

**PREACH FOR A BREACH:
SELECTIVE ENFORCEMENT OF COPYRIGHTS
AS AN OPTIMAL MONOPOLISTIC BEHAVIOR**

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Abstract

We present a multi-period equilibrium in which a creator of a work, motivated by economic considerations, selectively enforces his or her own copyrights. In effect, by strategically promoting the infringement of the copyrights, the creator is indirectly involved in predatory pricing, thereby raising barriers to entry. Our model is highly applicable to the software industry, where this phenomenon is likely because of the relatively high entry cost and relatively low copyright infringement cost. We further show the conditions under which an exogenous intervention, through intensive enforcement of copyrights, increases social welfare and, finally, briefly discuss potential legal implementation of intervention.

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1. Introduction

In this paper, we present a multi-period equilibrium in which—counter to first intuition—a creator of a work, motivated by economic considerations, selectively enforces his or her own copyrights. In effect, by strategically promoting copyright infringement, the creator is indirectly involved in predatory pricing, thereby raising barriers to entry. We specifically refer to the software industry, where this phenomenon is likely because of the relatively high entry cost and relatively low copyright infringement cost. We further show the conditions under which an exogenous intervention, through intensive copyright enforcement, increases social welfare. Finally, we briefly discuss the potential legal implementation of intervention.

The traditional economic analysis of intellectual property rights in general, and copyrights in particular, relies on the *ex ante* and *ex post* standpoints discussed, for instance, by Landes and Posner.¹

From an efficiency perspective, they argue that, *ex post facto*, social welfare will rise after a work is created if the work may be copied without limitations. The use of the product is beneficial to many, while the cost of making additional copies is insignificant. Furthermore, since new works often rely on previous works, then free distribution might not only encourage a direct use of the works but also serve as a basis for new works and ideas. Thus, free distribution helps to maximize future social welfare.

On the other hand, from a creator's point of view, *ex ante*, if there is no protection of future copyrights, one might not face a sufficient incentive to create new works, particularly when the cost of creating the original work is considerably higher than that of making each additional copy.^{2,3}

One straightforward implication of the *ex ante* view, often emphasized by copyright scholars, is the availability of legal remedies for copyright violations. Allowing the creator to fully recover the profit lost due to infringements protects the creator's premium and maintains the incentives to create. The State's role, according to this view, is to provide a clear registry of right: copyright holders have the full incentive to privately take action against any detected infringement. This paper challenges this standard view.

In addition to Landes and Posner's seminal article, several scholars have studied the incentives of the author and the state and considered their effect on social welfare within the copyright law framework.⁴ Liebowitz, for example, identifies market conditions in which some level of copyright infringement leads to increased social welfare.⁵ Besen and Kirby argue that in some cases, where consumers can distribute a copy by sharing in a less costly manner than the author can distribute it by producing an additional original unit, copyright holders might rationally seek a certain level of infringement because it will increase their profits.⁶ The intuition behind these articles and others is that while sharing via copying reduces the number of original sales, it also enhances consumers' willingness to pay because they can share and trade the goods with others. Recently, Bakos, Brynjolfsson, and Lichtman have developed the idea and demonstrated that even in the case of new technology, where the marginal cost of original production and sharing is assumed to be negligible, copyright violation via sharing on a small scale can increase producer profits.⁷

In this article, we identify another situation in which creators favor the violation of their own copyrights. That is, by selectively enforcing copyrights, creators maximize their profit under the threat of competition. While this produces a short-run profit loss, it generates long-run benefits in the form of reduced competition.

The underlying intuition is that in order to deter potential competitors from entering the market, incumbents may lower prices even at the cost of immediate profit loss. However, because the antitrust laws are sensitive to predatory pricing and unlawful monopolization,⁸ the incumbent may eventually reach the same result by strategically failing to enforce copyrights.⁹

In markets where copyright violation is widespread, incumbents may effectively use this policy and thereby “legally” maintain their monopolistic position. One example is the software industry, which we discuss in this paper.^{10,11}

Suppose, for instance, that the market consists of a firm with a unique product. Potential competitors threaten to develop a substitute product and enter the market. We claim that equilibrium might sustain when the monopoly intentionally splits the market into, say, two sub-markets distributed according to the elasticity of their demands.^{12,13} In the less-elastic-demand sub-market, the monopoly enforces its copyrights and thereby maintains its monopolistic power. In the more-elastic-demand sub-market, copyrights are not enforced and the price, in effect, drops to zero.¹⁴

For a new firm to enter the market, it must generate a minimum profit level to justify the initial fixed entry cost. Under the described strategy, however, by splitting the market into two sub-markets, one in which the product is, in effect, marketed at a zero price, the monopoly considerably reduces the potential profit of the potential competitor. If accurately executed, this strategy eliminates any incentive of potential competitors to enter the market. On one hand, no profits may be produced in the more-elastic-demand sub-market. On the other hand, selling in merely one sub-market—and, moreover, competing there with the existing monopoly—may not be sufficient to compensate the competitors for the high fixed entry cost.¹⁵

Regulations prevent the monopoly from simply setting a predatory price, for it will be charged with violating antitrust laws and with abusing its monopolistic position. However, promoting violation of its copyrights indirectly achieves a similar result.¹⁶ Unlike the common cases of abuse of monopolistic power, here the Federal Trade Commission (FTC) or the Department of Justice (DOJ) might find it difficult to prove that the monopoly violates antitrust laws, since the burden put on competitors is not loaded directly by the firm but merely loaded indirectly—the users are responsible for this phenomenon by transgressing the law. The monopoly’s omission is in choosing not to exercise its rights to a civil action¹⁷ or not starting a criminal action.¹⁸

In this paper, we also examine the effect on social welfare of the selective copyright enforcement equilibrium, attained by the monopoly’s strategy. Interestingly, we identify conditions under which an exogenous intervention by way of intensive enforcement of copyrights may increase social welfare.¹⁹

Intuitively, note that the described equilibrium relies on the fact that potential profits are not sufficient to compensate competitors for the fixed cost associated with entering the market. However, if those profits, combined with the consumer surplus net of the monopoly’s reduction in profits, are greater than the fixed entry costs, then an exogenous intervention in the enforcement of copyrights becomes socially beneficial.

Finally, we discuss possible procedures within the legal system that might enhance competition. These can be adopted by both private and public entities. In either case, they are aimed at eliminating strategic selective enforcement of copyrights and increasing efficiency.

In the following sections, we substantiate the above intuition in a formal model. In Section 2 we construct the primitives of the model. In Section 3 we show

market equilibrium, where a leading firm adopts a selective enforcement strategy to maximize profits under the threat of a potential competitor entering the market. We further demonstrate, in Section 4, the possible increase in social welfare, which may follow an exogenous intervention in the monopoly's enforcement strategy. In Section 5 we briefly discuss the legal implementation of an exogenous intervention. Finally, we summarize in Section 6.

2. The Model

Consider two potentially producing firms in the market: a leader and a follower. Though a firm's product is unique, it may be a perfect substitute for the other firm's product. For simplicity let us assume that the firms' production functions are identical and their marginal costs of production are zero. Let us denote the leader by L and the follower by F .

Consumers can costlessly reproduce the product if no copyrights are enforced by the firm. Therefore, the producing firm should decide on the quantity it produces and its level of copyright enforcement. We assume, without loss of generality, that the firm's decision on the level of enforcement, e , is binary. That is, $e \in \{0,1\}$, where $e=0$ ($e=1$) represents no (perfect) enforcement. Suppose a constant marginal enforcement cost, mc , is exhibited by both firms.²⁰

In addition, suppose there are two sub-markets with distinct demands for the substitute products. Particularly, let us assume that market's i ($i \in \{1,2\}$) demand function for the product is

(1)

$$p_i = \begin{cases} a - b_i q_i & \text{if } e = 1, \\ 0 & \text{if } e = 0, \end{cases}$$

where, p_i and q_i are the price of the product and the demanded quantity in sub-market i , and a and b_i are positive constants, where we assume that $b_2 > b_1$.

The number of consumers in a sub-market i is n_i and each consumer requires no more than one unit of the product. In order to assure non-negative prices for all q , we assume that $b_i \leq a/n_i$.

We posit that if the leader is to solely prevail in the market, it will either charge a monopolistic price in a sub-market i and enforce copyrights, or not enforce copyrights and thereby permit prices to drop to zero.²¹ Further, if the leader and the follower are to coexist in the market, then we assume that they compete in a Stackelberg-type competition and enforce copyrights in either both or one of the sub-markets.²²

Particularly, we posit two possible pricing schedules for each of the monopoly and duopoly market states: a monopoly price with copyright enforcement in each of the sub-markets (denoted by MM); a monopoly price with copyright enforcement in sub-market 1 and no copyright enforcement (leading to a zero price) in sub-market 2 (M); a Stackelberg competition price with copyright enforcement in the sub-markets (SS); and a Stackelberg competition price with copyright enforcement in sub-market 1 and no copyright enforcement (leading to a zero price) in sub-market 2 (S).

One should note that given the duopoly set-up stated above, any pricing and enforcement strategy other than M , MM , S , and SS is necessarily dominated. This stems from the fact that, independently of whether the market experiences full or zero enforcement, the best a monopoly (Stackelberg competitor) can do in equilibrium is to set the monopoly (Stackelberg) price.

Now, given the four potential market price schedules, we derive the profits generated by the firms under each of the scenarios.

If a firm solely prevails in the market and charges the monopolistic price with copyright enforcement in each sub-market, then its supplied quantity in each sub-market, q_i^{MM} , is

(2)

$$q_i^{MM} = \frac{a - mc}{2b_i}.$$

Substituting the quantity produced from Equation (2) into the price function in Equation (1) yields the monopolistic price in each sub-market, p_i^{MM} ,

(3)

$$p_i^{MM} = \frac{a + mc}{2}.$$

It follows from Equations (2) and (3) that the profits generated by the monopoly when copyrights are enforced, π^{MM} , are

(4)

$$\pi^{MM} = \frac{(b_1 + b_2)(a - mc)^2}{4b_1b_2}.$$

If, instead, we assume that the monopolistic pricing and copyright enforcement persist only in sub-market 1, while a zero price prevails in sub-market 2, then the supplied quantity and price in sub-market 1 are identical to those presented in Equations (2) and (3), respectively, and the total profits of the monopoly, π^M , are

(5)

$$\pi^M = \frac{(a - mc)^2}{4b_1}.$$

If, on the other hand, the leader and the follower coexist in the market and share the demand in each sub-market under a Stackelberg monopolistic competition

with copyright enforcement, then the total supplied quantity in each sub-market, q_i^{SS} , is

(6)

$$q_i^{SS} = \frac{3(a - mc)}{4b_i},$$

and hence the price in each sub-market, p_i^{SS} , is

(7)

$$p_i^{SS} = \frac{a + 3mc}{4}.$$

From Equations (6) and (7), it follows that the total profits generated by the leader, π_L^{SS} , and by the follower, π_F^{SS} , under the Stackelberg monopolistic competition prevailing in the two sub-markets are, respectively,

(8)

$$\pi_L^{SS} = \frac{(b_1 + b_2)(a - mc)^2}{8b_1b_2},$$

and

(9)

$$\pi_F^{SS} = \frac{(b_1 + b_2)(a - mc)^2}{16b_1b_2}.$$

Likewise, if we assume that a Stackelberg-type monopolistic competition prevails in sub-market 1, while a zero price persists in sub-market 2, then the total supplied quantity and price in sub-market 1 (denoted by q_1^S and p_1^S , respectively) are identical to those presented in Equations (6) and (7), respectively. Then the total profits of each firm, π_L^S and π_F^S , are, respectively,

(10)

$$\pi_L^S = \frac{(a - mc)^2}{8b_1},$$

and

(11)

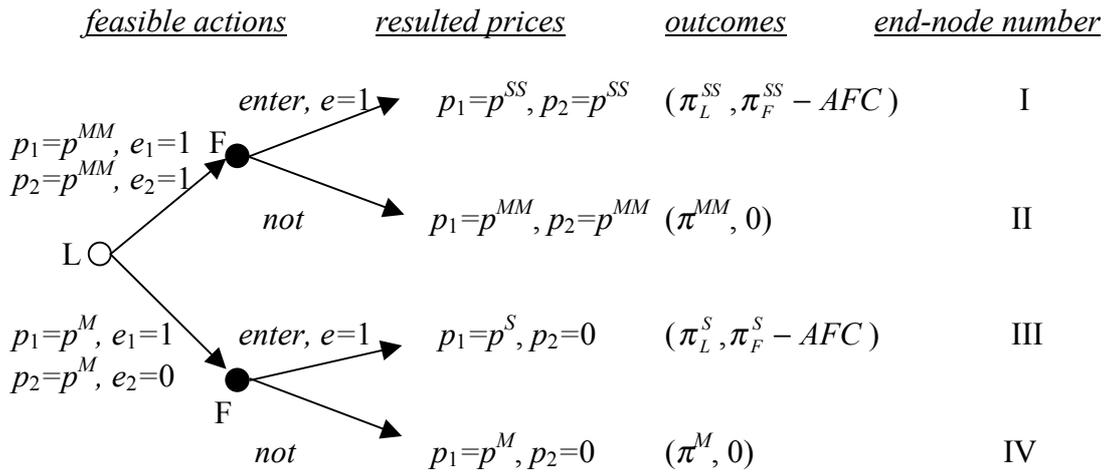
$$\pi_F^S = \frac{(a - mc)^2}{16b_1}.$$

Next we demonstrate an equilibrium under which a monopoly optimally adopts a strategy of selective copyright enforcement.

3. Selective Copyright Enforcement

Given the profit functions in Equations (4), (5), (8), (9), (10), and (11) derived under the described four market conditions, we now suppose that the leader and the follower interact within the extensive form game depicted in Figure 1.

Figure 1: *The interaction between the leader and the follower as an extensive form game*



In the first stage of the game, the leader selects the prices to prevail in each sub-market. As a sole producer at that stage, the leader can select either $p_1 = p_1^{MM}$

with $e_1 = 1$ and $p_2 = p_2^{MM}$ with $e_2 = 1$ (where p_i and e_i are the price and enforcement level, respectively, in sub-market i) or, alternatively, $p_1 = p_1^M$ with $e_1 = 1$ and $p_2 = p_2^M$ $e_2 = 0$ (recall that given the above set-up it follows that $p_i^M = p_i^{MM}$).

In the second stage of the game, the follower chooses whether to *enter* or *not enter* the market. Entry is accompanied by a fixed cost of size AFC .²⁴ The equilibrium prices in each sub-market that succeeds the follower's decision in stage two, contingent upon the leader's action in stage one, appear next to the end nodes in Figure 1. Most importantly, notice that in the strategies leading to node IV, the leader apparently sets identical monopolistic prices in both sub-markets but enforces copyright only in sub-market 1. Following Equation (1), the non-enforcement in sub-market 2 leads to a zero price in that market.

Finally, the term to the left (right) of the comma in the parenthesis in Figure 1 represents the profits of the leader (follower), depending on the prevailing prices in each sub-market, which follow the previously chosen actions.

Under the above set-up, we claim that

Proposition 1: *If $\pi_F^S < AFC < \pi_F^{SS}$, then the unique Perfect Nash Equilibrium (PNE) of the described extensive form game leads to an outcome where the incumbent sets prices $p_1 = p^M$ with enforcement $e_1 = 1$ and $p_2 = p^M$ with enforcement $e_2 = 0$, and the follower opts not to enter.*

Lemma 1: *The condition, which yields the unique PNE in Proposition 1, is equivalent*

$$\text{to } 0 < \frac{b_2}{b_1} \left[\frac{16b_1 AFC}{(a - mc)^2} - 1 \right] < 1.$$

Proof: The strategies that support the outcome described in Proposition 1 are

Leader: Set $p_1 = p_1^{MM}$ with $e_1 = 1$ and $p_2 = p_2^{MM}$ with $e_2 = 1$ if the follower does not enter thereafter; otherwise, set $p_1 = p_1^M$ with $e_1 = 1$ and $p_2 = p_2^M$ with $e_2 = 0$.²⁵

Follower: Enter and set $e=1$ if leader sets $p_1 = p_1^{MM}$ with $e_1 = 1$ and $p_2 = p_2^{MM}$ with $e_2 = 1$; otherwise, do not enter.

Focusing on the sub-game, which follows the incumbent's proposed prices $p_1 = p_1^{MM}$ with $e_1 = 1$ and $p_2 = p_2^{MM}$ with $e_2 = 1$, note that the follower's optimal response is to *enter* and set $e=1$ (an action accompanied by an average fixed cost of entry, AFC , and a marginal cost of enforcement, mc), if this action generates greater profits than *not enter*. That is, *enter* and set $e=1$ is a strategy supporting a sub-game Nash equilibrium if

(12)

$$\pi_F^{SS} - AFC > 0.$$

Likewise, if the leader chooses $p_1 = p_1^M$ with $e_1 = 1$ and $p_2 = p_2^M$ with $e_2 = 0$, then the sub-game Nash equilibrium is supported by a follower's *not enter* strategy if

(13)

$$\pi_F^S - AFC < 0.$$

From inequalities (10) and (11) we get

(14)

$$\pi_F^S < AFC < \pi_F^{SS}.$$

Now, given the follower's optimal response strategy, the leader anticipates that pricing $p_1 = p_1^{MM}$ with $e_1 = 1$ and $p_2 = p_2^{MM}$ with $e_2 = 1$ will generate profits of size π_L^{SS} , while pricing $p_1 = p_1^M$ with $e_1 = 1$ and $p_2 = p_2^M$ with $e_2 = 0$ will eventually produce π^M . Consequently, the leader's choice of $p_1 = p_1^M$ with $e_1 = 1$ and $p_2 = p_2^M$ with $e_2 = 0$ supports a sub-game Nash equilibrium if

(15)

$$\pi^M > \pi_L^{SS}.$$

Following Equations (5) and (8), the condition in (15) may be presented as

(15a)

$$\pi^M = \frac{(a - mc)^2}{4b_1} > \frac{(b_1 + b_2)(a - mc)^2}{8b_1b_2} = \pi_L^{SS}.$$

However, given that $b_2 > b_1$, it follows after a reduction that Condition (15a) sustains for all a , $b_2 > b_1$, and mc .

Finally, note that the Nash equilibrium in each sub-game is unique. This provides the uniqueness of the spoken PNE (end of proof of Proposition 1).

Given the expressions for the profit functions in (9) and (11), the condition in (12) may be written as

(12a)

$$\pi_F^{SS} - AFC = \frac{(b_1 + b_2)(a - mc)^2}{16b_1b_2} - AFC > 0,$$

and the condition in (13) may be expressed as

(13a)

$$\pi_F^{SS} - AFC = \frac{(a - mc)^2}{16b_1} - AFC < 0.$$

Further, Conditions (12a) and (13a) imply that AFC is such that

$$\pi_F^S = \frac{(a - mc)^2}{16b_1} < AFC < \frac{(b_1 + b_2)(a - mc)^2}{16b_1b_2} = \pi^{SS},$$

which after a reduction leads to the condition appearing in Lemma 1.

Note that the game described in Figure 1 is a two-stage interaction, where the leader makes the first move—simultaneously committing to certain price and enforcement levels—and the follower responds by either entering or not entering the market. One may argue, however, that, realistically, there might be a third stage in the game, where subsequent to the follower’s potential choice to enter, the leader should be able to change his initial no enforcement policy in sub-market 2 and optimally shift to an enforcement regime. Indeed, conditional on the follower entering the market, the leader would be better off by now enforcing a Stackelberg equilibrium price in sub-market 2 than by attaining zero profits from that sub-market, if he continues the no enforcement policy. This would, of course, lead to a different equilibrium than that stated in Proposition 1. In fact, the outcome of this equilibrium would be identical to that obtained under end-node II in Figure 1.

While the three-stage-game argument is valid under some circumstances, there are also real-world situations in which the leader may commit to the no enforcement policy so that it is either completely irreversible or, alternatively, requires excessive effort to reverse. These situations are in line with the two-stage framework of the model. The leader is better off with the irreversible commitment because he then obtains the outcome of end node IV as opposed to that of end node II.

The software industry is an example for a market in which the leader can credibly commit to a policy of no copyright enforcement: if no enforcement involves, for example, the exclusion of copyright protective measures generally inherent in the

software, then one cannot reverse its policy with respect to products already sold. Moreover, enforcing copyrights in a market where infringement has already become a norm might consume both time and cash. Hence, for practical matters, the no enforcement period may be considered as irreversible. In other words, in situations in which the leader may adopt measures that persuade the follower that he is, in fact, committed to no enforcement, then the presented model is valid and the derived outcome sustains Perfect Nash Equilibrium.²⁶

Note further that, intuitively, there are two crucial elements leading to the attained PNE. The first is that $\pi_F^S < AFC < \pi_F^{SS}$, which implies that the follower merely opts to enter the market when profits may be extracted from both competitive sub-markets. Further, $\pi_L^{SS} < \pi^M$, which implies that the leader is better off generating monopolistic profits from one sub-market than competing in both sub-markets.^{27,28}

Extending the above-described one-round game to a multiple-round framework generates the following result:

Proposition 2: *If $\pi_F^S < AFC < \pi_F^{SS}$ and the extensive form game depicted in Figure 1 is repeated finitely many times, then the unique PNE of the repeated game leads to an outcome where the incumbent consistently sets prices $p_1 = p_1^M$ with enforcement $e_1=1$ and $p_2 = p_2^M$ with enforcement $e_2=0$, and the follower consistently opts not to enter.*

Proof: The proof of Proposition 2 is similar to that of Proposition 1, however, the argumentation follows a backward induction process. That is, focusing first on the final period of the multiple-round game, it follows from Proposition 1 that if $\pi_F^S < AFC < \pi_F^{SS}$, then the follower chooses not to enter. Likewise, going back one

period to the period before the last, then, once again, if $\pi_F^S < AFC < \pi_F^{SS}$, then the follower chooses not to enter. This argumentation identically continues in all periods of the game, and thus by backward induction we have the result stated in Proposition 2.

Under the equilibrium proposed in Propositions 1 and 2, the monopoly allegedly conducts an illegal pricing policy. Sophisticatedly, however, the policy is hidden. Although prices are seemingly identical everywhere, the selective copyright enforcement indirectly and intentionally functions as a mechanism that, in effect, achieves the same objective—raising barriers to entry by allegedly conducting a predatory pricing policy.

Indeed, as laid by the Supreme Court of the United States, one of the thresholds to a predatory pricing argument is the cost: “a plaintiff seeking to establish competitive injury resulting from a rival’s low prices must prove that the prices complained of are below an appropriate measure of its rival’s costs.”²⁹ However, as construed by legal scholars, the Supreme Court limited predation claims to those cases where prices were below average total cost and not necessarily below marginal costs. The Court did not embrace a particular cost test such as the Areeda-Turner average variable cost rule.³⁰

The interpretation of unlawful predatory pricing is particularly important in cases of intellectual property,³¹ where costs are incurred mainly at the research and development phase, while subsequent marginal costs are significantly low. Frequently, then, a price higher than short-run marginal cost can be predatory for it can be calculated to exclude an equally efficient rival or to allow the predator to engage in prolonged periods of monopolistic pricing.³² Note that when predatory

pricing is difficult to establish, then using masquerading techniques is of great importance because it makes the predator practically immune.

Furthermore, Propositions 1 and 2 imply that due to dynamic developments and changes in the economic environment and industries, courts and lawmakers may seek to re-evaluate and expand the traditional view of predatory pricing.³³ Indeed, the existing law in many countries, such as Canada, Australia, England, and in the EEC is different from U.S. law in that respect.³⁴ Under those systems, proving predatory pricing strategy is possible if prices are below average total costs and, in some, even if the price is below marginal cost. As we show in the next section, the pricing and enforcement strategy conducted by the monopoly may indeed lead to economic inefficiencies.

4. Efficient Exogenous Intervention

We argue that

Proposition 3: *If the conditions for the described PNE are achieved and, further, if*

AFC is such that $\pi_F^S < AFC < \frac{3b_2(a - mc)^2 - b_1(a^2 + 30amc - 15mc^2)}{32b_1b_2}$, then an

exogenous intervention in enforcing copyrights is optimal.

Lemma 2: *If the conditions for the described PNE are achieved and, further, if*

$\frac{b_2}{b_1} > \frac{3a^2 + 26amc - 13mc^2}{(a - mc)^2}$, then an exogenous intervention in enforcing copyrights

is optimal.

Proof: Recall that under the described PNE, the leader sets $p_1 = p_1^M$ with $e_1=1$ and $p_2 = p_2^M$ with $e_2=0$ and the follower does not enter. The follower enters the market only if, at the minimum, $p_1=p^{SS}$ and $p_2=p^{SS}$ are to prevail in the respective sub-markets together with copyright enforcement. We therefore compare the social welfare attained under the PNE state, M (that is, without exogenous intervention) with that obtained under SS (that is, with exogenous copyright enforcement).

Given the prices and quantities derived above, Figures 2 and 3 depict the social loss in the market under M and SS , respectively, excluding fixed costs.

Figure 2: Social loss under M (without exogenous copyright enforcement)

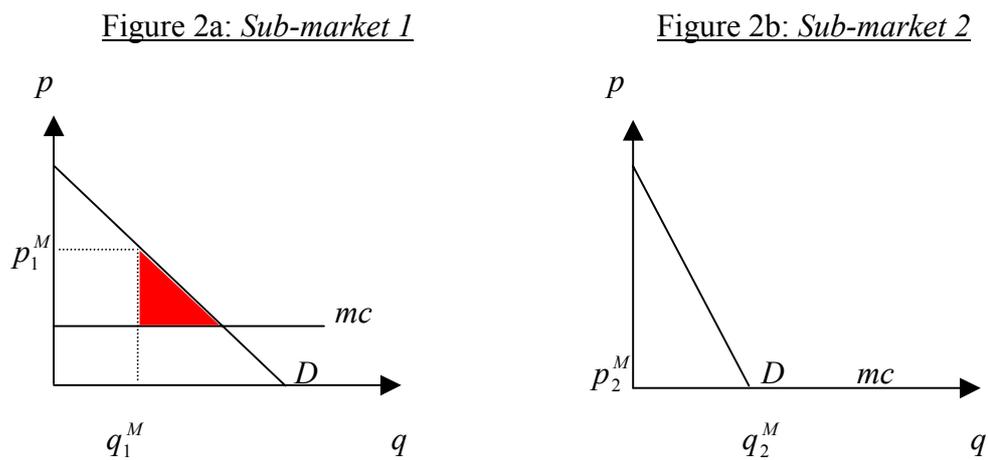
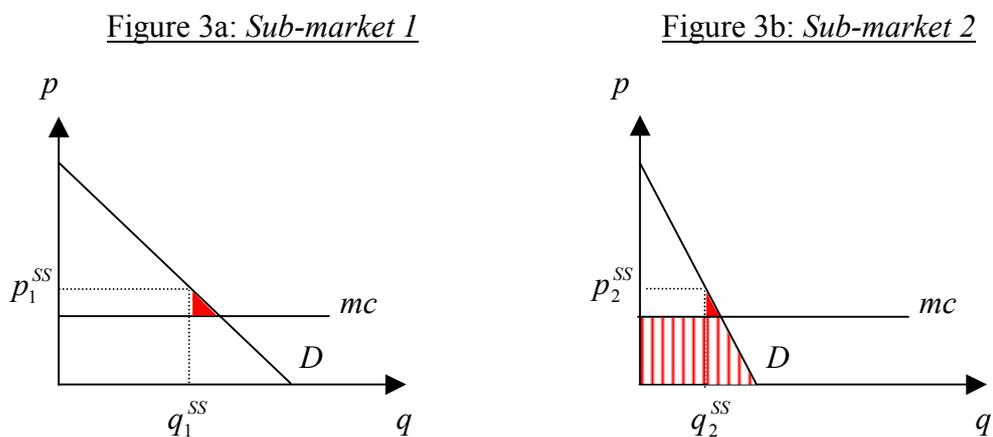


Figure 3: Social loss under SS (with exogenous copyright enforcement)



The shaded areas indicate the dead-weight loss. The striped areas depict the loss of consumer surplus due to intervention. Summing up the shaded areas in Figures 2a and 2b, we find that the total social loss (dead-weight loss) under M , SL_M , is

(16)

$$SL_M = \frac{(a - mc)^2}{8b_1}.$$

Similarly, computing the sum of the shaded and striped areas in Figures 3a and 3b, we find that the total social loss (dead-weight plus loss of consumer surplus) under SS , SL_{SS} , is

(17)

$$SL_{SS} = \frac{b_2(a - mc)^2 + b_1(a + 3mc)^2 + 24b_1mc(a - mc)}{32b_1b_2}.$$

If the value obtained from subtracting the right-hand side of Equation (16) from the right-hand side of Equation (17) is greater than the fixed costs associated with the follower's entry, then exogenous intervention is socially beneficial. That is, an exogenous intervention in enforcing copyrights is optimal if

(18)

$$AFC < SL_M - SL_{SS}.$$

Substituting the right-hand side of Equations (16) and (17) with the expressions in (18) yields

(19)

$$AFC < \frac{3b_2(a - mc)^2 - b_1(a^2 + 30amc - 15mc^2)}{32b_1b_2}.$$

However, given Propositions 1 and 2, we know that the condition in (14) is sufficient for the PNE. Thus, combining the conditions in (14) and (19) produces the requested result (end of proof of Proposition 1).

Provided that the conditions for PNE in (14) are achieved, the condition for intervention presented in Inequality (19) is redundant if and only if the right-hand side of Inequality (19) is greater than π_F^{SS} in Equation (9). That is, if

(20)

$$\frac{3b_2(a - mc)^2 - b_1(a^2 + 30amc - 15mc^2)}{32b_1b_2} > \frac{(b_1 + b_2)(a - mc)^2}{16b_1b_2},$$

then attaining the PNE conditions is sufficient for an intervention to become efficient.

However, Inequality (20) reduces to

(21)

$$\frac{b_2}{b_1} > \frac{3a^2 + 26amc - 13mc^2}{(a - mc)^2}$$

(end of proof of Lemma 2). \in

Proposition 3 argues that there may be market conditions that require regulators' intervention to attain optimal efficiency.³⁵ Spoken intervention is required when the follower's profits combined with the accompanying consumer surplus are greater than the combination of the entry fixed costs and the monopoly's reduction in profits. If this is indeed the case, then an exogenous enforcement of copyrights becomes socially beneficial.

Moreover, the greater the ratio of b_2 to b_1 is, the more likely it is that an exogenous intervention in the PNE is efficient. On one hand, a greater b_2 corresponds to a smaller social loss generated in sub-market 2 because of the intervention (see Figure 3b). On the other hand, a smaller b_1 is associated with an increase in the dead-

weight loss in sub-market 1 under both M and SS (see Figures 2a and 3a). It turns out, however, that when b_1 is sufficiently small relative to b_2 , the social loss under SS following an intervention is always smaller than that under M .

We should emphasize that the identified condition for an exogenous intervention in copyright enforcement, presented in Proposition 3, is specific to the assumed Stackelberg duopolistic competition. Put differently, if the alternative to the above PNE were a competitive equilibrium, the condition for intervention would alter. Moreover, there could also be cases in which exogenous intervention may not benefit social welfare.³⁶ Our basic argument is that under certain market conditions, regulators may indeed need to intervene and enforce copyright law in order to maximize social welfare.

Conceptually, this result is analogous to a well-accepted motivation of an antitrust authority for restricting the abuse of monopolistic power; namely, the potential reduction in social welfare. Here the monopolistic abuse is conducted via selective copyright enforcement as opposed to more conventional ways, such as direct predatory pricing.

We further conduct a comparative static analysis for the intervention conditions, which yields the following:

Lemma 3: *Given that the conditions for the PNE are achieved, then the greater b_2 is, the more likely is the optimality of the exogenous intervention in enforcing copyrights.*

Lemma 4: *Given that the conditions for the PNE are achieved, then the smaller b_1 is, the more likely is the optimality of the exogenous intervention in enforcing copyrights.*

Proof: The proof of both Lemma 3 and Lemma 4 is immediate following the condition in Lemma 2.

Observing Figures 2 and 3 immediately clarifies the intuition. Given that the PNE, as it is presented in Figure 2, is attained, then one may notice from Figures 2b and 3b that a greater b_2 corresponds to a steeper demand function in sub-market 2. The latter, however, only decreases the shaded and the striped area of the social loss under SS (Figure 3b). It thus turns out that a greater level of b_2 , *ceteris paribus*, is associated with a diminishing social loss when intervention occurs.

Further, notice that any increase in the level of b_1 sharpens the slope of the demand function in sub-market 1. This, in turn, decreases the dead-weight loss in both Figure 2a and 3a. Nevertheless, the drop in the dead-weight loss due to a rise in b_1 is greater under M (see Figure 2a) than it is under SS (see Figure 3a). It therefore follows that given the conditions for the PNE, an increase in the level of b_1 , *ceteris paribus*, reduces the potential necessity of an optimal exogenous intervention.

Finally, we claim that

Lemma 5: *Given that the conditions for the PNE are achieved, then the smaller the marginal enforcement cost mc is, the more likely is the optimality of the exogenous intervention in enforcing copyrights.*

Proof: Differentiating the right-hand side of the condition for an optimal exogenous intervention presented in Inequality (21) yields

(25)

$$\frac{\partial[(3a^2 + 26amc - 13mc^2)/(a - mc)^2]}{\partial mc} > 0,$$

which implies that the condition for an optimal exogenous intervention becomes more likely as mc becomes smaller.

Intuitively, the smaller the marginal costs of copyright enforcement are, the more probable it is that the additional copyright enforcement imposed on the market by regulators indeed benefits social welfare.

5. Exogenous Intervention: Legal Implementation

In the previous section, we identify conditions under which an exogenous intervention is required in order to improve efficiency. We now explore several legal mechanisms that might be used to achieve it. We propose two types of enforcement: private and public.

Under the private enforcement regime, a competitor is given tools with which to battle the leading firm's wrongful acts. The State does not directly intervene in the market, but it allows a competitor to act upon its interest.³⁷ Thus, for example, once the veil covering the monopoly's wrongful activity is pierced and the firm's strategic enforcement is revealed to be predatory pricing, a competitor may file an antitrust suit for violation of both Section 2 of the Sherman Act³⁸ and Section 4 of the Clayton Act.³⁹ Furthermore, Section 16 of the Clayton Act⁴⁰ allows private injunctive relief.

Antitrust laws are not the only ones that can provide competitors with remedies. Other areas of law can be used as well.⁴¹ One example is the doctrine of copyright misuse.⁴² The rationale underlying the copyright misuse doctrine is the following: while authors have by law certain monopolistic rights, which often equip them with market power, society seeks to limit the extension of the owners' copyrights beyond the boundaries drawn by the law.⁴³

Since the doctrine was first implemented in 1990, the courts have been divided in their views. Some consider it as part of antitrust law, emphasizing the fact that without antitrust principles the courts have no clear guidelines to decide whether a firm indeed misuses its rights.⁴⁴ Others, however, emphasize a more general public welfare approach for assessing misuses, stressing the independent character of the copyright misuse doctrine.⁴⁵ Under either interpretation, however, the strategic enforcement adopted by the monopolist in our model is captured as copyright misuse conduct.

Two obstacles are yet to be resolved in applying the copyright misuse doctrine to strategic enforcement. The first is the fact that this doctrine is by and large used as a shield and not as a sword. Defendants raise a copyright infringement suit in order to prevent the enforcement of copyrights upon them. The second obstacle lies in the class of circumstances in which the doctrine is generally implemented.⁴⁶

In our case, however, and counter to ordinary application, it is the *competitor* who seeks a *more intensive enforcement* of copyrights by the monopoly. Nevertheless, if the legal system aims to restrain the monopoly power generated by privileges given to it by society, then the spoken differences are insignificant and the copyright misuse doctrine may be applied. Next time the leading firm goes to court to sue for a breach of its copyrights, the court should refuse to provide it with a remedy. The “sanction” for a recurring strategic behavior may be the practical withdrawal of rights granted by the State.⁴⁷ The risk of losing its rights in all sub-markets should give the monopoly sufficient motivation to enforce them. Moreover, the law may be amended along these lines to allow competitors new and more flexible remedies under the doctrine of copyright misuse or other doctrines.

In general, the competitor would have an incentive to sue, either under antitrust or copyright laws, if expected compensation ruled by courts exceeds the cost of the suit. Furthermore, the monopoly might refrain from its strategy if courts impose expected costs greater than the benefit derived from the monopoly's policy. In the spirit of Figure 1 in Section 3, the court should impose on the monopoly expected costs greater than $\pi^M - \pi_L^{SS}$, which, in turn, will shift the equilibrium from end node IV to end node I (see Figure 1). This may be achieved, for example, if the sanction for the monopoly's strategic behavior is a complete withdrawal of the rights given by the State.⁴⁸

The other mechanism the legal system might provide is public enforcement. This framework includes two major means: first, the State, like the private entities, may enforce antitrust law upon the leading firm. Through the FTC or the DOJ, the State can file a criminal suit for antitrust violations.⁴⁹ Note that from a public welfare perspective, the likelihood that the overall public interest is maintained is greater here than under a private suit initiated by a competitor. This is because the State's broad viewpoint, which considers both the requirements of the individual firm and those of the consumers.⁵⁰

Finally, the State may use criminal law by pursuing the breaching public. Indeed, the U.S. Copyright Act includes a criminal procedure that allows the government to impose a fine or even incarceration when a party commits willful infringement.⁵¹ By adopting the role of the copyright owner, the government can enforce copyrights through the criminal procedure.⁵² This will produce a deterring effect for it will raise the costs of copying. Raising these costs will, in turn, open the door for competitors to enter the market and will enhance overall efficiency. In the

spirit of Lemma 7 in the previous section, this public policy is more likely to preserve optimality as the marginal enforcement costs become lower.

Note that by adopting the role of copyright enforcer, the State, while enhancing competition, might also increase the profit of the monopoly. In light of Figure 3b, the monopoly, in effect, moves the enforcement costs under the *mc* curve onto the taxpayer. While this incorporates a wealth distribution effect, efficiency is yet enhanced. Indeed, it may be argued that the monopoly should be charged by law for the State's enforcement cost.⁵³

6. Summary

According to conventional law and economic analysis, two major economic forces determine the optimal level of copyright enforcement. One, which supports complete enforcement, is designed to motivate creators *ex post* by assuring a maximum return for their efforts. The other, which supports no enforcement, is aimed at both providing the work with as many consumers as possible and facilitating the creation process *ex ante* by allowing a creator to rely on works created by others.

Completing the *ex post* argument, we claim in this article that a creator may use the violation of his or her copyrights as a mechanism to effectively induce a price break in a sub-set of the market, which, given sufficiently high entry costs, deters competitors from entering the market. Thereby, the creator may, in fact, maximize long-term profits by promoting an optimal level of copyright infringement.

¹ William M. Landes & Richard A. Posner, “An Economic Analysis of Copyright Law,” 18 *J. Legal Stud.* 325 (1989). Also see Stanley M. Besen et al., “An Economic Analysis of Copyright Collectives,” 78 *Va. L. Rev.* 383(1992); Gillian K. Hadfield, “The Economics of Copyright: An Historical Perspective,” 38 *Copyright L. Symp. (ASCAP)* 1 (1992), and Neil Nethanel, “Copyright and a Democratic Civil Society,” 106 *Yale L. J.* 283 (1996).

² This is, for instance, true in the software industry, which is the primary example for our model, where the cost of creating software is generally huge, while the cost of copying it is negligible.

³ For other motivations substantiating copyright laws, see Melville B. Nimmer & David Nimmer, *Nimmer on Copyright*; Paul Goldstein, *Copyright: Principles, Law and Practice* (2d ed. 1996). See also Howard Abrams, “The Historic Foundation of American Copyright: Exploding the Myth of Common Law Copyright,” 29 *Wayne L. Rev.* 1119, (1983); Ralph S. Brown, “Eligibility for Copyright Protection: A Search for Principled Standards,” 70 *Minn. L. Rev.* 579, 596-600 (1985); Alfred C. Yen, “Restoring the Natural Law: Copyright as Labor and Possession,” 51 *Ohio St. L.J.* 517 (1990); William W. Fisher III, “Reconstructing the Fair Use Doctrine,” 101 *Harv. L. Rev.* 1661 (1988); Benjamin Kaplan, *An Unhurried View of Copyright* 17 (1967); David Ladd, “The Harm of the Concept of Harm in Copyright,” 30 *J. Copyright Soc’y* 421 (1983); Lyman Ray Patterson & Stanley W. Lindberg, *The Nature of Copyright: A Law of Users’ Rights*, (1991).

⁴ Daniel K. Benjamin & Roger C. Kormendi, “The Interrelationship between Markets for New and Used Durable Goods,” 17 *J. Law & Econ.* 381 (1974); Janusz A. Ordover & Robert D. Willig, “On the Optimal Provision of Journals qua Sometimes Shared Goods,” 68 *Am. Econ. Rev.* 324 (1978); Ian E. Novos & Michael Waldman, “The Effects of Increased Copyright Protection: An Analytic Approach,” 92 *J. Pol. Econ.* 236 (1984); William R. Johnson, “The Economics of Copying,” 93 *J. Pol. Econ.* 158 (1985); Stanley M. Besen, “Private Copying, Reproduction Costs, and the Supply of Intellectual Property,” 2 *Info. Econ. & Pol’y* 5 (1986). Fernando Nascimento & Wilfried R. VanHonacker, “Optimal Strategic Pricing of Reproducible Consumer Products,” 34 *Mgmt. Sci.* 921 (1988); SKathleen R. Conner and Richard P. Rumelt, “Software Piracy: An Analysis of Protection Strategies,” 37 *Mgmt Science* 125 (1991). Lisa N. Takeyama, “The Welfare Implications of Unauthorized Reproduction of Intellectual Property in the Presence of Demand Network Externalities,” 17 *J Ind Econ* 155 (1994); Glynn S. Lunney, Jr. “Reexamining Copyright’s Incentives-Access Paradigm” 49 *Vand. L. Rev.* 483

(1996); Ram D. Gopal & G. Lawrence Sanders, "Preventive and Deterrent Controls for Software Piracy," 13 *J. Mgmt. Info. Sys.* 29 (1997); Yannis Bakos, Erik Brynjolfsson & Douglas Lichtman, "Shared Information Goods," 42 *J. Law & Econ* 117; Joseph P. Liu, "Owning Digital Copies: Copyright Law and the Incidents of Copy Ownership" 42 *Wm. & Mary L. Rev.* 1245 (2001).

⁵ See Stan J. Liebowitz, "Copying and Indirect Appropriability: Photocopying of Journals," 93 *J. Pol. Econ.* 945 (1985). His conclusion is that total welfare, i.e., consumer surplus plus producer profits, always increases as a result of copying if there are no costs associated with the functioning of such markets.

⁶ See Stanley M. Besen & Sheila Nataraj Kirby, "Private Copying, Appropriability, and Optimal Copying Royalties," 32 *J. Law & Econ* 255, 270 -271 (1989).

⁷ Although under other market condition it might markedly diminish producer profits supra, note 5. In the article the authors explore the "aggregation effect," which tends to increase producer profit and the "team diversity effect," which tend to diminish it. The intuition for the aggregation effect is that in many instances a group's valuation of a product has a probability distribution with lower variance than the distribution associated with individual members of the group and, therefore, allows the producer to extract more from the consumer surplus. In contrast, under the team diversity effect while the demand aggregation is beneficial only because teams tend to have more predictable valuation for a good, wide variation in team size can undermine this predictability and therefore reduce the surplus the producer can extract.

⁸ Section 2 of the Sherman Act, 15 U.S.C.A. § 2 condemns "every person who shall monopolize or attempt to monopolize...".

⁹ Note that this is a different motivation than the one referred to as the "network effect." The latter holds in situations where the utility a user gets from the consumption of a good increases with the number of other agents consuming the good. See William J. Kolasky, "Network Effects: A Contrarian View," 7 *Geo. Mason L. Rev.* 577 (1999). For a detailed discussion on network effects see, for example, Michael L. Katz & Carl Shapiro, "Systems Competition and Network Effects," *J. Econ. Persp.* 93 (Spring, 1994); Michael L. Katz & Carl Shapiro, "Network Externalities, Competition and Compatibility," 75 *Am. Econ. Rev.* 424 (1985); S.J. Liebowitz & Stephen E. Margolis, "Network Externality, An Uncommon Tragedy," *J. Econ. Persp.* 133 (Spring, 1994); Philip H. Dybvig & Chester S. Spatt, "Adoption Externalities as Public Goods," 20 *J. Pub. Econ.* 231 (1983). Mark A. Lemley &

David McGowan, “Legal Implications of Network Economic Effects,” 86 *Calif. L. Rev.* 479 (May, 1998); John E. Lopatka & William H. Page, “Microsoft, Monopolization, and Network Externalities: Some Uses and Abuses of Economic Theory in Antitrust Decision Making,” 40 *Antitrust Bull.* 317 (1995). But compare these to W.B. Arthur, “Competing Technologies, Increasing Returns, and Lock-in by Historical Events,” 99 *Econ. J.* 116 (1989).

¹⁰ For example, in a report conducted by the International Planning and Research Corporation (IPRC) for the Business Software Alliance (BSA) and for the Software & Information Industry Association (SIIA), which was published in May 2000, it was reported that in 1999, the overall rate of copied software use was 36%. In North America illegal use was 26% of all use; in Western Europe it was 34%; Asia and the Pacific 47%; Africa 56%; Latin America 59%; the Middle East 63%; and Eastern Europe 70%. The lowest use of illegal software in any one country was in the US – 25%, while the highest was in Vietnam – 98%.

¹¹ In general, the promotion of copyright violation within the software industry might be carried out in various ways, both actively (by not using the enforcement mechanisms available to the firm) and passively (by not using protective measures). Many ways to prevent copying can be included in software. These means do not burden the regular use of the software but affect only the ability to copy CD-ROMs, which contain the software. See for example “Cactus Data Shield” made by Midbar Tech Ltd at <http://www.midbartech.com/>; “Cd-Cops” made by Link Data Security at <http://www.linkdata.com/cdcops.htm>; “Copylok” made by Plan Technology Limited at <http://www.pantechology.com/>; “DiscGuard” made by TTR Technologies Inc at <http://www.ttrtech.com/>; “Protect-CD” made by Vob at <http://www.vob.de/us/products/professional/ProtectCD/index.htm>; “The Copy Protected CD” made by Hide and Seek Technologies at <http://www.hideseek.com/products.htm> and many more. Not only is it difficult, if not impossible, to break these programs, but tampering with them is considered a criminal offense under the Digital Millennium Copyright Act (See section Sec. 1201). It may arguably be that Microsoft, for instance, has adopted the strategy described in this article in some of the software markets in which it is involved. In a newspaper commentary, Kaspi points out that Microsoft’s compliance with presenting the software “Office 2000” in a newspaper advertisement for Hewlett-Packard CD-writers is meant to implicitly call readers to copy its software. See Arye Kaspi, *Ha’aretz*, June 2, 2000, Israel.

¹² In the presence of two sub-markets, which can be differentiated by the slope of their demand function, a monopoly may extract greater profits from the sub-market in which the demand function is flatter. See further details in the formal model in Section 2.

¹³ In the context of the software industry, it is likely that the two sub-markets are the commercial and private sectors. It is well accepted that the demand in the former is substantially less elastic. One may also think, for example, of two geographical sub-markets in an international context.

¹⁴ For this strategy to be effective, the boundaries between the sub-markets must, of course, be strictly maintained.

¹⁵ Another strategy may be to interchangeably allow copyright violation in the market in one period and enforce copyrights in the next period. This policy, however, may not only be technically difficult to implement (that is, selling a product in a market where it has previously become a norm to copy), but it may not support a Perfect Nash Equilibrium under a finite time horizon. For further details on this strategy, see for instance David M. Kreps, *A Course in Microeconomic Theory*, (NJ, Princeton University Press, 1990).

¹⁶ In fact, when the monopoly selectively enforces copyrights infringement, this might both produce a mean for predatory pricing and, more generally, provide for the monopoly a way of imposing a price discriminating policy.

¹⁷ Section 501 (b) of the 1976 Copyright Act, titled “Infringement of copyright” provides: “The legal or beneficial owner of an exclusive right under a copyright is entitled...to institute an action for any infringement of that particular right committed while he or she is the owner of it.” The owner might demand one of the remedies stated in sections 502-505.

¹⁸ Section 506 (a) of the 1976 Copyright Act, titled “Criminal Infringement” provides: “Any person who infringes a copyright willfully...shall be punished as provided under section 2319 of title 18, United States Code....”

¹⁹ The International Planning and Research Corporation (IPRC) published a report in May 2000, stating that in 1999 the damage due to use of illegal software in North America was 3.6 billion dollars. That was also the damage value in Western Europe. In the Middle East the losses were 286 million dollars, a significant figure considering the size of that market.

²⁰ Modeling two distinct production functions with increasing marginal costs implies that the firms should optimally balance production and enforcement. Our assumption about the cost of production

and enforcement allows us to overlook this issue and purely focus on the main insight of the model. Note, however, that on the part of enforcement, one may argue that the marginal cost might even drop with quantity since the latter is associated with a lower price of the product, which in turn decreases the incentive for copyright infringement.

²¹ Notice that if copyrights are not enforced, it is irrelevant whether the charged price is positive or zero, since all consumers are assumed to costlessly copy the product, which in effect sets the price to zero.

²² Recall that in a Stackelberg-type competition, the leading firm knows how the follower will react to any quantity it produces and incorporates this information into its optimal production strategy. That is, the leader internalizes the follower's "reaction function" and only then chooses production that maximizes profits. Also, one should note that our results do not particularly rely on the Stackelberg set-up assumption. One can, similarly, construct a setting with, for example, a Cournot-type oligopoly (where the profits of the competitors are identical) or perfect competition, which will also generate no entry on part of the follower(s). Hence, the intuition presented in the model does not depend on the specific set-up.

²³ Notice that we potentially allow distinct quantities and prices to be set in each market. This assumption is essential for the analysis. As mentioned in the previous section, one may think here, for instance, of the private and commercial sub-markets within the software industry.

²⁴ In fact, AFC is the average fixed entry cost per period. Hence, when entering the market the follower considers the profits per period vis-à-vis the corresponding average fixed cost. As we show in Proposition 2, the extension of the one-round game to a finite repeated game is immediate.

²⁵ Note from Equation (1) that, provided that $e_2=0$, then setting $p_2 \neq 0$ is redundant since prices will, in effect, drop to zero due to copyright infringements. Equivalently, given that $e_i=1$, the monopoly is always better off setting the monopolistic price.

²⁶ See also Steven C. Salop & R. Craig Romaine, "Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft," 7 *Geo. Mason L. Rev.* 617 (1999). In their article about the Microsoft case, they present additional arguments for which a threat of predatory pricing, despite its cost to the monopoly, is credible in a general framework and in the software industry in particular. First, they argue that a monopoly might hurt a rival in a way which benefits one of the monopolist's other products and those gains might be sufficient to offset the cost of carrying out the threat. This argument may also

apply to markets characterized by different demand curves. Maintaining the barriers between the two sub-markets in our model conceptually resembles the multiple product idea. Second, it might be beneficial for the monopoly to gain reputation as a predator, which, in turn, will encourage future potential competitors to not enter the market. Moreover, the traditional argument against the credibility of predatory pricing strategy is that the monopoly loses more than his competitor for maintaining its market share. Hence, rivals may assume they will outlast the monopoly in the battle. However, as Salop and Romaine argue there are other factors that support the monopoly's stand. Often, the monopoly exhibits greater resources than those of the potential competitor and it may thus "breathe" longer (especially, when no marginal costs are involved, as in the case, for example, of the software industry). Furthermore, the monopoly might have a reputation as one who carries out predatory threats even when they are costly to the monopoly in the short-run. Also, compare Jack L. Goldsmith and Eric A. Posner "A Theory of Customary International Law" note 43 *John M. Olin Law & Economics Working Paper No. 63 (2D Series)*.

²⁷ As one can see from the proof, $\pi_L^{SS} < \pi^M$ does not explicitly appear in Proposition 1 since it holds for all $a, b_2 > b_1$, and mc , given the setting of the model.

²⁸ Note that $\pi_F^S < AFC < \pi_F^{SS}$ and $\pi_L^{SS} < \pi^M$ imply that it is necessary for attaining the PNE that the AFC experienced by the follower sustains $\pi_F^S < AFC < \pi^M$. In other words, AFC must fall between the monopoly's profit in sub-market 1 and that of the follower if it enters that market. One might argue, however, that, realistically, if AFC is greater than π_F^S it is likely to also be greater than π^M , which implies that the monopoly should not have entered the market in the first place. The response to this claim is twofold: first notice that although the model demonstrates a duopoly situation, one can more generally think of the alternative full competition framework, where the competitor's profit is substantially lower than that of a monopoly. That is, our duopoly framework may also be extended to a competitive market where the difference between followers' and monopoly's profits is more significant. Furthermore, under some circumstances it is likely that the AFC experienced by the leader is lower than that incurred by the follower. This may be true for several reasons: The leader's research and development costs are incremental and are spread over time. It took the leading firm some time to enhance its software to its current condition while the follower, frequently, in order to compete, must launch a better product. Moreover, the monopoly's dominance in the market is already established and

the competitor is thus often required to devote substantial resources for establishing its market share. However, apparently, the major reason is the network effect. In order to compete with the monopoly the superiority of the product presented by the follower should be sufficiently great, such that it not only “compensates” the customers in terms of technical qualities, but also dominates the network effect advantages such as compatibility, switching costs etc.

²⁹ Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209, 222 (1993).

³⁰ See Herbert Hovenkamp, *Federal Antitrust Policy*, (West Publishing 1994) p. 305. “[T]he Supreme Court’s Brooke decision appears to have limited predation claims to those where prices are below average total cost. To be sure, price-cost relationships were not at issue and the Court refused to decide the proper cost test for predatory pricing.”; James R. McCall Private Enforcement of Predatory Price Laws Under the California Unlawful Practices Act and the Federal Antitrust Acts 28 Pac. L.J. 311-322 (1997) “As the law in the Ninth Circuit now stands, if the defendant seller’s prices ... are between average variable cost and average total cost, price predation can be found if the plaintiff meets the burden of proving, through noncomparison evidence, that the defendant was motivated by predatory intent.”. See also Patrick Bolton, Joseph F. Brodley & Michael H. Riordan, Predatory Pricing: Strategic Theory and Legal Policy, 88 Geo. L. J. 2239 (2000).

³¹ See Andrew Watson, “Predatory pricing in the software industry,” 23 *Rutgers L. Rec.* 1 (1998).

³² See Herbert Hovenkamp, *ibid* at p. 303.

³³ Indeed, Hovenkamp in his book *Federal Antitrust Policy*, *ibid*, argues that the legal test for predatory pricing has changed over time with judicial attitudes about how frequently it occurs. When the courts believed predatory pricing was a prevalent phenomenon, they tended to accept the plaintiff’s arguments. Increased skepticism concerning the frequency of predatory pricing has led the courts to develop stricter tests. Yet the strict tests are criticized on the grounds that they represent a static, non-strategic view of predatory pricing. Most economists no longer share this view. (See for example: Patrick Bolton, Joseph F. Brodley & Michael H. Riordan Bolton *supra* note 30). Ever since the Brooke decision, old economic theories gave way to new ones and today, with the aid of game theory analysis, it was established that predatory pricing is often a rational profit-maximizing strategy. (See: David Spector “Definitions and Criteria of Predatory Pricing” MIT working paper 01-10, Jan 2001.) Many economists stand abreast on this issue. In their effective criticisms, many scholars emphasize the fact that the court, in adopting that test, rested on outdated empirical studies by John Mcgee and Roland

Koleer. The new theories point out that the predator seeks to influence the expectations of an existing or potential rival or even the prey's creditors in order to convince the rival to abolish competition and to forgo future entry, making it unprofitable (these theories also include signaling theories and effects such as the reputation effect, test market predation and cost signaling.) These theories suggest that predatory pricing poses a special threat in rapidly growing, high-technology industries, which often involve intellectual property and continuing innovations (see Patrick Bolton, Joseph F. Brodley & Michael H. Riordan Bolton *supra* note 30 and the references there. Also see Andrew Watson "Predatory Pricing in the Software Industry" 23 *Rutgers L. Rec.* 1 (1998); Note: "Antitrust and The Information Age: Section 2 Monopolization Analyses in the New Economy" 114 *Harv. L. Rev.* 1623). Even the most notable scholars from the old Chicago school talk about the new economy and its effects on predatory pricing. In an article about antitrust in the new economy (See Richard A. Posner "Antitrust in the New Economy" *John M. Olin Law & Economics Working Paper No. 106 (2D Series)*), Judge Posner emphasizes the fact that "Intellectual property is characterized by heavy fixed costs relative to marginal costs. It is often very expensive to create, but once it is created the cost of making additional copies is low, dramatically so in the case of software, where it is only a slight overstatement to speak of marginal cost as zero." He also mentions "the existence of the monopoly may discourage subsequent technological innovation by other firms. If network externalities are large, they may provide the monopolist with a cost advantage that exceeds the benefit of a superior new technology. This is the issue of "path dependence": an industry may be stuck with an inferior technology because of the cost advantage of the existing network". Indeed, the new economy did not turn the Chicago school on its face, but Judge Posner emphasizes that skepticism regarding unilateral monopolizing actions is not the same as denial, and he is willing to accept that deterring entry by means of predatory pricing is not always an irrational strategy. Judge Posner further mentions that in determining whether the firm has a monopoly in an economic sense, the ratio of price to marginal cost is meaningless, since pricing intellectual property at marginal cost is non-remunerative and leads to bankruptcy. Judge Posner mentions that in the new technology "it is plausible that the profit from extending the monopoly another year or two will exceed the cost of the exclusionary practices required to achieve the extension. To put this differently, there is no reason to think that the cost of an exclusionary practice in such markets will exceed the additional monopoly profits that the practice makes possible, even though the cost may be incurred earlier...". In light of new economic theories,

scholars have offered that courts would take a more aggressive approach toward predatory pricing. In fact, they tend to offer one of two alternatives - either change the way in which courts measure the costs and the measurements for recoupment and stay within the framework of the test dictated by the Brook decision, or abolish the “cost” benchmark altogether. In a recent article by Aaron Edlin, he argues that there is no compelling reason to restrict predation cases to below-cost pricing (And compare: Herbert Hovenkamp, *supra* note 30, where he states the criticism against the Areeda-Turner test and summarize “short-run marginal cost is not an appropriate benchmark of identifying predation: although few prices below short-run marginal cost are non-predatory, a price higher than short-run marginal cost can also be “predatory”) since above-cost pricing can also hurt consumers by limiting competition. (See Aaron S. Edlin “Stopping Above-Cost Predatory Pricing” *UC Berkeley Public Law and Legal Theory Working Paper No. 57* (2000).

³⁴ A brief comparative survey corroborates this claim. In **Canada** - Section 50(1)(c) of the Competition Act R.S.C. 1985, c.C-34, states: “...engages in a policy of selling products at prices *unreasonably low*...”. As construed by Canadian Predatory Pricing Guidelines, with regard to prices set somewhere between average total cost and average variable cost (the “gray range”), the Director’s conclusion about their reasonableness will depend on the surrounding circumstances. “...a price within this range would be regarded as unreasonable if there was proof that the accused was ignoring opportunities to raise prices in the face of increasing demand, or there was direct evidence of the firm’s intent to use pricing for an anti-competitive purpose.” In **Australia** the law has gone even further. In a recent landmark decision (2.27.01), the Federal Court of Australia decided that predatory pricing is not limited to pricing below marginal cost or even to a different benchmarks of cost. Thoroughly surveying American and European cases and literature, and criticizing the Chicago School, the court emphasized new theories, which favor a more stringent test. The Australian court described the American test as an “attempt to provide a standard that could be applied rationally to all circumstances, a ‘bright line test’ that would not depend upon the alleged predator’s intent, which was regarded as an unsatisfactory criterion upon which to found liability” but that such a test does not fit the Australian law. In the court’s opinion, “the existence of predatory pricing should not be determined by reference to some precise formula or definition. Predatory pricing is no more than a price set at a level designed to eliminate a competitor or keep a potential competitor from the market... In particular, ... it does not matter that the price charged might exceed either the average total cost or average variable cost. In the

circumstances of a particular case it may nevertheless be a predatory price.” (*Australian Competition and Consumer Commission v. Boral Ltd.* [2001] FCA 30). In **England**, the prohibition of predatory pricing is defined in section 18(2) of the Competition Act 1998, which is based on Article 86 of the EC treaty. The act states that conduct may constitute an abuse if it consists in “(a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading condition...” In guidelines published by the English Office of Fair Trading, the Director General adopts the European court’s opinion in AKZO that prices above AVC but below ATC may indicate predation, but the Director General would need to establish evidence that the dominant undertaking intended to eliminate a competitor before predation could be found. On such occasions, the Director may consider other evidence on costs, for example whether the undertaking is covering its long-run avoidable costs. In the **EEC** see *AKZO Chemie BV. v. Commission of European Communities*, 1991 ECJ CELEX LEXIS 5086. The court states in this case that “prices below average total costs, that is to say, fixed costs plus variable costs, but above average variable costs, must be regarded as abusive if they are determined as part of a plan for eliminating a competitor. Such prices can derive from the market undertakings, which are perhaps as efficient as the dominant undertaking but which, because of their smaller financial resources, are incapable of withstanding the competition waged against them.” In a more recent case, the Court of Justice of the European Communities expanded the AKZO decision. In *Cie maritime Belge Transports Sa and others V. European Commission and others* [2000] All E.R. (EC) 385 the court explained that “The categories of abusive exclusionary pricing practices have not been exhaustively defined in the AKZO Chemie case. The court in the AKZO Chemie case did not definitively preclude the use of art 86 to cases where a dominant firm undertakes selectively targeted price reductions while retaining its prices above its total costs. ... in the AKZO Chemie case ‘the Court considered that competition based on pricing [was] not always legitimate and went on to identify two types of predatory pricing contrary to Article 86.’” The court added, however, that different considerations may apply where “an undertaking which enjoys a position of dominance approaching a monopoly, particularly on a market where price cuts can be implemented with relative autonomy from costs, implements a policy of selective price cutting with the demonstrable aim of eliminating all competition...There are peculiar features of certain markets...where costs may be an unreliable guide to the reasonableness of competitive strategies adopted by dominant firms.” The court went on to say, citing from Temple Lang, *European Community Antitrust Law: Innovation Markets and High Technology Industries*, that “if

nothing is added to the AKZO criteria, dominant companies selling products or services of which the variable cost is near-zero, which are relatively common in high tech industries, have much scope for putting competitors out of business by what would widely be regarded as predation.”

³⁵ Of course, as implied by the condition in Proposition 3, intervention requires that demand functions and production and enforcement costs may be estimated to justify the spoken intervention.

³⁶ For example, if a Cournot equilibrium replaced the potential Stackelberg equilibrium under our *assumed setting*, then an exogenous intervention would not benefit social welfare.

³⁷ One can argue that competitors might not sue or as we later claim, ask the government to sue, but only threaten the monopoly they will do so. This would allow the competitors to reach a Coasian deal with the leader under the threat of competition. While this argument is indeed valid, it only applies to certain market conditions. The effectiveness of such a threat depends on several factors such as how credible it is; what is the number of competitors willing to enter the market or willing to make a credible threat; what are the chances for detection etc. The higher the transaction costs and the need for coordination, the less likely that such a threat can succeed. Moreover, if the anti-trust policy motivation is to maximize consumer surplus, then one should consider acting even prior to the competitor’s complaint or formal filing of a suit. In criminal law the state often acts – even against the will of the involved parties.

³⁸ 15 U.S.C.A. § 2. See also Herbert Hovenkamp, *supra* note 30 at 541.

³⁹ 15 U.S.C.A. § 15: Under this section, any person who shall be injured in his business or property by reason of anything forbidden in the antitrust laws may sue and, if successful, recover threefold the damage sustained and the cost of suit, including a reasonable attorney’s fee. This section attempts to reduce or eliminate the disincentives to filing a suit, thus raising the odds of one being filed. As mentioned by commentators, this section can be broadly interpreted to allow recovery to a broad category of plaintiffs; hence, it may be in conflict with basic antitrust policies negating over-deterrence and speculative or even duplicative awards. Therefore, some court decisions have opted for a narrow interpretation of the section. Thus, for example, under the common law “standing rule” or “antitrust injury” of *Illinois Brick v. Illinois*, 431 U.S. 720 (1977), the court ruled that the indirect plaintiff has no standing and hence would be awarded no remedy. It is true that competitors had long been considered proper plaintiffs to sue for the cause of predatory pricing. However, the court still has to define whether there has been an injury to the plaintiff’s business (for if there was, the court is usually willing to award

damages for loss of future profits). This raises the question for would-be competing entities that have not been established yet and for other entities that are currently operating in other markets but may later enter the relevant one. When and under what conditions would they be entitled to sue and receive compensation? See Hovenkamp, *supra* note 25 at 559.

⁴⁰ 15 U.S.C.A. § 26

⁴¹ The applied doctrines used for enforcement are part of the positive law, or they will be developed over time through future courts' decisions.

⁴² While being less developed, the copyright misuse doctrine has the same roots as those of the patent misuse doctrine.

⁴³ Thus, for example, this doctrine was implemented in a case where a firm, in order to extend its rights, had used anticompetitive clauses in its standard software licensing agreement and was, therefore, found by Court to have practiced copyright misuse. See *Lasercomb Am. , Inc. v. Reynolds*, 911 F. 2d 970 (4th Cir.1990) [hereafter called the Lasercomb decision].

⁴⁴ See Chief Judge Posner in *Saturday Evening Post Co. v. Rumbleseat Press, Inc.* 816 F. 2d 1191 (7th Cir. 1987), where he argues, “‘If misuse claims are not tested by conventional antitrust principles, by what principles shall they be tested? Our law is not rich in alternative concepts of monopolistic abuse; and it is rather late in the date to try to develop one without in the process subjecting the rights of patent holders to debilitating uncertainty.’ This point applies with even greater force to copyright misuse, where the danger of monopoly is less. We hold that a no-contest clause in a copyright licensing agreement is valid unless shown to violate antitrust law.”

⁴⁵ See the Lasercomb decision, in which the court said the following: “While it is true that the attempted use of a copyright to violate the antitrust law probably would give rise to a misuse of copyright defense, the converse is not necessarily true - a misuse need not be a violation of antitrust law in order to comprise an equitable defense to an infringement action.”

⁴⁶ Paradigmatically, the misuse doctrines (in patent and copyright law) were designed to prevent the extension of the monopoly power granted by the legislator through unlawful means. The underlying motivation is that the realm of copyright and patent law is not wrongfully extended, for example, by tying arrangement, draconian anticompetitive licensing, etc. However, in our case, monopoly power is extended by “narrowing” the realm of copyrights via selective enforcement.

⁴⁷ A rationale for complete withdrawal of copyrights is that by failing to attempt to enforce its copyrights in one sub-market, the monopoly proves an intention to transfer its rights to the public domain; therefore, it should completely lose its copyrights in both sub-markets.

⁴⁸ Note that the threat to remove all copyrights granted by the State is “weakly credible” because under either alternative (with or without copyright withdrawal), the competitor remains out of the market while the monopoly suffers a substantial loss if the threat is exercised. Hence, the competitor might gain a market share if, in fact, the monopoly internalizes the threat.

⁴⁹ The State can also start a civil antitrust investigation, which often leads to consent decrees. These are out-of-court settlements approved by the court. They can be forced by the State but cannot form a basis for an antitrust private action. See Herbert Hovenkamp, *supra* note 30 at 533 et al.

⁵⁰ This claim ignores the potential greater transaction cost involved when the initiative for enforcement is public rather than private. Yet, we argue that this possible greater cost might be overpowered by the wider perspective of the State vs. that of the individual competing firm.

⁵¹ See section 506 and 506(a) of the Copyright Act and section 2319 of title 18, United States Code. section 506 (a) to the 1976 Copyright Act, Titled “Criminal Infringement” provides: “Any person who infringes a copyright willfully either-- (1) for purposes of commercial advantage or private financial gain, or (2) by the reproduction or distribution, including by electronic means, during any 180-day period, of 1 or more copies or phonorecords of 1 or more copyrighted works, which have a total retail value of more than \$ 1,000, shall be punished as provided under section 2319 of title 18, United States Code....”

⁵² There may be occasions when a competitor avoids private enforcement because of its costs. The competitor does not internalize all the public benefits resulting from the enforcement; therefore, it does not act. In such cases, however, government’s enforcement is of course in line with the competitor’s interest.

⁵³ Of course, when the State adopts the role of copyright enforcer, efficiency is maintained only when the monopoly’s original entry cost (denoted by *AFC* in the model) is such that production is yet economical, independently of the party that eventually bears the cost of enforcement.