# Effects of Cultural Content Piracy and Enforcement on Inbound Contents Tourism

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**Abstract**: A growing middle-income class in developing and emerging countries has creating new demand for travels to foreign countries. In spite of a new coronavirus, this phenomenon will not stop in the long run. Selection of specific destinations is apparently influenced by an interest in foreign cultures. People see information daily about foreign cultures through the Internet, and they often purchase related content and goods, like music CDs, books, game software and so on. However, they purchase not only originals but also fakes in developing countries where, under lax enforcement of intellectual property rights (IPRs), consumers accept copied goods as second-tier substitutes. This paper considers the effects of Japanese cultural content and related goods, including fakes, on inbound tourism demand. We first theoretically prove a discrepancy between IPR holders and the tourism industry in perceived desirable enforcement and then indicate that it disappears if the secondary market of cultural content and goods is relatively large. Otherwise, IPR and tourism incentives conflict with each other regarding levels of enforcement. Second, we consider a scheme to compensate for tourism-caused damage from IPR infringement when optimal enforcement levels differ.

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# 1. Introduction

Until the recent coronavirus pandemic, the market of international tourism had expanded around the world. There were many factors for the expansion. One important factor is easy access to information on foreign countries through the Internet. For example, people often watch SNS videos with introductions and explanations of foreign foods, travel experiences, lifestyles abroad, etc. Such information doubtlessly influences demand for foreign travels.[1]

This paper considers a relationship between subculture content or products under piracy and the demand for inbound tourism. In developing and emerging countries, people can easily access fake products and illegal websites supplying unauthorized manga and anime content and related products, which can attract consumers to foreign countries[2]. The phenomenon of fans visiting famous sites discovered through content, the so-called manga or anime pilgrimage (Seaton and Yamamura 2015, Tung, Lee, and Hudson 2019),[3] has become established in Japan: Subcultures attract foreigners and have created contents tourism.[4] In Asia, recent rapid economic development has produced a middle-income class who can afford to travel abroad. The tourism industry benefits from these travelers whose interests are likely to be affected by foreign culture.

Behind this phenomenon, intellectual property right (IPR) holders are damaged by piracy, though some ignore the infringement. A typical example is illegal manga content. In 2019, the Japanese owners of an illegal manga website, Manga Mura, were sued and arrested[5]. The website had placed servers in a foreign country, and made profits from advertisements and subscription fees. There are many websites

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[1] According to a Japan Tourism Agency [2020] report, which described data of questionnaires collected from foreign tourists going to Japan, the top 5 sources of helpful information before traveling are as follows; 1) SNSs (24.6%), 2) personal blogs (24.4%), 3) relatives and acquaintances in a home country (19.6%), 4) review websites (15.5%), 5) video sharing websites (14.9%). This data shows the influence of the Internet on inbound tourism.

[2] See Domon [2022].

[3] For example, see the website of the Anime Tourism Association in Japan (https://animetourism88.com/en/shadan/about).

[4] See Yamamura [2020]. In Japan, voluntary events for fans of manga, anime, and video games have successfully created fandoms, both domestically and internationally. Ksenia, Cheng, and Huiyuan [2018] explains how anime tourism does business involving "Otaku" and other fans, reviewing papers related to tourism marketing.

[5] On December 7th, 2019, one of the biggest illegal websites, Manga Mura, which uploaded large quantities of famous manga content, was found guilty in Japan (https://www.courts.go.jp/app/files/hanrei_jp/448/089448_hanrei.pdf).

like Manga Mura, especially in developing countries with lax copyright enforcement, which have ironically contributed to subcultures penetrating into the larger world. The Association for E-publishing Business Solutions in Japan announced in January 2021 that in only the month of November 2020 the total damage by the top 5 illegal manga websites had been about 350 million USD. In spite of reinforcement of copyright enforcement, illegal manga websites have been increasing and, according to the association, there were about 700 illegal websites for manga content in 2020[6].

If the incentives regarding enforcement against IPR infringement are identical between IPR holders and the tourism industry, there is no conflict. A simple case in which IPR holders prefer no enforcement and the tourism industry does not mind enforcement, for example, is music content that does not need any copyright protection due to promotional effects of piracy that increase profits. According to analyses by Gayer and Shy [2006] and Domon [2009][7], IPR holders can benefit by piracy due to profits from secondary markets like live performance.[8] This could apply for other cultural content for which lax enforcement could increase profits of both IPR holders and tourism companies. Big events for fandoms, like live performance of anime songs, expositions of manga and anime, and live musicals of anime and manga, make profits gradually increase both in the country and abroad[9]. New releases of anime on TV and in the theater are also considered as uncopyable content which works like live performance. However, if profits from such secondary markets are small, there may be a discrepancy in incentives between IPR holders and the tourism industry.

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[6] According to a report of the Association of Japanese Animations [2021], about half of the revenue of Japanese anime industries was made at international markets in 2020.

[7] Piolatto and Schuett [2012], taking into account the search cost of file-sharing, indicated that lesser-known artists prefer perfect enforcement, contradicting an empirical analysis by Mortimer et al. [2010]. The argument depends upon the assumption regarding live performance of a convex revenue function that increases along with both legal and illegal content.

[8] Regarding empirical analyses of piracy effects on music CD sales, see Barker and Maloney [2015] and Liebowitz [2016]. Their result is that piracy has a negative effect on CD sales, but did not consider a secondary market like live performance. The music industry has itself shifted toward online distribution as a primary source of profit. In this century, copyright royalty statistics of musicians in, for example, Japan, show a steady, gradual increase. Furthermore, in 2014, revenues from live concerts exceeded those from CDs for the first time, and live concerts have now become the main source of revenue in the music industry (Digital Content Association of Japan [2014]). Anime and manga demonstrate the same phenomenon. In Japan, character goods such as toys and clothes produce greater profits than the total profit from TV programs, movies, videos, and online distribution (Association of Japanese Animations [2020]), whereby children often watch illegal content on websites. In a sense, the illegal content promotes the character goods, as in music markets.

[9] See Association of Japanese Animations Report 2017 [2018].

Whether piracy has a beneficial effect on IPR holders depends on the level of positive externalities, created by piracy, attributable to demand at secondary markets. A relatively large demand in secondary markets brings IPR holders more profit under piracy without enforcement. I show that in such a case both IPR holders and tourism firms prefer no enforcement against piracy. Otherwise, a conflict takes place, and IPR holders prefer perfect enforcement while tourism firms prefer no enforcement. In this argument a key factor is a secondary market for which illegal content cannot be supplied. In music industries, this is a live performance, and in the manga and anime industries, it is a new movie released in theaters with big screens and professional audio systems, or TV programs broadcast for the first time and thus not available at the market and illegal websites. Fans always seek new content that cannot be substituted for, such as a live performance.

We first theoretically analyze externalities of content influencing on an inbound tourism demand. In Section 2, we set up a model, and then in Section 3, we solve for market equilibrium, showing a discrepancy in incentives regarding enforcement between IPR holders and the contents tourism industry. It is proved that a key factor to explain the discrepancy is the volume of a secondary content market. If the market is relatively small, the discrepancy arises. Furthermore, an optimal enforcement level must be either zero or maximum, which is derived from convexity of the profit function with respect to the enforcement level. In Section 4, we consider a profit transfer from the tourism industry to IPR holders obtained theoretically for such a case. Finally, in Section 5 I conclude our results.

## 2. A model

The model in this paper is an extension of Domon [2021]. This model differs by including a tourism firm whose profits are positively affected by the amount of content. In order to focus on incentive discrepancy regarding copyright enforcement between a content producer and an inbound tourism firm, we assume three players, a domestic content producer supplying goods and services for a foreign country, foreign pirates, and a domestic inbound tourism firm. There are four markets: for original goods, pirated goods, secondary goods, and inbound tours. Original goods compete with pirated ones, while both original and pirated goods have positive external effects on demand for secondary goods. Inbound tourism increases with these three goods due to positive promotional effects on demand.

Inverse demand functions of the first three markets, Market 1 (original content),

Market 2 (pirated content), and Market 3 (secondary goods) are as follows:

(1) $p_1 = \alpha - \beta q_1 - \gamma q_2 + \gamma q_3$,

(2) $p_2 = m \cdot \alpha - \beta q_2 - \gamma q_1 + \gamma q_3$,

(3) $p_3 = s \cdot \alpha - \beta q_3 + \gamma q_1 + \gamma q_2$,

where $\beta > \gamma > 0$ due to the second-order condition for profit maximization, which will be addressed in the next section, and $\alpha, m, s > 0$. $p_i$ and $q_i$ $(i = 1,2,3)$ are, respectively, a price and a quantity of goods $i$. In order to explicitly solve for market equilibrium and focus on the effects of parameters on it, we assume a symmetric effect of the quantity of other goods on demand functions. Parameters, $m$ and $s$, indicate, respectively, the relative size of piracy and secondary markets compared to the original goods market.

Furthermore, in order to examine the effects of the three markets on inbound tourism, we assume the following demand function:

(4) $D_4 = D_4(p_4, Q)$,

where $Q = q_1 + q_2 + q_3$[10], $\partial D_4 / \partial p_4 < 0$, and $\partial D_4 / \partial Q > 0$. A problem examined in this paper is whether $Q$ is increasing or not with respect to the level enforcement of piracy. A tourism firm is damaged by strict enforcement if $Q$ is decreasing with respect to the level of enforcement.

Cost functions of content producers are assumed as follows, for simplicity,[11]

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[10] Under the assumptions of $Q = \theta_1 q_1 + \theta_2 q_2 + \theta_3 q_3$ $(\theta_1, \theta_2, \theta_3 > 0)$ and $\theta_1 \geq \theta_2$, which means that the impact of originals is larger than that of fakes, Proposition 1 holds. For simple notations, I assume $\theta_1 = \theta_2 = \theta_3 = 1$.

[11] Assuming the cost functions $C_1 = f_1$, $C_2 = eq_2$, and $C_3 = f_3 + cq_3$ $(c > 0)$, instead of (5) and (6), to reflect streaming, we can obtain the same characteristics as in propositions of this paper.

(5) $C_i = f_i + \frac{1}{2} q_i^2, \ (i = 1,3)$

(6) $C_2 = \frac{1}{2n} q_2^2 + e q_2$,

where $f_i$ is a fixed cost and $e$ is the level of enforcement. The production cost of pirated goods is assumed to be lower than that of originals, i.e., $n > 1$. As explained in the next section, the price of pirated goods is a marginal cost including the risk of apprehension, due to a price-taker. This describes a situation in which, whether an infringer is an individual or not, she or he incurs an increasing marginal cost of $C_2$. A supply function for the tourism industry is

(7) $S_4 = S_4(p_4)$.

The function is assumed to be strictly increasing.

## 3. Market equilibrium in content markets

A game structure between an original and a fake content producer is as follows: first, an original producer, who is dominant in the foreign market, determines the quantity of originals and original-related goods; second, a pirate, who is a fringe firm producing fakes, determines the quantity of fakes.

In a content competition, we consider a dominant-fringe model in which fringe (fake) producers face perfect competition in the fake market, and a dominant (original) producer maximizes profit by taking into account their reactions. For simplicity we assume a representative fake producer facing perfect competition. Therefore, the supply function of fake goods is a marginal cost function, i.e., $q_2/n + e$.

Market equilibrium for Market 2 is obtained as follows,

(8) $\tilde{q}_2 = \frac{n}{1 + n\beta}\left(m\alpha - e - \gamma q_1 + \gamma q_3\right)$.

Since, in general, $\tilde{q}_2$ is positive even without a secondary market, I assume $e \le \overline{e}$ as follows (see Appendix 1);

(9) $e \le m\alpha - \underbrace{\frac{(1/n+\beta)\alpha\gamma}{(1/n+\beta)(2\beta+1)-\gamma^2}}_{+} (\equiv \bar{e})$ .

Taking the equilibrium into account, an original producer maximizes the profit function $\pi = (p_1 q_1 - C_1) + (p_3 q_3 - C_3)$ . The first-order conditions are as follows (see Appendix 2),

(10) $\frac{\partial \pi}{\partial q_1} = X + Aq_1 + Bq_3 = 0$ ,

(11) $\frac{\partial \pi}{\partial q_3} = Y + Aq_3 + Bq_1 = 0$ ,

where

$X \equiv \alpha - \frac{n\gamma(m\alpha - e)}{1+n\beta}$ , $Y \equiv s\alpha + \frac{n\gamma(m\alpha - e)}{1+n\beta}$ , $A \equiv \frac{2n\gamma^2}{1+n\beta} - 2\beta - 1$ , and $B \equiv 2\gamma - \frac{2n\gamma^2}{1+n\beta}$ .

Because of $\beta > \gamma$ , $A < 0$ and $B > 0$ due to

(12) $A = \frac{1}{1+n\beta}\left\{2n\underbrace{(\gamma^2 - \beta^2)}_{-} - (1+2\beta+n\beta)\right\}$ , and $B = \frac{2\gamma}{1+n\beta}\left\{1 + \underbrace{(\beta-\gamma)}_{+} n\right\}$ .

From the second-order conditions, $A^2 - B^2 > 0$ . If the second-order condition is satisfied, $A - B < 0$ because $A^2 - B^2 = (A-B)(A+B) > 0$ and $(A+B) = 2(\gamma - \beta) - 1 < 0$ .

The market equilibrium (see Appendix 3) is,

(13) $q_1^* = \frac{BY - AX}{A^2 - B^2}$ , $q_3^* = \frac{BX - AY}{A^2 - B^2}$ , and

$$(14)\quad \tilde{q}_2^{\,*}(e,q_1^*,q_3^*)=\frac{n}{1+n\beta}\left(m\alpha-e-\gamma q_1^*+\gamma q_3^*\right)=\frac{n}{1+n\beta}\left(m\alpha-e+\frac{\gamma(X-Y)}{A-B}\right).$$

The following lemma is suggestive to consider the effect of $e$ at equilibrium on inbound tour demand.

**Proposition 1**. $\frac{\partial Q}{\partial s}>0$ and $\frac{\partial Q}{\partial e}<0$.

Proof. See Appendix 4.

This proposition indicates that strict enforcement reduces demand for inbound tourism, damaging the tourism industry, while the demand increases with $s$. These results mean that the tourism industry prefers no enforcement for any $s$, in spite of copyright infringements.[12]

Next, we consider the incentive of a domestic copyright holder for strict enforcement. Denoting $\pi^*(e)$ as the profit of a domestic copyright holder at market equilibrium, the effect of enforcement on profit is obtained as follows;

**Proposition 2.** $\frac{d\pi^*(e)}{de}\begin{pmatrix}>\\=\\<\end{pmatrix}0 \Leftrightarrow s\begin{pmatrix}<\\=\\>\end{pmatrix}1-\frac{2\gamma n(m\alpha-e)}{\alpha(1+\beta n)}$ and $\frac{d^2\pi^*(e)}{de^2}>0$.

Proof. See Appendix 5.

This proposition indicates that strict enforcement is harmful for an original content producer if the demand of a secondary market is larger than that of the original one. Furthermore, due to convexity of $\pi^*$, an optimal $e$ for an original producer is either $e=\bar{e}$ or $e=0$ as shown in Figure 1.

Denoting $e$ satisfying $d\pi^*/de=0$ as $\hat{e}$, we obtain the following result,

[12] Given the details in Appendix 4, we can see the effects of $e$ on each type of content demand. Along with $e$, the quantity of originals increases, but the quantity of secondary products decreases. Therefore, copyright holders have a dilemma between these two effects.

**Proposition 3**. i) If $s \geq 1-M$ $\left(M = \dfrac{2\left(1/n+\beta\right)\gamma^2 n}{\left\{\left(1/n+\beta\right)\left(2\beta+1\right)-\gamma^2\right\}\left(1+\beta n\right)} > 0\right)$, then $\hat{e} \geq \overline{e}$, and $\pi^*$ is maximized at $e=0$. ii) If $s \leq 1-L$ $\left(L = \dfrac{2\gamma mn}{1+\beta n} > 0\right)$, $\pi^*$ is maximized at $e=\overline{e}$. iii) If $1-L < s < 1-M$, $\pi^*$ is maximized at either $e=0$ or $e=\overline{e}$.

Proof. See Appendix 6.

Since $\hat{e}$ is increasing with $s$, there is a critical $s(\equiv \hat{s})$ under which an optimal $e$ for an original producer shifts from 0 to $\overline{e}$.

These propositions show that there is a discrepancy in incentives regarding the enforcement level between an original content producer and the tourism industry if $s$ is relatively small. The volume of a secondary market in which piracy is difficult or impossible is a key factor causing the discrepancy. Only under a relatively small secondary market will an original content producer prefer enforcement, but the tourism industry always prefers no enforcement.

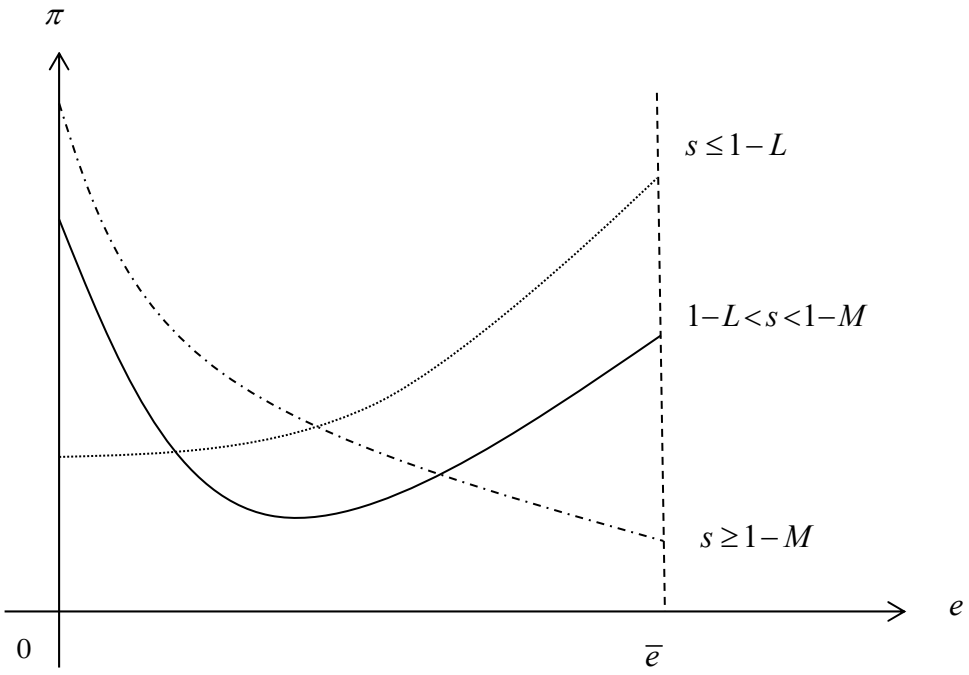


**Figure 1: Profit curve w.r.t. $e$**

## 4. Benefit transfer to copyright holders

Piracy is beneficial for foreign tourists and the inbound tourism industry while a copyright holder suffers damages from it, if the secondary market is relatively small [13]. The holder should seek strict copyright enforcement by authorities. Enforcement results in the loss of foreign tourists' and tourism firms' surpluses, denoted respectively as $CS$ and $PS$, and a usual remedy to solve this problem is to tax beneficiaries and transfer the revenue to victims.

In this model the damage to a copyright holder is expressed as,

(15) $\Delta\pi = \pi^*(\bar{e}) - \pi^*(e)$ for $s \le \hat{s}$,

which is strictly concave because $\pi^*$ is strictly convex. A cost for enforcement is assumed,

(16) $C_e = C_e(e)$,

where $C_e$ is assumed to be a strictly increasing function. Merits from lax enforcement resulting in consumers' and producer's surpluses in the tourism market are denoted in Figure 2 as $\Delta TW = \Delta CS + \Delta PS$, which is strictly decreasing with $e$, and

(17) $\Delta CS(e) = CS\big|_{e<\bar{e}} - CS\big|_{e=\bar{e}}$ and $\Delta PS(e) = PS\big|_{e<\bar{e}} - PS\big|_{e=\bar{e}}$.

Domestic authorities need to take into account not only foreigners' damages from strict enforcement but also domestic economic welfare. Therefore, the problem is to maximize the following domestic economic welfare,

(18) $DW(e) = \pi^*(e) + PS(e) - C_e(e)$.

The procedure to solve this problem is not the usual one using first-order conditions because convexity might not be satisfied, but there exists $e^{**}$ maximizing $DW(e)$

[13] If $s > \hat{s}$, no enforcement is best for all; a copyright holder, the tourism industry, and international tourists. In this case, it is not necessary to consider a transfer to copyright holders.

under the assumption of continuous functions. To compensate a copyright holder for $\Delta\pi$, the authority can use benefits that foreign tourists enjoy under lax enforcement, $\Delta CS(e^{**})$.

A scheme for the compensation of a copyright holder must be implemented within the country, since intervention into foreign counties is generally impossible. There is an international tourist tax, which many countries implement. For example, in Japan the revenue is spent for tourism-related industries to attract more tourism[14]. Piracy and IPR infringements take place only in copyable goods like music and manga content. Since cultural products are important factors attracting foreign tourists, authorities should account for the damage when IPR holders claim international piracy.

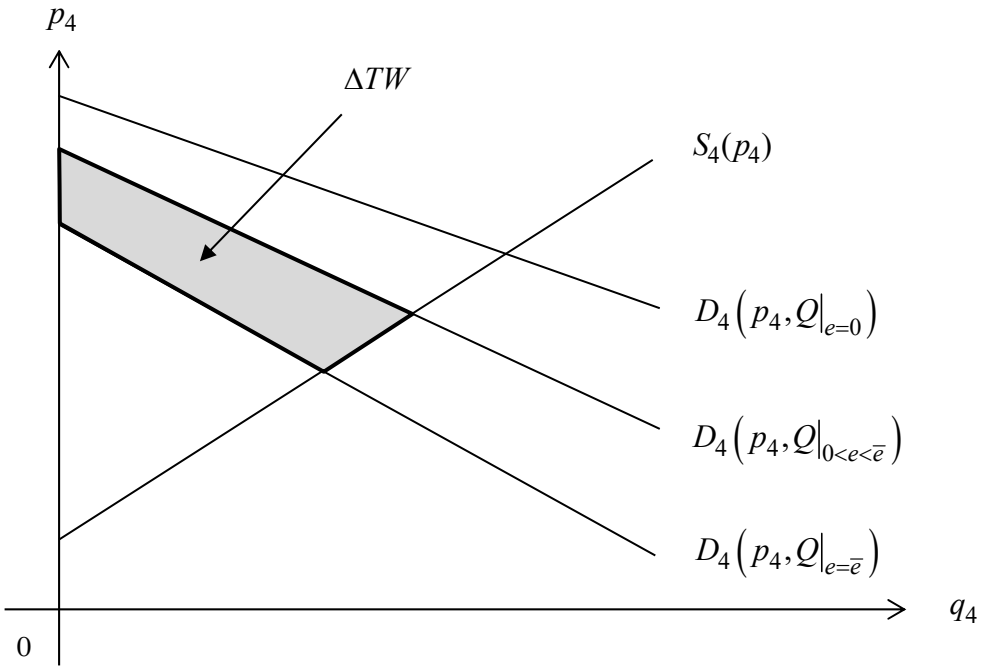


**Figure 2: Benefits of social welfare in a tourism market**

## 7. Concluding remarks

Outcomes obtained in this paper are summarized as follows. First, a copyright holder's optimal level of enforcement is either zero or maximum. If a secondary market is relatively large, she or he prefers no enforcement because of positive externalities stemming from fakes. Such a phenomenon seems to take place among

[14] See Hasunuma [2020].

musicians dependent upon live performance and in anime broadcast as TV series and newly released in theaters, which serve a function like live performances. Conversely, if the secondary market is relatively small, a copyright holder prefers strict enforcement. Second, it was proved that content piracy always increases demand for inbound tourism. A combination of this result with a small secondary market creates a compensation problem between copyright holders and the tourism industry. An income transfer by using an international tourist tax can be used for compensation, which is theoretically supported by the analysis. The Japanese government actually implements a subsidy scheme for content creators.

For some time, subcultures like rock music have attracted tourists who want to visit places related to the creators. What cultural products attract tourists have changed with the times, and manga and anime are newcomers. Since the beginning of this century, piracy on the Internet has been widespread and, if users could understand other languages, especially Chinese, they have freely had access to plenty of websites for uploading illegal manga with translations and anime with subtitles throughout Asia. With other content on the Internet, the tourism industry apparently receives benefits from infringement. In terms of copyright protection, some copyright holders complain about infringement and others neglect it. This paper explains neglect through a promotional effect on secondary markets, but there is a dynamic promotional effect not only on secondary but also on original markets. This effect is also important when considering the neglect of infringements. We could not consider the dynamic effect because of the complexity of model analysis.

## Appendix 1.

A model without Market 3 is,

(A-11) $p_1 = \alpha - \beta q_1 - \gamma q_2$,

(A-12) $p_2 = m \cdot \alpha - \beta q_2 - \gamma q_1$,

The market equilibrium under $q_2/n + e$ is,

$$(A\text{-}13) \quad q_1^* = \frac{(1/n+\beta)\alpha - \gamma(m\alpha - e)}{(1/n+\beta)(2\beta+1) - 2\gamma^2},$$

$$(A\text{-}14) \quad \tilde{q}_2^* = \frac{1}{(1/n+\beta)\underbrace{\{(1/n+\beta)(2\beta+1) - 2\gamma^2\}}_{+}} \times$$

$$\left[ (1/n+\beta)\underbrace{\{(1/n+\beta)(2\beta+1) - 2\gamma^2\}}_{+}(m\alpha - e) - \gamma\{(1/n+\beta)\alpha - \gamma(m\alpha - e)\} \right].$$

If and only if $[\bullet] > 0$ in the above, then $\tilde{q}_2^* > 0$. The condition is as follows;

$$(A\text{-}15) \quad m\alpha - e > \frac{(1/n+\beta)\alpha\gamma}{\underbrace{\{(1/n+\beta)(2\beta+1) - 2\gamma^2\}}_{+}} (> 0).$$

## Appendix 2.

$$(A2\text{-}1) \quad \frac{\partial \pi}{\partial q_1} = \left( \alpha - 2\beta q_1 - \gamma \tilde{q}_2 + \frac{n\gamma^2}{1+n\beta} q_1 + \gamma q_3 - q_1 \right) + \left( \gamma q_3 - \frac{n\gamma^2}{1+n\beta} q_3 \right)$$

$$= \left( \alpha - 2\beta q_1 - \gamma \left( \frac{n}{1+n\beta}(m\alpha - e - \gamma q_1 + \gamma q_3) \right) + \frac{n\gamma^2}{1+n\beta} q_1 + \gamma q_3 - q_1 \right) + \left( \gamma q_3 - \frac{n\gamma^2}{1+n\beta} q_3 \right)$$

$$= \left( \alpha - \frac{n\gamma(m\alpha - e)}{1+n\beta} \right) + \left( -2\beta + \frac{2n\gamma^2}{1+n\beta} - 1 \right) q_1 + \left( -\frac{2n\gamma^2}{1+n\beta} + 2\gamma \right) q_3 = 0$$

$$(A2\text{-}2) \quad \frac{\partial \pi}{\partial q_3} = \left( \gamma q_1 - \frac{n\gamma^2}{1+n\beta} q_1 \right) + \left( \alpha - 2\beta q_3 + \gamma q_1 + \frac{n\gamma^2}{1+n\beta} q_3 + \gamma \tilde{q}_2 - q_3 \right)$$

$$= \left( \gamma q_1 - \frac{n\gamma^2}{1+n\beta} q_1 \right) + \left( \alpha - 2\beta q_3 + \gamma q_1 + \frac{n\gamma^2}{1+n\beta} q_3 + \gamma \left( \frac{n}{1+n\beta} \left( m\alpha - e - \gamma q_1 + \gamma q_3 \right) \right) - q_3 \right)$$

$$= \left( \alpha + \frac{n\gamma(m\alpha - e)}{1+n\beta} \right) + \left( -2\beta + \frac{2n\gamma^2}{1+n\beta} - 1 \right) q_3 + \left( -\frac{2n\gamma^2}{1+n\beta} + 2\gamma \right) q_1 = 0$$

## Appendix 3.

(A3-1) From $X + Aq_1 + Bq_3 = 0$ and $Y + Aq_3 + Bq_1 = 0$,

(A-3-2) $AX + A^2 q_1 + ABq_3 = BY + ABq_3 + B^2 q_1$ and

(A-3-3) $BX + ABq_1 + B^2 q_3 = AY + A^2 q_3 + ABq_1$.

By solving these,

(A3-4) $\left( A^2 - B^2 \right) q_1 = BY - AX$, $q_1^* = \dfrac{BY - AX}{A^2 - B^2}$

(A3-5) $\left( A^2 - B^2 \right) q_3 = BX - AY$, $q_3^* = \dfrac{BX - AY}{A^2 - B^2}$

(A3-6) $\tilde{q}_2^* = \dfrac{n}{1+n\beta} \left( m\alpha - e - \gamma q_1^* + \gamma q_3^* \right)$

$$= \frac{n}{1+n\beta} \left\{ m\alpha - e - \gamma \left( q_1^* - q_3^* \right) \right\}$$

$$= \frac{n}{1+n\beta} \left[ m\alpha - e - \frac{\gamma}{A^2 - B^2} \left\{ \left( BY - AX \right) - \left( BX - AY \right) \right\} \right]$$

$$= \frac{n}{1+n\beta} \left[ m\alpha - e - \frac{\gamma}{A^2 - B^2} \left( A + B \right) \left( Y - X \right) \right]$$

$$= \frac{n}{1+n\beta} \left\{ m\alpha - e - \frac{\gamma(Y - X)}{A - B} \right\}.$$

## Appendix 4.

Under equilibrium in the content market, $Q = q_1^* + \tilde{q}_2^* + q_3^*$. Because of

(A4-1) $\dfrac{\partial q_1^*}{\partial s} = \dfrac{B}{A^2 - B^2} \dfrac{\partial Y}{\partial s} = \dfrac{\overset{+}{B}}{\underbrace{A^2 - B^2}_{+}} \alpha > 0$, $\dfrac{\partial q_3^*}{\partial s} = -\dfrac{A}{A^2 - B^2} \dfrac{\partial Y}{\partial s} = -\dfrac{\overset{-}{A}}{\underbrace{A^2 - B^2}_{+}} \alpha > 0$,

(A4-2) $$\frac{\partial \tilde{q}_2^*}{\partial s} = -\frac{n\gamma\alpha}{(1+n\beta)\underbrace{(A-B)}_{-}} > 0,$$

we obtain $\partial Q / \partial s$. Furthermore,

(A4-3) $$\frac{dq_1^*}{de} = \frac{1}{A^2-B^2}\left(-A\frac{dX}{de} + B\frac{dY}{de}\right)$$

$$= \frac{1}{A^2-B^2}\left(-A\frac{n\gamma}{1+n\beta} - B\frac{n\gamma}{1+n\beta}\right) = -\frac{n\gamma}{\underbrace{(A-B)}_{-}(1+n\beta)} > 0,$$

(A4-4) $$\frac{dq_3^*}{de} = \frac{1}{A^2-B^2}\left(B\frac{dX}{de} - A\frac{dY}{de}\right)$$

$$= \frac{1}{A^2-B^2}\left(B\frac{n\gamma}{1+n\beta} + A\frac{n\gamma}{1+n\beta}\right) = \frac{n\gamma}{\underbrace{(A-B)}_{-}(1+n\beta)} < 0,$$

(A4-5) $$\frac{d\tilde{q}_2^*}{de} = \frac{n}{1+n\beta}\left\{-1 - \frac{\gamma}{A-B}\left(\frac{dY}{de} - \frac{dX}{de}\right)\right\}$$

$$= \frac{n}{1+n\beta}\left\{-1 - \frac{\gamma}{A-B}\left(-\frac{n\gamma}{1+n\beta} - \frac{n\gamma}{1+n\beta}\right)\right\} = \frac{n}{1+n\beta}\left\{-1 + \frac{2n\gamma^2}{\underbrace{(A-B)}_{-}(1+n\beta)}\right\} < 0,$$

and, from these results, we obtain $\partial Q / \partial e = d\tilde{q}_2^* / de < 0$. □

## Appendix 5.

(A5-1) $$\frac{d\pi^*(e)}{de} = \frac{\partial \pi^*}{\partial q_1^*}\frac{dq_1^*}{de} + \frac{\partial \pi^*}{\partial q_3^*}\frac{dq_3^*}{de} + \frac{\partial \pi^*}{\partial \tilde{q}_2^*}\left(\frac{d\tilde{q}_2^*}{de} + \frac{\partial \tilde{q}_2^*}{\partial q_1^*}\frac{dq_1^*}{de} + \frac{\partial \tilde{q}_2^*}{\partial q_3^*}\frac{dq_3^*}{de}\right).$$

From the first-order conditions of (7) and (8),

(A5-2) $$\frac{d\pi^*(e)}{de} = \frac{\partial \pi^*}{\partial \tilde{q}_2^*}\left(\frac{d\tilde{q}_2^*}{de} + \frac{\partial \tilde{q}_2^*}{\partial q_1^*}\frac{dq_1^*}{de} + \frac{\partial \tilde{q}_2^*}{\partial q_3^*}\frac{dq_3^*}{de}\right).$$

Defining $(\bullet)$ in the above right hand as $Z$, we obtain the following result:

(A5-3) $$Z = -\frac{n}{1+\beta n} + \frac{2}{A-B}\left(\frac{n}{1+\beta n}\right)^2 < 0,$$

because of $A-B<0$. Therefore,

(A5-4) $$\frac{d\pi^*(e)}{de}\begin{pmatrix}>\\=\\<\end{pmatrix}0 \Leftrightarrow \frac{\partial\pi^*(e)}{\partial\tilde{q}_2^*}\begin{pmatrix}<\\=\\>\end{pmatrix}0.$$

The sign of $\partial\pi^*/\partial\tilde{q}_2^*$ is determined by the parameters as follows,

(A5-5) $$\frac{\partial\pi^*}{\partial\tilde{q}_2^*}=\frac{\gamma}{\underbrace{A-B}_{-}}\left\{(1-s)\alpha-\frac{2\gamma n\overbrace{(m\alpha-e)}^{+}}{1+\beta n}\right\}.$$

As a result, we obtain the first part of the proposition. As to the second derivative, due to $dA/de=dB/de=d\mathrm{Z}/de=0$,

(A5-6) $$\frac{d^2\pi^*}{de^2}=\frac{2\gamma^2 n}{\underbrace{(A-B)}_{-}(1+\beta n)}\underset{-}{Z}>0. \qquad \square$$

## Appendix 6.

First, $e$ minimizing $\pi^*$ is obtained from $d\pi^*/de=0$, that is,

(A6-1) $$\hat{e}=m\alpha-\frac{\alpha(1+\beta n)(1-s)}{2\gamma n}$$

which increases with $s$.

i): If and only if $\hat{e}\geq\overline{e}$, under which $\pi^*(e)$ is strictly decreasing in $e\in[0,\overline{e}]$, from Proposition 2, we obtain

(A6-2) $$1-s\leq\frac{2\left(1/n+\beta\right)\gamma^2 n}{\left\{\left(1/n+\beta\right)\left(2\beta+1\right)-\gamma^2\right\}\left(1+\beta n\right)}(\equiv M).$$

As a result, if $s>1-M$, then $\pi^*(e)$ is maximized at $e=0$.

ii): If and only if $\hat{e}\leq 0$, under which $\pi^*(e)$ is strictly increasing in $e\in[0,\overline{e}]$, from Proposition 2, we obtain

(A6-3) $$1-s\geq\frac{2\gamma mn}{1+\beta n}(\equiv L).$$

As a result, if $s\leq 1-L$, then $\pi^*(e)$ is maximized at $e=\overline{e}$.

iii): For $1-L<s<1-M$, $\pi^*(e)$ is minimized in $\hat{e}\in[0,\overline{e}]$. Because of convexity of $\pi^*(e)$, $\pi^*(e)$ is maximized at either $e=0$ or $e=\overline{e}$ in this case. In addition, since $\hat{e}$ is increasing with $s$, there is an $s$ at which $e^*$ shifts from $\overline{e}$ to 0.

## References


Association of Japanese Animations, 2018, *Anime Industry Report 2017* (in Japanese), Shufu no Tomosha.

Association of Japanese Animations, 2020, *Anime Industry Report 2019: Summary* (in Japanese), https://aja.gr.jp/jigyou/chousa/sangyo_toukei.

Association of Japanese Animations, 2021, *Anime Industry Report 2020* (in Japanese), file:///C:/Users/usacc/Downloads/2020_Anime_ind_rpt_summary_jp%20(3).pdf.

Barker, G. and Maloney, T., 2015, "The Impact of Internet File-sharing on the Purchase of Music CDs in Canada," *Journal of Evolutionary Economics* 25 (4), 821–848.

Digital Content Association of Japan, 2014, White Paper on Digital Content (in Japanese), Digital Content Association of Japan.

Domon, K. and Lam, T. D., 2009, "Profitable Piracy in Music Industries," *Review of Economic Research on Copyright Issues* 6(1), 1-11.

Domon, K., 2021, "Optimal Enforcement for Content Industries under Positive External Effects of Piracy," *Review of Law & Economics* 17(3) 657-672.

Domon, K., 2022, "Effects of Cultural Content Piracy and Enforcement on Inbound Contents Tourism," Available at *SSRN*: https://ssrn.com/abstract=4280470 or http://dx.doi.org/10.2139/ssrn.4280470.

Gayer, A. and Shy, O., 2006, "Publishers, Artists, and Copyright Enforcement," *Information Economics and Policy* 18 (4), 374-384.

Hasunuma, S., 2020, "Kokusai Kanko Ryokakuzei no Zeishu no Shito to Kankei Ronten – Kokkai Giron wo Chushin ni – (in Japanese)," Rippou to Chous, 422. https://www.sangiin.go.jp/japanese/annai/chousa/rippou_chousa/backnumber/2020pdf/20200414053.pdf.

Japan Tourism Agency, 2020, *Consumption Trends of Inbound Tourists: Preliminary Figures of First Quarter in 2020* (in Japanese), https://www.mlit.go.jp/kankocho/siryou/toukei/content/001354360.pdf.

Ksenia, K., Cheng, P., and Huiyuan, C., 2018, "Anime Consumer Motivation for Anime Tourism and How to Harness It," *Journal of Travel & Tourism Marketing* 36(2), 268–281.

Liebowitz, S. J., 2016, "How Much of the Decline in Sound Recording Sales Is Due to File-sharing?," *Journal of Cultural Economics* 40, 13–28.

Mortimer, J. H., Nosko, C., and Sorensen, A., 2010, "Supply Responses to Digital Distribution: Recorded Music and Live Performances," *Information Economics*

*and Policy* 24 (1), 3-14.

Piolatto, A. and Schuett, F., 2012, "Music Piracy: A Case of "The Rich Get Richer and the Poor Get Poorer," *Information Economics and Policy* 24 (1), 30-39.

Seaton, P. and Yamamura, T, 2015, "Japanese Popular Culture and Contents Tourism – Introduction," *Japan Forum* 27 (1), 1-11

Tung. V. W. S., Lee, S., and Hudson, S., 2019, "The potential of anime for destination marketing: fantasies, otaku, and the kidult segment," *Current Issues in Tourism* 22 (12), 1423-1436.

Yamamura, T., 2020, "Contents Tourism and Creative Fandom: The Formation Process of Creative Fandom and Its Transnational Expansion in a Mixed-media Age," *Journal of Tourism and Cultural Change* 18 (1), 12–26.