intolerable fine level, it will not do that because this strategy reduces its overall profit. The explanation of this result can be summarised as follows. As fines generate revenue to the genuine producer, it makes a trade off between pursuing counterfeiters and collecting fines. In this context, counterfeiting seems like a chased hen that lays golden eggs pursue.

This result relies upon the fact that the monopolist can collect the fines and the incurred cost for pocketing these fines is not too high in comparison to the anticipated benefits. If the fines collected are pegged to the price of the original item and indexed on the quantity sold, the above assumption seems reasonable. For instance, in France, 'persons found with a counterfeit item in their possession are subject to a fine (up to double the value of the authentic object) and a criminal sentence' (http://www.comitecolbert.com). Once enforcement is effective, the information about the fine level and the probability to be caught become common knowledge. Hence, counterfeiters take into account this information and reflect it into the price of the counterfeit products, generating a demand decrease while the monopolist continues to pocket fines and benefits from positive collateral effects resulting from a reduced level of counterfeiting activity.

In sum, unlike the conventional view recommending complete deterrence if enforcement is costless, we show that this outcome is not always desirable from the firm viewpoint. Indeed, incomplete deterrence implying that neither the fine nor the detection rate are maximal, is necessary to maximize the profit of the genuine firm. The trade-off between the fine and detection levels does not aim at deterring offenders but are designed to regulate and allow a certain level of counterfeiting. In the same vein, the profit-related reason to justify purposeful incomplete deterrence differs from the reasons usually found in the literature such as risk aversion, wealth constraints of offenders resulting in differences in the maximum feasible fine and non-monetary sanctions (Kaplow 1992).

4 Conclusion

Contrarily to the conventional viewpoint on intellectual property rights that claims that the presence of counterfeiting activity is always and unconditionally undesirable because it erodes the profit of luxury producers, we show that the monopolist could benefit from the presence of counterfeiters. Counterfeiting can be compared to the light of the sun: it can burn the genuine firm but living without can be more harmful. This counter-intuitive insight relies on a double mechanism : (1) the amount of sanctions is shaped by genuine firms and in addition these payments are pocketed by them (the identity of the recipient matters) which in turn 'increase' the net revenue of selling original items compared to a situation where all counterfeiters are eliminated and (2) counterfeiting delivers collateral benefits such as signaling true luxury, increasing the snob value of originals or rewarding high-end designers in a non-monetary way. Unlike the conventional wisdom, that suggests that the monopolist will prefer completely deterring counterfeiters, our results state that even when the genuine producer can strongly shape the 'rules of the

game' (namely, the penalties imposed on counterfeiters), he will not entirely eliminate counterfeiting. When fines are slightly lower than the deterrence threshold, then the monopolist pockets the fines, and the demand addressed to the counterfeiters is enough to generate the positive collateral effects. In sum, the co-existence of genuine and counterfeit items associated with a certain level of counterfeiters monitoring can make the genuine producer better off.

Appendix

The sign of $\frac{\partial \hat{f}}{\partial \alpha} = \frac{(1-\phi)[(2-\phi)\alpha^2 - 4\alpha + 2]}{\phi[2(1-\alpha)+\alpha\phi]^2}$ is the same then the sign of polynomial $P(\alpha) = (2-\phi)\alpha^2 - 4\alpha + 2.$ as $\Delta' = 2\phi$ then $\alpha_1 = \frac{2-\sqrt{2\phi}}{2-\phi}$ and $\alpha_2 = \frac{2+\sqrt{2\phi}}{2-\phi}$ as $0 < \phi < 1$, then $0 < \alpha_1 < 1$ and $\alpha_2 > 1$.

α	0	α_1	1
Sign of $P(\alpha)$	+	0	−

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