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Relationship between CD Sales and Rentals in the Japanese Music Market

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Abstract

This study estimated demand functions for CD and its rental simultaneously, using the data for each CD title appearing on the annual Rental Top 100 charts from 2005 to 2009 to investigate the relationship between the sale and rental of CDs. The results showed that a CD with high sales was rented frequently, and vice versa. This study also found that hit music in the network distribution market is likely to become a hit in the CD retail market, while network distribution and rental seem to have a substitute relationship.

Key Words : CD sales, rental, network distribution

1 Introduction

When consumers source music, they can choose to attend a concert, buy compact discs (CDs) and digital versatile discs (DVDs), or access radio and television programs. Downloading music onto personal computers and cellular phones has also become common recently. Thus, there are now more choices as to how music is sourced, due to the development of digitalization and broadband Internet. However, purchasing CDs has been the main way that listeners have obtained music up to the present. Music CDs are divided into two formats : singles and albums. In Japan, singles continue to be a popular format, although in the U.S. and other countries, most CDs are in album format¹. Once music recorded on a single becomes a hit, the music is often recorded on an album. Thus, Japanese consumers can choose between purchasing a single or an album for the same piece of music. Furthermore, the Japanese rental system for music CDs is another legal way of listening to music, based on the amended Copyright Law of 1985. Therefore, Japanese music consumers have more choices compared with consumers in many other countries. However, this raises the question of whether an increase in the number of distribution channels for music leads to a greater variety of music that can be accessed, or whether it merely gives greater choice in terms of how a piece of music can be accessed.

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The first purpose of this study is to investigate empirically the relationship between the sale and rental of a CD in the Japanese music market. Many Japanese record companies claim that the rental system has had an adverse impact on CD sales and have objected to the rental business since its inception. However, this issue has not been subjected to scientific analysis. If rentals were a perfect substitute for purchase, the rental system would have a negative effect on CD sales and the assertion by record companies would be confirmed. On the other hand, if consumers come to know an artist by renting a CD and become fans of the artist, they might purchase CDs featuring the artist that are released later. In addition, if music users are segmented into CD purchasers and rental users, rental can be regarded as another channel. In this case, the retail and rental markets do not have a substitute relationship and the rental system provides additional revenues for record companies and copyright holders. With regard to the impact of the rental system on CD sales, two opposite effects can be assumed. Which assumption is correct or which one outweighs the other can only be clarified by conducting an empirical investigation.

The second purpose of this study is to examine the impact of hits in the network distribution market on CD sales and rentals. Single track is a network distribution service that provides the same full-length original song as the song recorded on a CD. Record companies not only produce packaged music CDs for retail and rental but also provide their music for content distributors via networks such as iTunes. If a packaged CD and single track have a substitute relationship, it can be supposed that a record company is engaged in mutually exclusive activities. On the other hand, if consumers choose either to purchase a CD or use a network distribution service, based on different criteria, consumers may come to know unfamiliar music through the network distribution service. Thus, this study examines whether or not an increase in marketing channels provides us with an opportunity to experience more various kinds of music by investigating the relationship among distribution channels.

The rest of this paper is organized as follows. Section 2 gives an overview of the Japanese music market including the rental system. Section 3 surveys the related literature. Then, a model and data are presented in Sections 4 and 5, respectively. Section 6 presents empirical results. The final section offers a discussion and conclusion.

2 Overview of the Rental System and the Japanese Music Market

In Japan, the renting of audio recordings was started by a few university students in 1980. Their services were appreciated by young music fans, because they rented audio recordings to users for about 10 percent of the list price of each audio recording. Subsequently, many entrants appeared and the number of rental stores had surpassed 2,000 by the mid-1980s.

Most record companies did not welcome the rental business. However, record companies could not prevent rental stores from lending audio recordings to users, because the Japanese Copyright Law did not have a provision regarding lending rights, that is, the exclusive right of record companies to offer audio recordings to rental stores for the purpose of lending. Thus, record companies urged the government and the Diet to introduce a lending right into the Law. As a consequence of their fierce lobbying, the amended Copyright Law of 1985 gave exclusive lending rights to record companies and performers for 1 year from the date of first release and the right to receive a reasonable level of remuneration from

rental stores for an additional 49 years.

Record companies are able to prohibit rental stores from lending audio recordings for a period of up to 1 year from the date of the first release, based on the amended Copyright Law of 1985. However, in fact, rental users are able to rent most singles and albums produced by Japanese record companies within 3 days and 3 weeks, respectively, after the first release. Some Diet members were concerned about a potential negative impact of the long-term prohibition of rentals on the management of rental stores. Thus, they urged Japanese record companies to offer audio recordings to rental stores immediately when the Copyright Law was amended. Record companies reluctantly acceded to this request, instead of acquiring lending rights.

Although Japanese record companies have reached an agreement with rental stores on shortening of the rental prohibition period, foreign record companies have not accepted it. Therefore, the rental prohibition period for audio recordings produced by foreign record companies remains at 1 year, strictly based on the provision of the Copyright Law.

Music CD sales have declined worldwide since reaching a peak in the late 1990s. In Japan, the single market decreased markedly from 97.4 billion yen in 2000 to 37.3 billion yen in 2010, according to the investigation conducted by the Recording Industry Association of Japan (RIAJ). The album market also decreased from 426.4 billion yen in 2000 to 184.4 billion yen in 2010. Although the CD rental market also decreased from 62.9 billion yen in 2000 to 54.7 billion yen in 2010, the degree to which the rental market decreased was smaller than that of the CD retail market. Consequently, the CD rental market in 2010 surpassed the singles retail market.

In Japan, the single track service has been provided primarily through cellular phones², although iTunes and other providers that distribute full-length songs through the Internet have been expanding their business. In the case of music distribution services via cellular phones, users pay music charges as well as communication charges to cellular phone operators. Distribution via cellular phones has been popular in Japan, because the business model is a convenient one for young people who do not have credit cards.

Music distribution services via cellular phones largely consist of a ring tone service, which only provides a song's tune, and single track that provides a full-length song. The ring tone service started in December 1999, while the single track service dates from November 2004. Based on the investigation conducted by the RIAJ, the single track market had grown rapidly and reached 56 billion yen in 2009. However, the single track market began to decrease to 53.9 billion yen in 2010. It seems that the single track market shifted from growth into the mature stage within a short period.

3 Related Literature

With regard to the demand for music, Burke (1994), Stamm (2000) and Stevans and Sessions (2005) estimated demand functions for audio recordings, using aggregated time trend data and calculated income and price elasticities of audio recordings. Music magazines such as *Billboard* have not generally provided the number of CDs sold, although information on rankings, artists, and CD prices has been included in the hit charts. When sales data by title are not available, some empirical studies use the aggregated time trend sales data and estimate the overall market demand function. Other

studies assume that a CD staying on the hit charts for a long period has large sales, and then investigate the factors affecting the length of time a CD remained on the hit charts. On the other hand, in Japan, Oricon Entertainment Co. has collected CD sales data from many retail stores and published the number of CDs sold and artist information in the Oricon hit charts. Thus, the demand for CDs by title can be estimated in Japan. Asai (2011a) estimated the demand for singles and albums using CD data by title.

Asai (2011b) examined the determinants of demand for music distributed via networks, using a hazard model and found that the higher the sales of CDs, the longer the period that the music survived on the hit charts. Asai also reported that music featuring artists who already had high sales tended to drop out of the network distribution hit charts sooner.

Renting music CDs is not common outside Japan. Thus, economic studies on rental systems for music could not be found. On the other hand, rental of DVDs has been popular in the motion picture industry worldwide and several empirical studies of the relationship between DVD sales and rentals have already been conducted. Weinberg (2005) found that in the U.S. there was virtually no overlap between the top rentals and the top selling 10 videos in 2002. The finding implies that consumers decide whether they purchase or rent an individual video based on separate criteria. McKenzie (2010) and Walls (2010) performed empirical studies of the relationship between box office revenues and DVD sales. Jozefowics *et al.* (2008) estimated demand for rental of video home system (VHS) and DVD and found that box office revenues had a positive impact on VHS and DVD rental revenues. Asai (2009a) constructed a simultaneous equation for DVD sales and rentals to examine the relationship in Japan between the DVD retail and rental markets. Asai found that the growth of the video retail market led to the expansion of its corresponding rental market and that the latter did not constrain the former.

While the Japanese rental system is legal, illegal file sharing has become a common worldwide phenomenon since the late 1990s. Record companies have claimed that peer-to-peer usage is a major factor in decreased CD sales. This assertion is reminiscent of an earlier claim by Japanese record companies that rentals adversely affect their sales except for the fact that the rental system is legal. Liebowitz (2006) analyzed the music market using aggregated time series data and reported that file sharing was one factor in the decline in sales of music CDs. Zenter (2006) estimated the effect of music downloads on CD sales using individual data and found that peer-to-peer usage reduced the probability of purchasing CDs by 30 percent. Obertholzer-Gee and Strumpf (2007) estimated CD sales using title-based data and reported that the effect of downloads on CD sales was statistically indistinguishable from zero. Bhattacharjee *et al.* (2007) examined demand for albums using a hazard model and found that file sharing did not hurt sales of the top-ranked albums, while it had a negative impact on low-ranked albums.

4 Model

This study constructs simultaneous equations for sales and rentals by format, because Asai (2011a) found that factors affecting hits differed between singles and albums. The model is established as follows.

CD sales = f (rental frequency, network distribution, record company, attributes of artists)

CD rental frequency = $f(\text{CD sales, network distribution, record company, attributes of artists})$

Estimated equations are specified by equations (1) and (2).

$$\ln(\text{Sale}) = \alpha_0 + \alpha_1 \ln(\text{Rental}) + \alpha_2 \ln(\text{Artist}) + \alpha_3 \ln(\text{Net}) + \alpha_4 \text{Company} + \alpha_5 \text{Man} + \alpha_6 \text{Woman} + \alpha_7 \ln(\text{Artist})^2 + \alpha_8 \text{Foreign} \quad (1)$$

$$\ln(\text{Rental}) = \beta_0 + \beta_1 \ln(\text{Sale}) + \beta_2 \ln(\text{Artist}) + \beta_3 \ln(\text{Net}) + \beta_4 \text{Company} + \beta_5 \text{Man} + \beta_6 \text{Woman} + \beta_7 \text{Fan} + \beta_8 \text{Foreign} \quad (2)$$

where \ln denotes the natural logarithm.

The liner term and quadratic term of the variable Artist are incorporated in equation for sales. While equation for rentals uses only the linear term, the variable Fan is incorporated in equation for rentals. Thus, the two equations are exactly identified.

The dependent variable Sale is the number of singles or albums sold by title (unit). The other dependent variable Rental represents the number of times a single or an album was rented. When the value of α_1 is negative, the rental system adversely affects CD sales. When the value of β_1 is negative, the retail market growth adversely affects the CD rental market. When the both values of α_1 and β_1 are positive, the retail and rental markets have positive feedback.

The variable Net represents the ranking calculated by the number of times that a piece of music was downloaded in the single track market. The data on the number of times that a piece of music was downloaded are not available, while the title, the names of artists, record companies and ranking are published in the single track hit charts. Thus, this study used the ranking as the variable representing the frequency of downloads due to the availability of data. Where the variable Net has a smaller value, this indicates that the music was downloaded more frequently.

A single CD contains a song or a few songs, while an album contains approximately 12 songs. Single tracks are similar to singles in terms of the number of recorded songs, while the correspondence between a song provided in a single track format and songs recorded on an album is weak. Therefore, the variable Net is used only for single equations. If hit music in the single track market has high sales of a single, the value of α_3 is supposed to be negative. When the value of β_3 is negative, hit music in the single track market is rented frequently. Thus, the estimates of α_1 , α_3 , β_1 and β_3 show the relationship among distribution channels in the Japanese music market.

Throsby (1990) asserted that the variable representing quality and attributes of performers should be included in arts demand functions. The variables Artist, Company, Male, Female, Omnibus and Foreign represent artist attributes. The variable Artist represents high sales of total audio recordings featuring an artist in the previous year or the year before last (100,000 yen), denoting the degree of popularity of artists.

Major record companies can afford to conduct large-scale advertising campaigns. This study identified whether or not a CD was released by a major record company. The variable Company is set to 1 if a CD is released by one of the five major record companies, AVEX Entertainment, EMI, Universal Music, Warner, or Sony Entertainment, and their affiliates and is 0 otherwise. AVEX Entertainment was the second-ranked company as measured by sales (yen) in 2009 and 2010. It has performed activities mainly inside Japan, while the other firms have operated as global record companies.

Artists are largely classified into three types : male solo artist, female sole artist, or a group con-

sisting of several artists. The variable Male is set to 1 if the CD features a male solo artist and is 0 otherwise. Similarly, the variable female is set to 1 if the CD features a female solo artist and is 0 otherwise.

Album genre is largely divided into Japanese popular music featuring Japanese artists and foreign music featuring foreign artists, while all singles in this study were exclusively Japanese popular music. The variable Foreign is set to 1 if an album features foreign artists and is 0 otherwise. The variable Foreign is included in album equations for sale and rental.

The variable Fan in equation for rentals represents high popularity of an artist. Oricon investigates the favorite artists of more than 2000 music fans and compiles favorite artist charts each year. The variable is set to 1 if an artist appears on the Top 20 favorite artist charts in 2007 or 2008 and is 0 otherwise. Most of the favorite artists appearing on the Top 20 charts had been ranked within the Top 50 annual top sales for several years. This indicates that the artists selected as “favorite” have very high sales of audio recordings over a period of time. Table 1 shows that the correlation coefficients between the variables Artist and Rental were close to zero (0.084 and 0.181). Thus, rental equation uses only the linear term of the variable Artist, while the variable Fan is incorporated in it. On the other hand, the correlation coefficients between the variables Sale and Artist (0.164 and 0.369) were more than those between the variables Rental and Artist. Thus, equation for sales incorporates the quadratic term of the variable artist to allow for non-linear relationship between CD sales and artist’s previous performance.

The variables representing CD price and rental fee are not included in this study. The rental fee is not set by CD title but depends on whether the CD is a single or an album. The rental fee cannot be included in rental equations, because the rental fee for a single (an album) is the same among singles (albums) and this study estimates demand functions by format.

Initially, a CD with one title had one price. However, recently, record companies often release several kinds of CDs with the same title. Some of the CDs with the same title may have special offers such as a promotional DVDs or invitations to the artist’s events, as ways to increase CD sales. In Japan, therefore, there are CDs that have the same title but different prices. However, Oricon hit charts have provided the price of representative CDs only³. Furthermore, Oricon hit charts reported the total number of retail units of CDs with the same title, and the sales data for each CD with the same title but with different content are not available. Therefore, weighted average price cannot be calculated from the data provided by Oricon. Unavailability of data is the reason why this study did not include the price variable.

5 Data

The subjects of this study are singles and albums that appeared on the annual Rental Top 100 during a 5-year period from 2005 to 2009. Some singles and albums continue to appear on the sales and rental hit charts for a period exceeding 1 year. Consequently, the numbers of singles and albums that have different titles for this 5-year period were 478 and 387, respectively. When singles and albums appear on the hit charts for more than 1 year, the rental frequency and retail units sold were totaled in this study.

The data on the number of CDs sold by title, the previous sales by artist, the ranking of the single track service, record company and genre are available from the *Oricon Yearbooks2006-2009* and *Oricon Entertainment White Paper 2009-2010*. The data for the annual Rental Top 100 were collected by the Compact Disc & Rental Commerce Trade Association of Japan (CDV-Japan) and are available from the web site⁴. Available data from CDV-Japan during the estimation period were annual Rental Top 100 singles and albums, while the sales data provided by Oricon are annual Top 1000 singles and albums. Some singles and albums appearing on the annual Rental Top 100 in this study did not enter the annual Sales Top 100 charts, although they appeared on the Sales Top 1000. Thus, the degree of hits among the 478 singles and 387 albums was different between sales and rentals.

Table 1 shows the correlation coefficients between variables except the dummy variables consisting of zero and 1 by format. With regard to singles in Table1 (a), the correlation coefficient between the variables Sale and Rental was high at 0.562 and was significant at the 1 percent significance level. Figure 1 shows the relationship between sales and rentals for singles. The correlation coefficient between the variables Sale and Net was -0.177 and null hypothesis for the value was rejected at the 1 percent significance level. Although the correlation coefficient between the variables Rental and Net was also negative at -0.046 , the value was very small and null hypothesis was not rejected. With regard to albums in Table 1 (b), the relationship between the variables Sale and Rental was positive, which was shown in Figure 2. The correlation coefficient between the variables Sale and Artist was also positive at 0.369.

In Table 1 (a) and (b), the correlation coefficients between the variables Rental and Artist (0.084

Table 1 Correlation Coefficients

	(a) Singles				(b) Albums		
	Sale	Rental	Artist	Net	Sale	Rental	Artist
Sale	1.000				1.000		
Rental	0.562	1.000			0.767	1.000	
Artist	0.164	0.084	1.000		0.369	0.181	1.000
Net	-0.177	-0.046	-0.037	1.000			

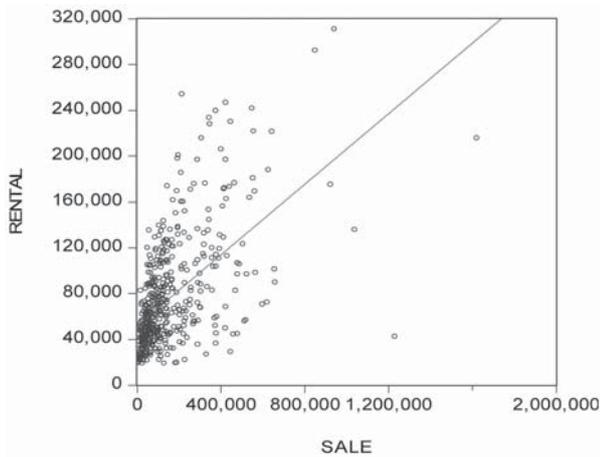


Figure 1 Sales and Rentals for Singles

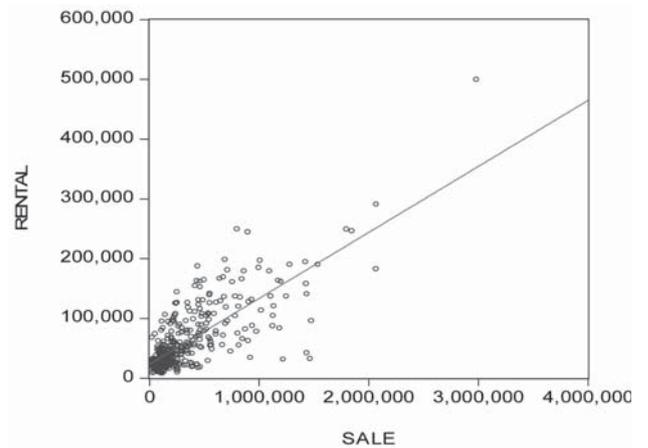


Figure 2 Sales and Rentals for Albums

and 0.181) were less than those between the variables Sale and Artist.

6 Estimation Results

The present study confirmed that the variables Sale and Rental were endogenous by the Hausman test. Therefore, equations (1) and (2) were estimated simultaneously, using the full information maximum likelihood (FIML), which enables asymptotically efficient estimators. Table 2 (a) and (b) shows the estimation results for singles and albums, respectively.

With regard to singles in Table 2 (a), the values of α_1 and β_1 were significantly positive at the 1 percent significance level. The results imply that a single that was rented frequently had high sales and a single with high sales was rented frequently. The value of α_1 representing the impact of rental frequency on single CD sales (1.0958) was larger than the value of β_1 (0.2531). The difference in the degree of hits between sales and rentals may be reflected in the difference in the estimates of α_1 and β_1 .

The estimate of the linear term of the variable artist (α_2) was negative, while the value of the variable (α_7) was positive. The effect of an artist's previous performance on singles sales using the estimates α_2 and α_7 as well as the average of previous sales of an artist for singles (2,922 million yen) was positive at 0.160. This implies that singles featuring artists who already had high sales tend to become hits. On the other hand, the value of β_2 representing the impact of previous sales performance on single rental frequency was negative. It seems that rental users tended to select singles featuring artists that did not have a large number of previous sales. The estimate of α_3 representing the impact of hits in the single track market on packaged singles sales was -0.0480 , implying that singles recorded music with a large number of downloads had high sales. On the other hand, the estimate of β_3 representing the impact of downloads on rental frequency in Table 3 (a) was positive at the 1 percent significance level. It seems that the impact of network distribution on the retail market was significantly positive, while the impact on the rental market was negative.

With regard to albums, the estimates α_1 and β_1 in Table 2 (b) were also positive. It is found that the retail and rental markets of albums also had a positive external effect on each other. The effect of an artist's previous performance on album sales evaluated at the average of previous sales of an artist for albums (2,005 million yen) was 0.2874. The impact of previous sales performance of the artist on albums sales was positive and larger than that for singles. Albums sales were more dependent on the previous sales performance of the artist than singles sales.

The value of α_8 representing the impact of albums featuring foreign artists on sales was positive, while the value of β_8 representing the impact on rental frequency was significantly negative. The rental prohibition period for albums released by foreign record companies is 1 year, while that for Japanese albums is at most 3 weeks, as mentioned above. Thus, rental users have to wait 1 year from the first release to rent albums released by foreign record companies. Using the Bass model, Asai (2009b) has shown that the turnover rates for hit music have been accelerating since the 2000s. Judging from the negative value of β_8 , rental users may lose interest in foreign albums during the 1-year rental prohibition period.

With regard to the estimate for company, the estimate for single sales (α_4) was significantly negative (-0.4877). The estimate for album sales was also negative, although null hypothesis was not re-

Table 2 Estimation Results

	(a) Singles	(b) Albums
α_0 (constant)	-0.2641 (7.2227)	-0.2128 (1.8408)
α_1 (Rental)	1.0958 (0.6526)*	1.1496 (0.1764)***
α_2 (Artist)	-0.2338 (0.0806)***	-0.1021 (0.0464)**
α_3 (Net)	-0.0480 (0.0448)	
α_4 (Company)	-0.4877 (0.0710)***	-0.0517 (0.0811)
α_5 (Man)	0.5156 (0.1425)***	0.1216 (0.1437)
α_6 (Woman)	-0.1702 (0.0807)**	-0.0293 (0.0979)
α_7 (Artist \times Artist)	0.0243 (0.0075)***	0.0132 (0.0046)***
α_8 (Foreign)		0.6666 (0.1933)***
β_0 (constant)	8.0720 (0.8122)***	8.5278 (2.4943)***
β_1 (Sale)	0.2531 (0.0693)***	0.1577 (0.2154)
β_2 (Artist)	-0.0109 (0.0063)*	0.0019 (0.0133)
β_3 (Net)	0.0541 (0.0127)***	
β_4 (Company)	0.1135 (0.0599)*	0.1818 (0.0804)**
β_5 (Man)	-0.2231 (0.0919)**	-0.0439 (0.1306)
β_6 (Woman)	0.0079 (0.0539)	-0.0087 (0.0765)
β_7 (Fan)	0.0961 (0.0583)*	0.4780 (0.1933)**
β_8 (Foreign)		-0.5848 (0.2905)**
Adjusted R ² (Sales)	0.540	0.492
Adjusted R ² (Rental)	0.398	0.358

*** 1% ** 5% * 10%

jected. It seems that major record companies releasing CDs is not always at an advantage for CD promotion. Universal Music, Sony Music Entertainment, Warner Music and EMI are major global record companies. Hull *et al.* (2011) stated that the combined global market share of the four companies was high at 84.6 percent in 2009. On the other hand, the total share of these companies in Japan was relatively low at 41.2 percent in the same year, according to the *Oricon Entertainment White Paper 2009*. Not only global record companies but also medium-sized Japanese firms have played an active role, which is one of distinctive features of the Japanese music market.

7 Discussion and Conclusion

Many record companies have consistently claimed that the rental system has had an adverse effect on CD sales. Contrary to this assertion, this study found that CDs with higher sales were also rented more frequently, and that CDs that were rented frequently had higher sales. Thus, the results of this study do not support the assertion made by record companies. Record companies endeavor to find and develop artists who have consumer appeal. On the other hand, rental stores are not directly engaged in promotional activities on the behalf of artists. The relative insignificance of the contribution made by rental stores may cause record companies to regard these stores as free riders.

This study found that music with a large number of downloads tended to be hits in the single retail market. Asai (2011b) examined the factors in hits of music distributed via a network using a hazard model and reported that music with high CD sales also tended to be hits in the single track market. The results of Asai (2011b) and this present study indicate that hit music in the network distribution market has a high possibility of becoming a hit in the CD retail market, and vice versa.

This study also found that several factors affecting demand differed between the sale of a CD and its rental. Previous sales performance by an artist had a positive impact on CD sales, while the impact of any previous sales performance on the number of times a single or an album was rented was negative. Furthermore, the impact of previous sales performance on album sales was larger than that on singles sales. Asai (2011b) showed that music featuring an artist who had already high sales dropped off the single track hit charts after a short period. The rental fees for singles and albums are only about 10 percent of the price for buying these items. The price of the single track service is almost the same as the rental fee for an album. The results of Asai (2011b) and this present study indicate that demand for expensive CDs had a positive relationship with the previous sales performance of an artist, while demand for the inexpensive rental and single track services had a negative relationship with the previous sales performance of an artist. RIAJ (2008) reported that consumers choose the way they obtain music, based on a balance between loyalty to the artist and cost, and they purchase albums featuring their favorite artists, despite their high cost. On the other hand, consumers can adopt a more experimental attitude to renting a CD and using the single track service, because the rental fee and the price of a single track are relatively low. Some consumers may regard the rental and single track service as a type of sampling exercise to find new artists that they like.

RIAJ (2002) reported that most rental users make a copy of the CDs they rent in order to enjoy the music later. Certainly, nobody purchases CDs that they have already rented and made a copy of. However, some rental users may find artists they like by renting and purchase CDs featuring the artists that are released later. Judging from the results of this study, it may be preferable for record companies to consider rental stores as another marketing channel. This present study also found that consumers choose either to purchase or rent a CD based on different criteria. This implies that the rental system provides consumers with the opportunity to experience a variety of music.

Finally, the problems regarding data and variables need to be considered. First, this present study incorporated the variables representing artist attributes, based on Throsby (1990) that asserted the importance of considering quality in art demand studies. However, the variables representing CD attributes such as price and the number of recorded songs could not be incorporated in equations for sales and rentals due to the availability of data. Second, this study had to use the download ranking as the variable representing frequency of downloads, because the data on the number of times a piece of music was downloaded could not be obtained. If the data were available, a more detailed investigation could be conducted. It would be highly desirable to be able to re-estimate the equations using the data representing CD attributes and the number of downloads and confirm the results of this present study. Japanese policymakers have recently taken an interest in the entertainment industries. It would be desirable to establish an efficient system of storing and publishing information and data for the benefit of both policymakers and researchers.

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Footnotes

- 1) The RIAJ (2012) reported that the ratios of singles (units) to total CDs sold in 2010 in the U.S., U. K., Germany, and France were 0.7 percent, 2.4 percent, 6.9 percent, and 3.3 percent, respectively. On the other hand, the ratio in Japan was high at 24.5 percent in 2010, based on the investigation conducted by the RIAJ.
- 2) The ratio of single track through cellular phones to the total single track services measured by sales (yen) accounted for 88.3 percent in 2010.
- 3) When the CD demand function was estimated using the price of representative CDs, the null hypothesis for the price estimates was not rejected at the 10 percent significance level.
- 4) Formerly, the CDV-Japan web site published the annual number of times a CD was rented. However, the web site does not publish the rental frequency at present, although data on title and ranking on the weekly Rental Top 100 charts are reported.

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