The Benefits of Piracy – A Competitive Perspective

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Introduction

Piracy is commonly considered to be detrimental to firms’ profit unless there exist strong network effects in the product market. This study offers an alternative perspective on the potential benefits of piracy. We show that piracy attracts the most price sensitive consumers. Piracy could be beneficial to firms in this case because it removes these customers from the market, therefore reducing firms’ incentive to engage in self-destructing price competition. In equilibrium, piracy may increase firm profits despite decreased number of consumers in the market. We show that the key to the analysis is the fact that consumers have different marginal utility of money.

Anti-piracy has increasingly become the top agenda for software publishers and music studios. In a number of well-publicized cases, the Record Industry Association of America (RIAA) sued a total of 3,429 individuals for illegally downloading or swapping music files online. The focus on anti-piracy is not surprising given the large amount of potential loss suffered by the industries. RIAA estimates that the industry loses $4.2 billion each year to piracy. Business Software Alliance and IDC find that $30 billion worth of software in use today was obtained illegally. The objective of anti-piracy is to convert these losses into firm profits. By reducing the number of users who pirate products, the firms are expected to see increased number of paying customers and achieve high profits.

This research questions this basic premise in a competitive environment. We show that piracy attracts the most price sensitive ones. Piracy could be beneficial to firms in this case because it removes these consumers from the market so that firms have less incentive to engage in self-destructing price competition. Anti-piracy however unwinds the self-selection process and forces firms to compete more vigorously on price. In equilibrium, it may reduce firm profits despite increased number of customers in the market.

Literature Review

Piracy is often described as theft from the firms. Intuitively, such theft must harm the firms selling the products. Conner and Rumelt (1991) are among the first to point out that piracy could be beneficial with the presence of a positive network externality. A number of studies follow up on this intuition and refine the findings. Takeyama (1994) suggest that piracy could be an effective way to “price discriminate” consumers in the presence of network externalities. Shy and Thisse (1999) extends the result to a duopoly
market. Hann and Croson (2000) further extend the competitive analysis to consider the strategic use of piracy protection by incumbents for entry deterrence. The presence of network effect is well-documented in the software industry (Bronfjsson and Kemerer 1985). However, online piracy increasingly involves products with little or no network effects. For example, the values of music or video products are more determined by their intrinsic quality than total number of listeners or viewers. In contrast with these earlier studies, this research explicitly considers the potential benefits of piracy without network effects.

Model

Key to the analysis of piracy is to understand why some people pirate while others do not. Most prior literature focuses on consumers’ piracy costs. Shy and Tissue (1999) suggest that cost of piracy is the loss of service and support provided by firms to legal users. Those who value these service and support will therefore choose to purchase. Chen and Png (2003) consider cost of piracy as ethical costs. Consumers who are more ethical face higher cost to piracy. Other piracy studies similarly emphasize piracy costs and consumers’ heterogeneity in their piracy costs. The focus on piracy costs is however just one side of the story. In deciding whether to purchase or pirate a product, consumers compared the cost of piracy with the value of money saved. While consumers may be heterogeneous in their valuation of piracy costs, we contend that the primary factor for most pirate users is their marginal utility of money. Microsoft Windows XP Professional sells for $269 a copy. This amount represents a significant fortune for an average user in a developing country like India or China, but much less for a white-collar professional in the US. Not surprisingly, India and China have much higher piracy rate than US.

The notion that consumers have different marginal utility of money has been long established in economic research. To capture this notion and show its impact on piracy, we assume two groups of consumers in the market: one has lower marginal utility of money \( k_L \) and the other has higher marginal utility of money \( k_H \). The market size is generalized to 1 and consumers with low marginal utility account for \( \alpha (\alpha < 1) \) of the market. The two groups of consumers are the same on all other aspects.

There are two firms competing in the market. We use a general form of demand function to model the competition between the two firms, where the demand for Firm \( i \) is affected by both its own price \( p_i \) and its competitor’s price \( p_j \). Firm \( i \) receives demand from both types of consumers. We first consider its demand from the low utility type. For simplicity, we assume that the demand function is linear (see Raju 1995).

\[
q_{i,L} = \alpha (\sigma_i - b_i p_i + c_i p_j) i, j \in \{1,2\}, \sigma_1 + \sigma_2 = 1 \tag{1}
\]

If both firms charge zero price, their market shares are \( \sigma_i \) and \( \sigma_j \) respectively. The firm’s own price effect and cross price effect are \( b_i \) and \( c_i \) respectively.
We now consider the demand from the high type consumers. Note that the only difference between the low type and the high type are their marginal utility of money, i.e. the impact of purchase price on consumers’ utility. The disutility of spending $p$ is $pk_H$ for a high type. The low type would need to spend $\frac{kp}{k_L}p$ to incur the same disutility. That is, a high type consumer in a market with prices $(p_i, p_j)$ will be facing the exact same decision as a low type consumer in a market with prices $(\frac{k_H}{k_L} p_i, \frac{k_H}{k_L} p_j)$. The demand from high type consumers can therefore be derived from (1)

$$q_{i,H} = (1 - \alpha) \left( \sigma_i - \beta_i \frac{k_H}{k_L} p_i + c_i \frac{k_H}{k_L} p_j \right); i, j \in \{1, 2\}, \sigma_1 + \sigma_2 = 1$$

Comparing (2) with (1), we see that the high type consumers are more price sensitive with higher own price effect and cross-price effect.

**Proposition 1**: Consumers with high marginal utility of money are more price sensitive.

We now consider the role of piracy. Consumers can choose to pirate instead of purchase. However, piracy is illegal and piracy users face potential lawsuit and jail times. Such troubles create disutility to consumers. We use $c_i$ to represent the disutility of pirating from firm $i$. The potential legal penalty (e.g. jail time) are the same for both types of consumers, therefore we assume the same disutility for both. Same disutility however does not mean the same costs in financial terms. For example, the same jail time means higher financial costs for consumers with low marginal utility of money.

While the disutility of piracy is the same for both types of consumers, the benefits are not. Piracy saves consumers the purchase price $p_i$. The consumers with high marginal utility of money receive higher utility from piracy. The benefits of piracy for the two types of consumers are $k_{i,H} p_i$ and $k_{i,L} p_i$, respectively. A consumer will pirate only if the benefits exceed the disutility of piracy. Both types of consumers pirate if the disutility of piracy is small ($c_i < k_{i,L} p_i$). For median disutility, only high type consumers pirate ($k_{i,L} p_i < c_i < k_{i,H} p_i$). No one pirates if the disutility is high ($c_i > k_{i,H} p_i$).

**Proposition 2**: Piracy has more attraction for consumers with high marginal utility of money.

Combining Proposition 2 and Proposition 1, we have

**Proposition 3**: Piracy has more attraction for price sensitive consumers.
By reducing price sensitive consumers, piracy reduces competition, potentially increasing firm’s profit marginal. On the other hand, it also reduces the market size. We consider below whether piracy could be beneficial to firms. We note that when piracy disutility is high, firms receive demand from both types of consumers. The demands of the two firms are:

\[ q_i = \alpha(\sigma_i - b_i p_i + c_i p_j) + (1 - \alpha)\left(\sigma_i - b_i \frac{k_H}{k_L} p_i + c_i \frac{k_H}{k_L} p_j\right); i, j \in \{1, 2\}, \sigma_1 + \sigma_2 = 1 \quad (3) \]

The first item of right hand side represents firm i’s demand among low type consumers. The second item represents its demand among the high types. If both firms charge zero prices, each gets its base market share \( \sigma_j \). Firm i’s demand depends on both its own price \( p_i \) and its competitor’s price \( p_j \). \( b_i \) represents the own price effect and \( c_i \) represents the cross-price effect.

We now consider a symmetric case, i.e. \( b_1 = b_2 = b, c_1 = c_2 = c \) and \( \sigma_1 = \sigma_2 = \frac{1}{2} \). Both firms maximize their individual profits. The equilibrium price, demand and profit are:

\[ p_1 = p_2 = \frac{1}{2\left(\alpha + \left(1 - \alpha\right)\frac{k_H}{k_L}\right)(2b + c)} \]

\[ q_1 = q_2 = \frac{1}{2}\left[\frac{b + 2c}{2b + c}\right] \]

\[ \pi_1 = \pi_2 = \frac{b}{4\left(\alpha + \left(1 - \alpha\right)\frac{k_H}{k_L}\right)^2(2b + c)^2} \]

Now we consider market equilibrium price and profit when piracy disutility is medium. In this case, all high type consumers pirate. The equilibrium market price becomes:

\[ p_1' = p_2' = \frac{1}{2(2b + c)} \]

And the equilibrium market price is:
\[
\pi_1' = \pi_2' = \frac{ab}{4(2b + c)^2}
\]  

Comparing (6) and (8), we find that, when \( \frac{1 + \frac{\alpha}{\alpha}}{\frac{\alpha}{\alpha H}} < \frac{\alpha}{\alpha L} \), \( \pi_1 < \pi_1' \). That is, piracy may increases firm profits if the ratio of marginal utility of money between the two types of consumers is sufficiently high. Interestingly, the condition does not depend on the absolute level of consumers’ marginal utility of money. All that matters is the relative difference.

**Proposition 4**: Piracy could be beneficial to firms if there is a significant relative difference between the marginal utility of money of two types of consumers.

**Discussion and Conclusion**

In this paper, we show that piracy could be beneficial to firms without the presence of network effect. If consumers have significant difference in their marginal utility of money, piracy could reduce competition and increase firm profits. The key to the analysis is the fact that the same amount of money represents different value to different consumers. Poor consumers usually value money more than rich consumers. The firms therefore need to engage in more heated competitions to attract these consumers, which could be detrimental to their overall profits. Our result has a clear managerial implication: software firms and other intellectual property owners shall be cautious in pursuing their anti-piracy campaign, especially in countries with large wealth gap. It could be detrimental to their profits.

**Reference**

Business Software Alliance (BSA) and IDC. (2004). First Annual BSA and IDC Global Software Piracy Study.

