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研究課題名(和文) Do you want to steal my songs? The importance of diffusion in the music industry

研究課題名(英文) Do you want to steal my songs? The importance of diffusion in the music industry

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研究成果の概要(和文)：有名で未知のアーティストがどこでトラックをホストするかを決定したときの結果を著作権と海賊行為と比較します。

1) 海賊行為は有名な芸術家と未知の芸術家の交渉力を平等にする。2) 違法コピーが原因で、質の高い市場が出現する可能性があります。3) 違法コピーは必ずしも価格の低下を意味するわけではありません。4) 未知のアーティストが著作権で保護された商用プラットフォームで自分の曲をホストしている場合にのみ、著作権侵害によって総福祉が減少する可能性があります。違法コピーによる急増と新規顧客の獲得は全体的な幸福を高めますが、高品質のコピーを低品質のコピーに置き換えることによる切り替え効果はそれを減少させます。

研究成果の学術的意義や社会的意義

この研究プロジェクトは、どのエージェントが恩恵を受け、どのエージェントが違法コピーの存在下で悪化するかを決定する条件についての理解を深めることを目的としています。我々の結果は、全員福祉を同時に改善することは不可能であると述べている。したがって、政策決定者は、保護したいグループに応じて適切な規制を設計する必要があります。

研究成果の概要(英文)：I build a model in which two artists that are heterogeneous in their degree of ex-ante popularity decide where to host their tracks, at a for-profit platform or at an open platform, to compare the outcomes with copyright and piracy:

1) Piracy equalizes the bargaining power of the famous and the unknown artists. 2) High-quality markets can appear because of piracy. 3) Piracy does not necessarily imply a price decrease. 4) Total welfare may decrease with piracy, but only if the unknown artist hosts her tracks at the for-profit platform with copyright. In this case, diffusion gains and inclusion of new customers due to piracy increase the total welfare, but the switching effect driven by the consumers who exchange high-quality copies by low-quality ones decreases the total welfare.

研究分野：産業組織

キーワード：Piracy Price Discrimination Popularity Welfare

様式 C - 19、F - 19 - 1、Z - 19、CK - 19 (共通)

1 . 研究開始当初の背景

Cultural goods, such as novels, movies, music... are protected by Intellectual Property rights in most countries, for which a monopoly is assigned to creators during a certain period of time. In many cases this monopoly lasts during many years, and can even be inherited by the descendants of the creator. The logic behind copyrights is to offer some protection to the creators in order to secure the fruits of their labor and be compensated for their effort which, in turn, encourages creativity.

In the digital era, the Internet has dramatically changed the possibilities and patterns of consumption. People consume more music and downloaded singles have replaced the CDs as the chief sale format. But also copyrights are systematically violated by online piracy practices, consisting in copying copyrighted materials illegally. The Motion Picture Association of America estimates that US studios lose more than \$3 billion annually in potential revenues. On the basis of a policy report by the Institute for Policy Innovation, the Recording Industry Association of America claims that global music piracy causes \$12.5 billion of losses every year. However, these estimations should be taken carefully: those who download illegal copies may have never intended to acquire legal ones, so there is no direct translation from illegal downloads to sales.

Due to the alleged failure in protecting the efforts of the creators, one would expect them to react fiercely against piracy and also to find less people devoted to creative activities. In contrast, we observe an increase in the sales of the initially-less-popular contents, and heterogeneous reactions: some creators clearly stand against piracy whereas others support it. Those against piracy stress that it is similar to stealing a CD at a store; those in favor of piracy argue that it increases the number of attendants to the stage shows.

2 . 研究の目的

This research intends to determine who the winners and losers are in a stylized version of the music industry, and also whether the total welfare increases, when we compare two legal regimes. In the first regime, copyrights are fully observed. However, copyright does not mean that the tracks are going to be offered at a strictly positive price; instead, the artist may want to offer her tracks for free if the gain in popularity can be capitalized through the money collected from the concert tickets. The point of the copyrights is that no consumer can acquire the tracks through any channel different from that specified by the artists; this is, only legal copies are traded. In the second regime, we allow for the existence of piracy; this is, consumers can acquire illegal copies of the tracks for free even when the artist only wants to offer her tracks at a strictly positive price.

3 . 研究の方法

We propose a theoretical model in which three types of agents interact in the music industry: a continuum of consumers of mass 1, two platforms, and two artists.

There is a large number of consumers who know the existence of the two artists. Each consumer demands tracks and live performances, both affected by the information about the quality of the artist that the consumer has. Regarding the demand of tracks, if the consumer has listened to the songs by the artist beforehand, he assigns her a quality q ; otherwise, he expects the artist to produce songs of quality βq , with $0 < \beta < 1$. Each consumer only considers attending to concerts of the artists whose tracks he has listened to previously.

Tracks are not traded directly between consumers and artists in this market; instead, they are hosted at platforms. There are two platforms: one for-profit platform and one open platform. The for-profit platform hosts high-quality copies of the songs, normalized to 1, and sells them at a strictly positive price. On the other hand, the open platform hosts low-quality copies of the songs, α , and offers them for free. The assumption of low-quality copies hosted at the open platform can be interpreted in different ways: consumers may download corrupted files with some probability, or the platform includes ads that consumers find annoying.

When consuming a song by artist a of quality $q^a = \{q, \beta q\}$ hosted at a certain platform, the consumer of type ω enjoys a utility equal to the product of her valuation ω times the quality of the song times the quality of the hosted copy (1 if hosted at the for-profit platform or α if hosted at the open platform) minus the price paid for the copy (p if hosted at the for-profit platform or 0 if hosted at the open platform). The utility is normalized to 0 if the consumer does not acquire any song.

Finally, there are two artists that are heterogeneous in their ex-ante degree of popularity. Specifically, there is one famous artist, whose quality is known ex-ante by all consumers, and one unknown artist, whose quality is known ex-ante by no consumer. A bargaining

process determines the share that each artist receives from the profit generated by the sales of her tracks. Additionally, the famous artist earns a fixed revenue from her live performances, whereas the revenue from her live performances for the unknown artist is an increasing function of the diffusion, being the diffusion equal to her accessed tracks at either platform.

We consider two mutually exclusive legal regimes, copyright and piracy, and characterize the equilibrium outcome for each one. Copyright is the legal regime under which the tracks of the artists are only available in the platform of their choice. On the contrary, piracy is the legal regime under which any track hosted at the for-profit platform according to the will of the artist is also available at the open platform (but not vice versa). All costs are normalized to zero.

The timing of the game is as follows: first, the for-profit platform announces the price at which songs will be traded. Second, each artist either accepts or rejects the offer. If she accepts, a bargaining process determines how the profit generated will be split; otherwise, the songs are hosted at the open platform. Third, consumers acquire songs and update their information on the unknown artist to determine the demand of live performances. Notice that the options to acquire songs depend on the legal regime: under copyright, consumers only decide between accessing or not; under piracy, if the song is available in more than one platform, consumers decide where to access it. Finally, payoffs are realized.

4 . 研究成果

(1) Equilibrium in the market

With copyright, the for-profit platform sets a price at which consumers only purchase songs by the famous artist when it is impossible to attract the unknown artist, or when doing so is not profitable: the lower price set to attract the unknown artist triggers the demand, but this increase may not be enough to increase the total profit as all the tracks, including those by the famous artist, are now traded at a lower unitary price.

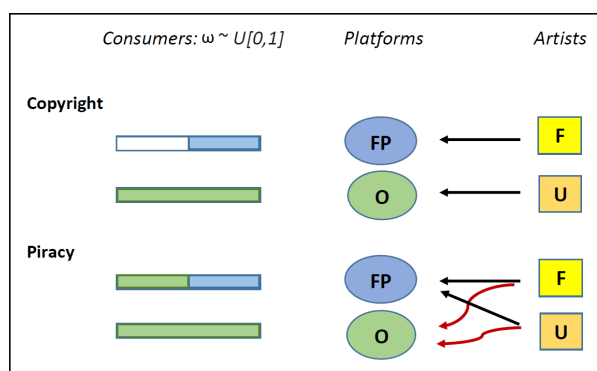
With copyright, the for-profit platform sets a price at which consumers purchase songs both by the famous artist and by the unknown artist when it is impossible to induce the unknown artist to decline the deal while selling some tracks by the famous artist, or when doing so is not profitable: the lower price set to attract the unknown artist triggers the demand, and this increase may more than offset the loss due to the lower unitary price.

With piracy, the for-profit platform sets a price at which consumers only purchase songs by the famous artist if the quality of the unknown artist is expected to be low enough (one third or less than that of the famous artist); and sets a price at which consumers purchase songs both by the famous artist and by the unknown artist otherwise.

(2) Welfare implications when moving from copyright to piracy

Consumers only purchase songs by the famous artist with copyright and with piracy:

In this case, there is an increase in the total welfare with piracy because those consumers who did not acquire the tracks by the famous artist with copyright, now access them illegally through the open platform. Moreover, there is a transfer of welfare from the for-profit platform and the famous artist to the consumers who acquired the tracks by the famous artist with copyright through the price decrease.

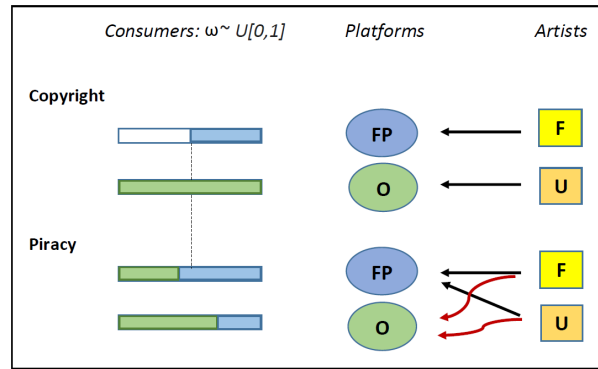


Consumers only purchase songs by the famous artist with copyright, but purchase songs by the two artists with piracy:

In this case, the total welfare increases for two reasons: first, the consumers who were excluded from the market with copyright now acquire copies of the tracks by the famous artist (furthermore, not all of them acquire the illegal, low-quality copies); second, a legal market for the tracks by the unknown artist appears, as some consumers replace the low-quality copies consumed with copyright by high-quality ones. In other words, piracy implies that consumers have more varieties to choose among.

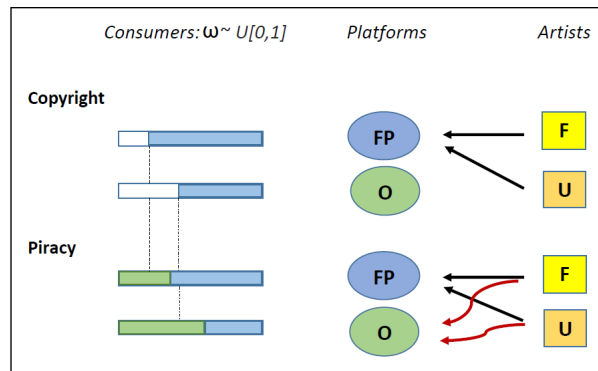
When focusing on the specific groups of agents, the consumer welfare increases with piracy:

more consumers participate, the price decreases, and more varieties are available. The welfare of the unknown artist also increases as, in addition to sustaining the maximal diffusion, he gains more money through the high-quality copies sold. However, the welfare of the famous artist decreases, as the increase in demand is not compensated by the lower unitary price. The welfare variation of the for-profit platform is ambiguous, as on the one hand the profit from the famous artist decreases but the profit from the unknown artist increases.



Consumers purchase songs by both the famous and the unknown artists with copyright and with piracy:

This case is the most intricate one, as there are many different effects interacting simultaneously. First, as it happened before, the consumers previously excluded from the market can now participate by consuming illegal copies. Second, there is an increase in the popularity of the unknown artist, as with piracy the consumers not participating in the market could never listen to her tracks, but now those deciding to consume the illegal copies also get to learn about her. Third, there is a switching effect, as some consumers that acquired high-quality copies with copyright now consume the illegal, low-quality ones. Finally, piracy equalizes the bargaining power of the two artists, which in turn equalizes the share paid to them by the for-profit platform. The former three effects determine whether the welfare change is positive or negative; concretely, the total welfare increases with piracy if the diffusion gains are large enough or if the quality of the copies hosted in the open platform is large enough.



Interestingly, in this case the presence of piracy does not automatically imply a price decrease as, depending on the parametric conditions, the for-profit platform may decide to focus on the consumers with higher willingness to pay, so increasing the price. The results regarding the welfare change of the different types of agents also depend on the parametric conditions, and are determined by the interaction of the four effects previously identified. The analysis of the variation of the consumer surplus is the subtlest one, as we need to differentiate between three subgroups: the consumers that start participating with piracy, those who stick to the high-quality copies, and those who switch from high-quality to low-quality copies. If piracy causes a price decrease, the three subgroups are better off, and the consumer surplus increases. However, if piracy causes a price increase, the first subgroup is better off, the second subgroup is worse off, and some consumers from the third subgroup are better off whereas the others are worse off (concretely, the welfare of the subgroup of switchers increases if and only if the quality of the low-quality copies is large enough).

The welfare of the famous artist goes down with piracy whenever it implies a price decrease: her bargaining power does not change but she sells a smaller number of high-quality copies, each at a lower price. However, if piracy implies a price increase, her welfare goes up if the price effect is strong enough to compensate the switching effect, which happens if and only if the quality of the low-quality copies is low enough.

The analysis is messier for the unknown artist: first, since it is easier for the for-profit platform to attract her with piracy, her share decreases; second, as the famous artist, she sells a smaller number of high-quality copies with piracy; and third, piracy causes her diffusion gains to be larger. Thus, the effect of a price change is less straightforward than what it was for the famous artist. However, as it happened for the famous artist, all the effects can be summarized in a condition stating that the unknown artist gains larger profit

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with piracy if and only if the quality of the low-quality copies is low enough. Similar considerations apply for the for-profit platform: first, the number of high-quality copies sold with piracy is lower in the markets of both the famous and the unknown artist; and second, the for-profit platform receives a larger share of the profit from the sales of the tracks of the unknown artist. As it happened for the unknown artist, the price effect is not as straightforward for the for-profit platform as it was for the famous artist, but again the for-profit platform is better off with piracy if and only if the quality of the low-quality copies is low enough.

The results obtained are qualitatively robust to the relaxation of the assumption regarding the ex-ante degree of popularity of the artists. Specifically, instead of assuming that everybody knows the quality of the famous artist and that nobody knows the quality of the unknown artist ex-ante, we consider that the quality of one of the artists is known ex-ante by a larger proportion of consumers, so differentiating between the more-known artist and the lesser-known artist.

5 . 主な発表論文等 (研究代表者は下線)

[雑誌論文] (計 1 件)
査読有り :

Maria MARTIN-RODRIGUEZ, “A Dynamic Monopoly with Risk-Averse Consumers.”
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[その他]

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6 . 研究組織

研究協力者

科研費による研究は、研究者の自覚と責任において実施するものです。そのため、研究の実施や研究成果の公表等については、国の要請等に基づくものではなく、その研究成果に関する見解や責任は、研究者個人に帰属されます。