

# Fighting Fire with Fire: Commercial Piracy and the Role of File Sharing on Copyright Protection Policy for Digital Goods

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EXTENDED ABSTRACT

## 1 Motivation

Digital piracy has become a major issue for the global information goods economy. The threat and the damage caused by piracy are widespread and span the entire range of information goods from music and movies to software. Each year, the industry's losses to piracy amount to billions of dollars. According to the BSA/IDC 2009 Global Software Piracy Report (BSA/IDC 2009), software piracy caused a revenue loss of more than 50 billion dollars in the world in 2008, and that for every two dollars' worth of software purchased legitimately, more than one dollar's worth was obtained illegally. Some 35 percent of all music discs sold worldwide are illegal copies costing the industry \$4.6 Billion (IFPI 2005), and the movie industry's annual losses to piracy reached \$6.1 Billion (MPA-LEK 2008). Further, each year the affected industries spend millions of dollars in direct costs of fighting piracy through activities such as litigation and publicity campaigns.

There are two main types of piracy concerning digital goods producers: The first type is *commercial piracy*, in which a third party creates illegal copies of the digital products and sells them to consumers for profit. Especially rampant in emerging economies such as China, Eastern Europe, and South America, This type of piracy, usually takes place from illegal outlets that sell CDs, cassettes, and other physical media that store digital goods (IFPI 2005). The second type is *individual piracy*, where end users make copies for themselves by using copying technologies available to them. The exact method depends on the product and the medium it is stored in. Some examples are creating copies of movies by burning DVDs, and making illegal copies of digital music on computers and hand-held devices. Naturally, not every consumer has the technology or the know-how to individually pirate. In fact, for certain products such as digital music, historically, individual copying has not been very easy for many consumers and only a limited population of consumers have had the technology, equipment, and the ability for copying digital goods. Further, even in cases when it was relatively easy to copy, the individual copying activity was limited to relatively closed circles of acquaintances, and thus individual piracy had not led to the mass and rapid distribution of illegal copies of copyrighted material. However, in recent years, with the emergence and the growth of the Internet, coupled with increased digitalization of media, this situation has changed. The Internet, by its widespread and highly connected nature, enabled the formation of "digital communities" where people could not only socialize but also share digital files including copyrighted material. This capability peaked with the emergence of peer-to-peer (P2P) networks. Starting with the centralized Napster in the late 1990s and then morphing into decentralized networks such as Kazaa,

Grokster, and BitTorrent, P2P networks provided an unprecedented number of consumers with ease of illegally sharing a wide spectrum and selection of digital goods such as movies and music and substantially increased the consumer population able to individually pirate both in the United States and around the world (see, e.g., OECD 2004 and Mennecke 2005).

The emergence of P2P networks alarmed the information goods industry, especially the music side. The substantial activity of MP3 music file sharing on these networks generated a hot debate. Feeling threatened by the increasing Internet individual piracy, the recording industry, or more accurately the industry's main trade group RIAA (Recording Industry Association of America), took legal action first suing the P2P networks, and even succeeded in ending the activities of some of these networks (cf. Borland 2001, 2003 and Phillips 2005). Next, the group turned its attention to increasing deterrence on the users themselves. In a sequence of lawsuits that started in 2003, RIAA has sued a number of P2P network users who have been allegedly sharing copyrighted music on the Internet in the United States and all around the world in countries such as Sweden, Switzerland, Argentina, Hong Kong, and Singapore (EFF 2005, ZDNet 2005, BBC 2005, Gonsalves 2009). The debate escalated as the consumer groups, P2P networks and Internet Service Providers challenged the action (legally or otherwise) from the points of view of privacy and fairness (Ramasastry 2004). Further, some critics argued that the recording industry was hurting itself with this action by alienating its own fan base (EFF 2005).

The lawful publishers of digital goods naturally have a legal right to seek enforcement of their copyright protection by paying attention to Internet individual piracy activity. However, in most countries in the world today there is a varying degree of both individual and commercial piracy, and in a market with presence of both types of piracy, the role that Internet piracy plays is more complicated. In particular, from the legal publisher's point of view, the effect of each one of the two types of piracy is different. First, when one considers the process of obtaining the good, commercial pirates provide consumers with a product that is in fact overall a closer substitute to the legal one: obtaining digital goods from commercial pirates does not require any special copying equipment, technological sophistication or know-how on the consumer's part as it only simply needs buying a physical medium such as a CD from a pirate vendor to utilize this source. In every country, especially in developing countries, a substantial part of the population does not have Internet access or know-how or desire to learn to swap files on P2P networks (CIA 2006). Such consumers can still purchase the product of the commercial pirates and substitute it for the legal one. On the other hand, being sufficiently technologically literate is a prerequisite to have the capability to individually pirate digital goods, and most individual file sharers, such as P2P users, belong to an especially technologically savvy demographic group of consumers (NARM 2004, FTC 2005).<sup>1</sup> As a consequence, individual piracy innately has a more limited potential population segment than commercial piracy. Second, there is a significant strategic side of commercial piracy in that commercial pirates set and adjust prices as a response to the legal publisher's prices, and as a consequence when setting her price, the legal publisher has to take into account the price response of the commercial pirates (Kelly 2005). As a result, and as the music industry also admits, commercial piracy in many cases poses a more critical strategic threat for copyright owners (Smith 2005). Combining these observations, the existence of individual piracy, whether in the form of P2P file sharing or otherwise, may present strategic opportunities to consider for copyright owners.

Building on this premise, in this paper, our goal is to show that over-restricting individual piracy

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<sup>1</sup>For instance Baskerville (2006) describes the consumers who are likely to pirate digital goods on the Internet as "young, naturally rebellious, and technologically savvy".

can in fact reduce a legal publisher’s profits by forcing her not to fully take advantage of potential strategic opportunities. Specifically, we argue that in the presence of commercial piracy, (i) reducing consumers’ ability to individually pirate (such as filing lawsuits against P2P networks to shut down illegal file-sharing activity at those venues); or (ii) increasing deterrence for consumers to commit individual piracy (such as increasing the detection and punishment rate for sharing copyrighted material) can decrease a legal publisher’s profits. To demonstrate these arguments, we construct and analyze a model of competition between the legal publisher and a commercial pirate in a market environment where the consumers also can copy individually.

## 2 Overview of the Model, Analysis, and Results

Our model utilizes the set up in Chen and Png (2003) extending it by introducing strategic competition from a commercial pirate. We also incorporate a non-unit opportunity costs of being caught for pirates (see below). A firm, hereafter referred to as the legal publisher and denoted by  $L$ , produces a digital good and sells each unit at price,  $p_L$ , to maximize her profit. A commercial pirate firm, hereafter denoted by  $C$ , makes illegal copies of the digital good produced by the legal publisher and offers to consumers at a unit price  $p_C$ . The marginal cost of production is zero.

There is a continuum of consumers, each having a unit demand for the product, and whose valuations,  $v$ , are uniformly distributed on  $[0, 1]$ . A consumer can be one of the two types: a “technologically savvy” consumer who is capable of making illegal individual copies of the product; or a consumer who is “not technologically savvy”, not capable of making copies individually. A technologically savvy consumer can acquire the product through individually copying, purchasing the product from the commercial pirate or from the legal publisher; whereas for a consumer who is not technologically savvy, purchasing the good, either from the legal or the illegal source, is the only option to acquire the good. Each consumer has a unit demand for the product and has a type  $\theta \in \{T, NT\}$  that indicates that particular consumer’s capability (technologically savvy to be able to pirate or not) of pirating the digital good by making individual copies such as using a P2P network to download and share files with other users. If a consumer has type  $T$ , she will individually copy if she chooses to, while if a consumer has type  $NT$ , individual copying is not an option available to that consumer. A consumer is of type  $T$  with probability  $\alpha$  and is of type  $NT$  with probability  $1 - \alpha$ . Without loss of generality, the cost of individually acquiring an illegal copy is assumed to be zero.

Following Chen and Png (2003), when a consumer illegally acquires the product (either from the commercial pirate firm or by individually copying in our case), there is a chance that she will be detected and prosecuted. If a consumer is prosecuted for piracy she incurs a total cost that potentially includes a fine and other fixed costs of prosecution as well as opportunity costs that are incurred from being prosecuted. Such opportunity costs would likely be positively correlated with the consumer’s valuation for the product as the maximum amount that a consumer is willing to pay for the product is an indicator of the consumer’s wealth and corresponding opportunity costs (see, e.g., O’Connell et al. 2004). For simplicity, we assume that the correlation is of first order. Therefore, we can write the total cost that a consumer incurs if detected to have pirated the product as

$$\psi(v) = f + \beta v, \tag{1}$$

where  $f, \beta \geq 0$ . In (1),  $f$  is the fixed part of the costs of being caught and prosecuted.  $\beta$  is

the coefficient that links the costs of being prosecuted with the valuation of the consumer and is positive indicating the positive correlation between the consumer valuation and the opportunity costs of being detected and prosecuted.<sup>2</sup> The probability of detection for piracy can vary between individual piracy and commercial piracy. We denote the probability that an individually copying consumer to be detected by  $\mu_S$  and that for a consumer who acquires the copy from the commercial pirate firm as  $\mu_C$ , where  $\mu_S, \mu_C \in [0, 1]$ . For consumers, the probability of detection for individual piracy and the probability of being detected when purchasing from commercial pirates are usually very low (i.e., in the order of  $10^{-3}$  to  $10^{-5}$  or lower; see e.g., EFF 2005) and the probability of prosecution for a consumer purchasing from a commercial pirate is normally lower than that for individual piracy (i.e.,  $\mu_C < \mu_S$ ). Accordingly, the results we present in this paper will reflect these facts. Note that, despite the low probability of detection, the high levels of punishment and disutility when caught (i.e.,  $f$  and  $\beta$ ) bring the *expected* disutility from being caught to levels where the piracy decision for the consumers becomes non-trivial. To avoid trivialities in this aspect we assume  $0 < \mu_C\beta, \mu_S\beta, \mu_Cf, \mu_Sf < 1$  since otherwise no consumer would ever choose to acquire the product from the commercial pirate firm or by individual copying. If he chooses to enter the market, the commercial pirate could also be detected and prosecuted by the government with a certain probability. Let  $F$  denote the *expected* penalty he pays in monetary fees or through disutility from prosecution and penalties if and when detected, i.e.,  $F$  denotes the fixed cost of “entry” to the market for the commercial pirate.<sup>3</sup>

The game between the legal publisher ( $L$ ), and the commercial pirate ( $C$ ) evolves as follows: First, the legal publisher sets her price ( $p_L$ ) and releases the product. Obtaining a copy of the original product, the commercial pirate decides whether to enter the market by producing illegal copies. If the commercial pirate decides to enter, he determines what quantity to produce and the unit price ( $p_C$ ) he will set. Given  $p_L$  and  $p_C$ , each consumer maximizes the net expected benefit she receives by making a decision on whether to acquire the product and, if so, from what source. If the consumer is of type  $T$ , she has four options: (i) purchase the product from the legal publisher; (ii) purchase the product from the commercial pirate; (iii) individually acquire a copy through technological means (such as file sharing through the Internet); and (iv) do not acquire the product. If the consumer is of type  $NT$ , she faces all these options except (iii). Each consumer makes a decision among the options available to her by weighing the costs and benefits of each option. Finally, based on the consumer decisions, the payoffs are realized. We derive the equilibrium and explore the effects of two factors on the legal publisher’s profits; namely, the proportion of the consumers who can individually copy the product and the detection and punishment rate of consumers who individually pirate the product.

Our first result states that increasing the population size of the consumers capable of individual piracy will *not* necessarily result in less profit for the legal publisher. At first glance, increasing the population of the technologically savvy consumers has a negative effect on the legal publisher’s profit since when more consumers can pirate individually they are less likely to purchase the product. However, a larger population of the individual copiers also reduces the demand for the commercial pirate. As a result, just to be able to cover the risk of entry, the commercial pirate may be forced to

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<sup>2</sup>The opportunity costs may include the loss of value obtained from the product. Specifically, when  $\beta = 1$ , we obtain the loss function of Chen and Png (2003), who assume that the consumers will lose the product when piracy is detected as a special case of our formulation.

<sup>3</sup>Note that  $F$  is a shorthand notation for the “fixed costs” of entry, the expected value of “disutility from being detected and prosecuted” (a random variable which can obtain a value zero in certain states) and possibly some other fixed costs.

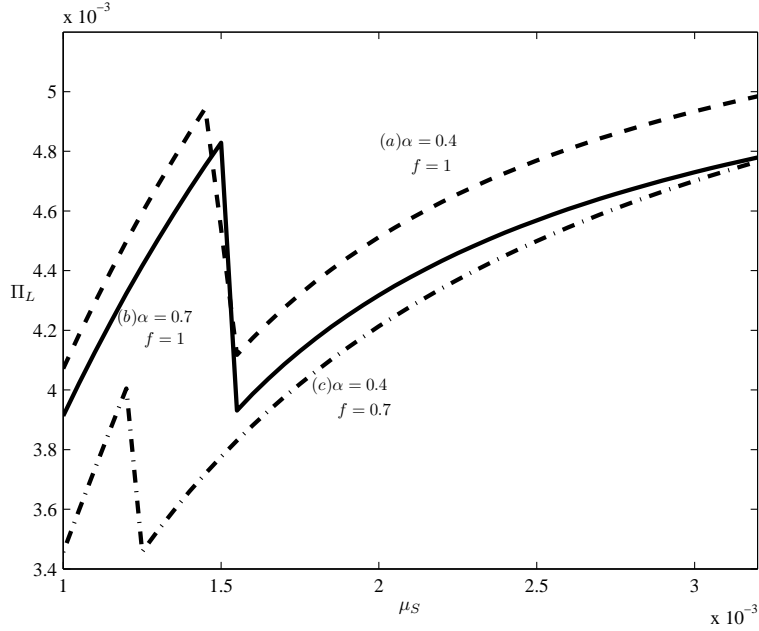


Figure 1: Legal publisher's equilibrium expected profits as a function of  $\mu_S$ , with positive commercial piracy market share in equilibrium. In case (a),  $\alpha = 0.4$ ,  $f = 1$ ; in (b),  $\alpha = 0.7$ ,  $f = 1$ ; and in (c),  $\alpha = 0.4$  and  $f = 0.7$ . For all cases,  $\mu_C = 0.001$  and  $\beta = 10$ .

price high and therefore appeal only to the technologically non-savvy consumers. Taking advantage of this situation, the legal publisher can lower her price to drive the commercial pirate out of the market. In this case, an increased population of consumers who are able to copy individually can allow the legal publisher to increase her price and her profits while still keeping the commercial pirate out of the market.

We next show that, in contrast to what one would first expect, increasing the detection and prosecution rate on individual piracy can reduce the legal publisher's profit. This can happen in two ways, implying two diametrically opposite strategies for the legal publisher combatting commercial piracy. First, increasing the detection rate for individual piracy may potentially drive consumers to the commercial pirate, making it easier for him to enter and sell to both technologically savvy and non-savvy consumers. In such a case, in equilibrium, the legal publisher may be forced to lower her price to keep the commercial pirate out of the market, and consequently, may experience a decrease in her profits. Second, as illustrated in Figure 1, increasing control over individual piracy can hurt the legal publisher *even when* the commercial pirate is actively in the market. When the percentage of the technologically savvy consumers in the market is not very high, the commercial pirate may be optimally pricing high to target only the consumers who cannot individually pirate. However, an increase in individual piracy detection rate increases the potential market for the commercial pirate among the users who are technologically savvy. Consequently, the legal publisher may be forced to increase her price to induce the commercial pirate not to lower his price, effectively conceding market share to the commercial pirate to minimize profit loss. As a result, the legal publisher's profits may decline sharply, as can also be seen in Figure 1.

Our results suggest a careful reconsideration of policies to fight individual piracy for information goods producers. The information goods industry, especially the music industry, has been

spending significant resources globally trying to suppress new technologies that enable consumers to individually pirate, and to deter users from individual piracy in recent years. When fighting piracy however, the industry should consider the strategic role that Internet file sharing plays in the broader picture. The industry can perhaps benefit by employing Internet file sharing as a strategic ally in a controlled way to curb the deep losses that commercial piracy induces on the industry, economies, and communities around the world.

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