The Economics of IPR Protection Policies: Comment

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Abstract

We provide a theoretical result on the effect of piracy on the sales of legal product using the same framework as Gil (2006). We obtain that when the illegal sector is perfectly competitive and the marginal cost of the legal firm and the quantity tax are small enough, piracy does not lead to lower sales of the legal product.

1 Introduction

In a paper published in this journal, Gil (2006) offers a model in which a legal firm competes with illegal firms that illegally copy the product of the legal firm. Gil (2006, p. 299) makes the following assertion,

“... the continuous violation of international Intellectual Property Rights (IPR hereafter) laws in developing countries scares away investment from multinational firms resulting in lower growth and consumption paths”.

He also offers data on the effect of piracy on the music industry. In particular, he says,

“the music industry has also suffered the effect of piracy: according to the International Federation of the Photographic Industry (IFPI) global sales increased in the 90’s from US\$24.1 billion to US\$38.6 billion. Nevertheless, global sales fell 5% in 2000, 8.8% in 2001 and 7.1% in 2002, reaching a low of US\$30.9 billion (Zentner, 2006)”.

Finally, he also says,

“SGAE (Spanish entity that looks after the interest of authors) reports that Spanish music sales went down by 17 million CDs due to illegal street sales”.

Gil thus implicitly claims that piracy leads to lower sales of the product of legal firms, though he does not offer a theoretical result on this.

Here, we provide a theoretical result on the effect of piracy on the sales of legal product using the same framework as Gil. We obtain that when the marginal cost of the legal firm and the quantity tax are small enough, piracy does not lead to lower sales of the legal product.

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This result is due to the effect of piracy on the incumbent's pricing behavior, the fact that the illegal copy is lower in quality than the legal product and the fact that the market (in the model) is uncovered (that is, there is always at least one consumer who does not buy at all).

The rest of the paper is organized as follows. Section 2 considers the case of a monopoly. Section 3 reviews the decisions of the private sector when there is an illegal sector and compares the legal firm's demands in both settings. Section 4 concludes.

2 Monopoly

The demand faced by the legal firm when it is a monopolist is

$$D_2^m(p_2) = k - \frac{p_2}{\theta_2} \quad (1)$$

where p_2/θ_2 is a consumer indifferent between buying from the legal firm and not buying at all, θ_2 is the quality of the legal product and $p_2 = p + t_2$, where p is the price set by the legal producer and t_2 is the quantity tax on the legal product. The profit function of the legal firm is

$$\Pi_2 = D_2^m(p + t_2)(p - c_2) - F, \quad (2)$$

where c_2 and F are the marginal and fixed costs incurred by the legal firm in creating innovation, respectively. The price that maximizes the legal firm's profit is

$$p^{m*} = \frac{k\theta_2 + c_2 - t_2}{2}.$$

Taking into account this price and the legal firm's demand (1), we obtain the monopoly demand at equilibrium, which is

$$D_2^{m*} = \frac{k\theta_2 - c_2 - t_2}{2\theta_2}. \quad (3)$$

3 The decisions of the private sector when there is an illegal sector

Following Gil, the price of the illegal product is

$$p_1 = \frac{c_1}{1 - h(G)}, \quad (4)$$

where c_1 is the marginal cost of firms in the illegal sector, G is the government's spending on prosecuting producers of illegal products and $h(\cdot)$ is the probability of catching those producers, where $h(0) = 0$, $h(\infty) = 1$, $h' > 0$ and $h'' \leq 0$. In this case, the legal product faces the following demand function

$$D_2 = k - \frac{p_2 - p_1}{\theta_2 - \theta_1}, \quad (5)$$

where $(p_2 - p_1)/(\theta_2 - \theta_1)$ is a consumer who is indifferent between buying the legal and illegal products. By maximizing the legal firm's profit, we obtain its reaction function. Unfortunately, the expression of this reaction function by Gil contains a sign mistake. The correct expression is as follows

$$p(p_1) = \frac{k(\theta_2 - \theta_1) - t_2 + c_2 + p_1}{2}. \quad (6)$$

As we can see, taxes bring down the price charged by the legal producer. This is because the legal producer wants to ensure that the final price that consumers must pay to purchase the legal product (p_2) does not become too high. By substituting the price of the illegal product (expression (4)) in the legal firm's reaction function (6), we obtain the price charged by the legal producer at equilibrium, which is

$$p^* = \frac{k(\theta_2 - \theta_1) - t_2 + c_2 + \frac{c_1}{1 - h(G)}}{2}.$$

Taking into account the prices of the legal and illegal products, and the legal firm's demand (5), we obtain the demand of the legal firm at equilibrium, which is

$$D_2^* = \frac{k(\theta_2 - \theta_1) - t_2 - c_2 + \frac{c_1}{1 - h(G)}}{2(\theta_2 - \theta_1)}. \quad (7)$$

By comparing the equilibrium demands of the legal firm in the two settings (equations (3) and (7)), we find that the legal firm's demand is greater when there is piracy if and only if

$$\frac{\theta_2}{\theta_1} > \frac{c_2 + t_2}{\frac{c_1}{1 - h(G)}}. \quad (8)$$

As can be seen, when the marginal cost of the legal firm and the quantity tax are small enough, piracy does not lead to lower sales of the legal product. In particular, when the

marginal cost is equal for all firms ($c_1 = c_2$) and the quantity tax is zero ($t_2 = 0$), piracy leads to higher sales of the legal product.¹

4 Conclusions

We provide a theoretical result on the effect of piracy on the sales of legal product using the same framework as Gil (2006). We obtain that when the illegal sector is perfectly competitive and the marginal cost of the legal firm and the quantity tax are small enough, piracy does not lead to lower sales of the legal product. In that case, according to the model developed by Gil, if the purchase of an illegal copy were not available, this would not imply the purchase of a legal product. In other words, if the illegal copy were not available, a consumer would not buy all the legal products of which he has an illegal copy.

The conditions that support this result, that is, the marginal cost of the legal firm and the quantity tax being small enough, are not unrealistic or unlikely. For instance, the Spanish Minister for Culture has recently reduced the price tax on CD's to 4% and on books to 1% (El Mundo, 2004) and from Peitz and Waelbroeck (2005) we observe that a CD can be seen as a good with large fixed costs and low variable costs.

This result has previously been obtained from a theoretical viewpoint for both the case of copies made by end consumers (Shy and Thisse, 1999 and Bae and Choi, 2006) and the case of copies made by a single firm that sells them on the market (Martínez-Sánchez, 2007). The result is also compatible with the results in Johnson (1985), where it is obtained that copying reduces sales of the legal product in spite of the incumbent's pricing behavior. This is because Johnson (1985) assumes that the quality of the illegal copy is the same as that of the legal product and the market is covered (that is, all consumers buy either the legal or the illegal product).

This result is partially supported by the empirical study by Oberholzer and Strumpf (2007), which finds a negligible effect of file sharing on music sales. However, this result contrasts with most studies of piracy and some court rulings, which assume that the copies sold by the pirate are equivalent to units of products that the legal firm does not sell. In particular, the 2005 Global Software Piracy Study defines industry losses as the value of pirated software at the price of the legal product. Moreover, there are contradictory verdicts from different courts in this regard. For instance, one of the reasons why the courts ruled that Napster harmed the music industry was the loss of sales of CDs (see Peitz and Waelbroeck, 2005). However, a judge in Alicante (Spain) ruled that commercial piracy harmed neither intellectual property nor the record company's sales of CDs and DVDs (see ruling JUR 2005\240478).

As can be seen, the theoretical and empirical results are different. This may be because two facts are not taken into account in either empirical or theoretical literature: (i) legal firms are committed to maintaining their prices or are reluctant to cut prices because they bear high costs, in particular for marketing and promotion (according to information compiled by the Record Industry Association of America (RIAA)), so when there are illegal producers the sales of legal product can decrease; (ii) the life cycle of the music format, which means that MP3 format is replacing CD, just as CD replaced cassette (Bourreau, 2005).

¹ Notice that $\theta_2/\theta_1 > 1$.

Finally, we stress that the result obtained in this comment implies that the decrease in the sales of CDs is perhaps not a result of piracy. In that case, industry losses from piracy are lower than claimed by the industry itself, by most studies and by some court rulings.

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