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Economic Analysis of On-Line Music: Choice Between On-Line and Traditional Music Shops

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Economic Analysis of On-line Music: Choice between On-line and Traditional Music Shops*

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The aim of this paper is to analyze the interaction between on-line and traditional music shops in order to understand the economic changes taking place in the music market. Music has been enjoyed since the emergence of human civilization, but until very recently only live performances could be experienced. The record industry emerged less than 100 years ago, in 1910. Today we can play CDs and MDs, as well as records and cassettes, indoors or outdoors. Recently we have seen the invention of digital music players such as Apple's iPod and Toshiba's Gigabit, which can play music after downloading digital music data from on-line music shops. The person can consider the various music media possibilities: CD from a traditional shop; CD from an on-line shop; Memory disc including music data from the terminals of the on-line music system in a shop; Hard disk including music data from an on-line shop. In fact, the person has to select a music medium taking into account the existence of music services from the supplier, the existence of music players and use of the Internet. In this paper the corresponding utility function is estimated using a rank-logit model.

JEL: C35, M31, R39

1. Introduction

In this paper an economic model is proposed for the effect of online music stores on the distribution of music information goods, including compact discs and online data, and the location of traditional stores such as music stores.

Many information and non-information goods are economic goods and are consumed in the world. Information goods can now pass via the Internet. Previously, it was necessary to buy compact discs of information or software. Music is one of the most popular forms encoded as binary information. When a person wants to listen to music, which does he or she select: online music download shops such as the iTunes Music Store, online CD stores such as Amazon, or traditional music shops such as Tower Records? We have developed an economic approach to clarify information flow taking place by face-to-face communication in the real world and telecommunication in the virtual world (on business, Takita, Yuzawa and Suda (1993), and in education, Takita (2001) (2005)). In the case of music, we focus on competition between CD stores and online stores. A comprehensive economic approach to the information-based society (Takita (1997)) is applied below to the music market.

Music has been created since the birth of humanity, and has been much associated with human life. Information has three elements: pictures, languages and audio. Music is a kind of information. In the history of information storage, old pictures and written languages have been preserved in clay plate and on paper, but audio information was not recorded until the invention of the phonograph by Edison, who was a telecommunication engineer, in 1877. Edison thought of the phonograph as a tool to preserve information. But the phonograph was used to record and replay music. It is still less than 100 years since the record industry began to distribute information goods in the form of music. Technology has since transformed the

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music entertainment scene. Records and cassettes have been replaced by compact discs and mini discs. The phonograph was developed into the multi-component stereo system. Portable cassette players, CD players and MD players have also been developed. Most recently, we can enjoy personal digital music players. Hundreds or thousands of new or old songs can be downloaded from music download stores or transferred from our own compact discs. The portable digital music player acts as a portable jukebox.

2. Producing Process of Music as Information

Music can be interpreted as a kind of information good, which is distributed to consumers in our society. Music is consumed as economic goods distributed to people via traditional or online stores. People will pay much more for music created by more famous musicians.

In the formal taxonomy of information, pieces of information are classified into particular categories in each portal site, such as Microsoft MSN, as shown in **Table 1**. The classification is not uniform across Yahoo, MSN and so on – certainly in comparison with paper-based information. There are seven first categories on the top page in the MSN site: *News & Sports*, *Look it Up*, *Living & Finances*, *Entertainment*, *Shop*, *Technology*, and *People*. The *Entertainment* category includes various items of information such as *Games*, *Horoscopes*, *Movies*, *Music* and *TV*. One can download music data on the Music page. As shown in **Table 2**, the music category consists of many genres of music: Alternative, Blues, Classical, Country, Dance, Easy Listening, Electronica, Folk, Holiday, Jazz, Latin, and Metal. There are online

Table 1: Classification of Information

1. News & Sports	News, Slate Magazine, Sports by FOX Sports, Video, Weather
2. Look it Up	City Guides, Classifieds, Encarta Education, Maps & Directions, White Pages, Yellow Pages
3. Living & Finances	Autos, Careers & Jobs, Dating & Personals, Health & Fitness, Lifestyle, Money, Real Estate, Travel
4. Entertainment	Games, Horoscopes, Movies, <u>Music</u> , TV
5. Shop	Air Tickets, Autos, Buy a House, Hotels, Rent an Apartment, <u>Shopping</u>
6. Technology	Downloads, Microsoft.com, Microsoft Update, Tech & Gadgets
7. People	Greeting Cards, Spaces, Kids, Latino

Source: MSN (2006) (<http://www.msn.com>)

Table 2: Top Genres

1. Alternative	a. Albums
2. Blues	b. Songs
3. Classical	c. Play lists
4. Country	d. News & Just Released
5. Dance	
6. Easy Listening	
7. Electronica	
8. Folk	
9. Holiday	
10. Jazz	
11. Latin	
12. Metal	

Source: MSN (2006) (<http://music.msn.com>)

download music stores. Alternatively, the *Shop* category includes six kinds of lower categories: *Air Tickets, Autos, Buy a House, Hotels, Rent an Apartment, and Shopping*. As shown in **Table 3**, The Shopping category then has over 7000 stores of 18 lower categories: *Baby & Nursery, Books & Magazines, Clothing & Shoes, Computers & Software, Electronics, Photo, Flowers, Gourmet & Chocolate, Health & Wellness, Home Furnishings, Kitchen, Music, Office Products, Pets, Sports & Outdoors, Tools & Hardware, Toys, Travel, and Video Games*. The music category consists of many genres of music: Blues, Box Sets, Classical, Country, Dance & Electronic, Folk & Roots, Gospel, Jazz, Musical Instruments, New Age, Opera, R & B Soul, Rap & Hip Hop, Rock & Pop, Soundtracks, Specialty, and World. If we wish to listen to songs by an artist, we have to select a particular online store to buy a music compact disc.

We now discuss some processes that produce music as information goods, which then become economic goods. This explanation is based on Ohhira and Kuriyama (1995) and MPT (1990). First, the composer and song writer specify their inspiration as “data, memo and materials” from natural scenes and social phenomena as “sources.” The composer fits music to words, and the songwriter sets a poem to music. Together, they create sheets of written music with the song as “undistributed information goods.” These may be produced as “distributed information goods” by music publishers. The consumers of published sheet music are musicians and music lovers. The production of auditory music involves needs further processes. A conductor, singers and instrumental players render an unpublished or published sheet of music into a sound, or music performance, which at that stage is an “*undistributed information good*.” Finally, music producers make a master disc, and produce music data as “*distributed information goods*” including compact discs and online music data. People then recognize music as economic goods which they can consume. The music industry copies music data onto compact disc. They also sell compact discs and supply music data via Internet music stores. Finally, people enjoy listening to music performances using compact disc players, real players or Microsoft media players, or digital music players, as information goods.

Music can be redefined as information, which comprises written or spoken languages, rhythmical sounds, and perhaps accompanying still and mobile pictures, as described in **Figure 1**. *Information by languages* includes ‘score’, ‘words of a song’, ‘episode by composers, songwriters and players’. Singing songs or playing musical instruments creates *information by sounds*. The package of record or compact discs includes jacket pictures which is *information in pictures*. The DVD medium adds much *information as mobile pictures*,

Table 3: Classification of Shopping Information

1. Baby & Nursery	16. Toys
2. Books & Magazines	17. Travel
3. Clothing & Shoes	18. Video Games
4. Computers & Software	
5. Electronics & Photo	Others:
6. Flowers	See all categories,
7. Gourmet & Chocolate	Sales & Deals,
8. Health & Wellness	Gift Center,
9. Home Furnishings	Editors' picks,
10. Kitchen	Seasonal shopping.
11. Music	
12. Office Products	
13. Pets	
14. Sports & Outdoors	
15. Tools & Hardware	

Source: MSN (2006) (<http://music.msn.com>)

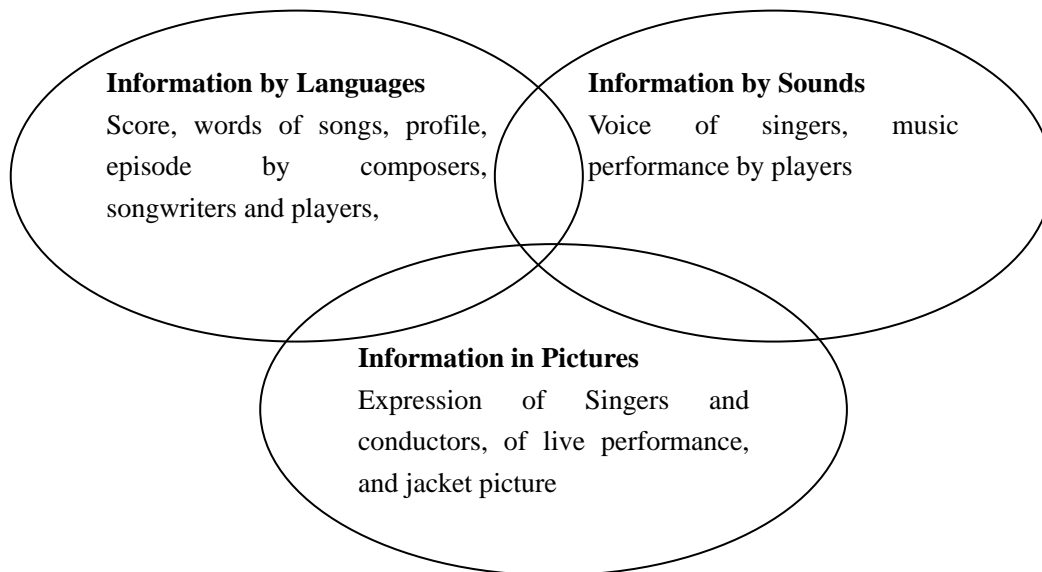


Figure 1: Elements of Information for Music

such as the artistes performing the music. Finally, we can enjoy the music using a compact disc player in our homes. With modern large size and high resolution monitors and stereo component systems, most people can experience more realistic music performance.

3. Choosing between Traditional and Online Stores

The process of choosing a type of music store is shown in **Figure 2**.

(1) Behavior of consumers of music

A consumer wishes to listen either to old or newly released songs, in a genre such as classical, pop or jazz. The situation is specified by a combination of factors: weekday or weekend, daytime or nighttime, immediate listening or later, a few songs or tens, newly released or older.

Example

You wish to buy music compact disc or online music data immediately in daytime to get tens of new songs.

A consumer of music has personal attributes: age, sex, occupation, location of residence, taste of genre, ease of use of music players, extent of use of computer software and the Internet. This consumer considers the choice of music store type: traditional CD store, online CD store, traditional CD stores with terminal downloading to memory disk, and online download store. The consumer compares the characteristics of traditional and online music stores: time taken to get music, costs to get music, wider use and compatibility of media, additional value including language and picture information, ease of purchasing process. Each consumer has a distinct capability for use of music players and use of computer software and the Internet. Finally, the consumer is aware of the relative importance of the various characteristics of traditional and online music stores, depending on music content and the scenario. The consumer then makes a ranking of music store types. Given both supply and

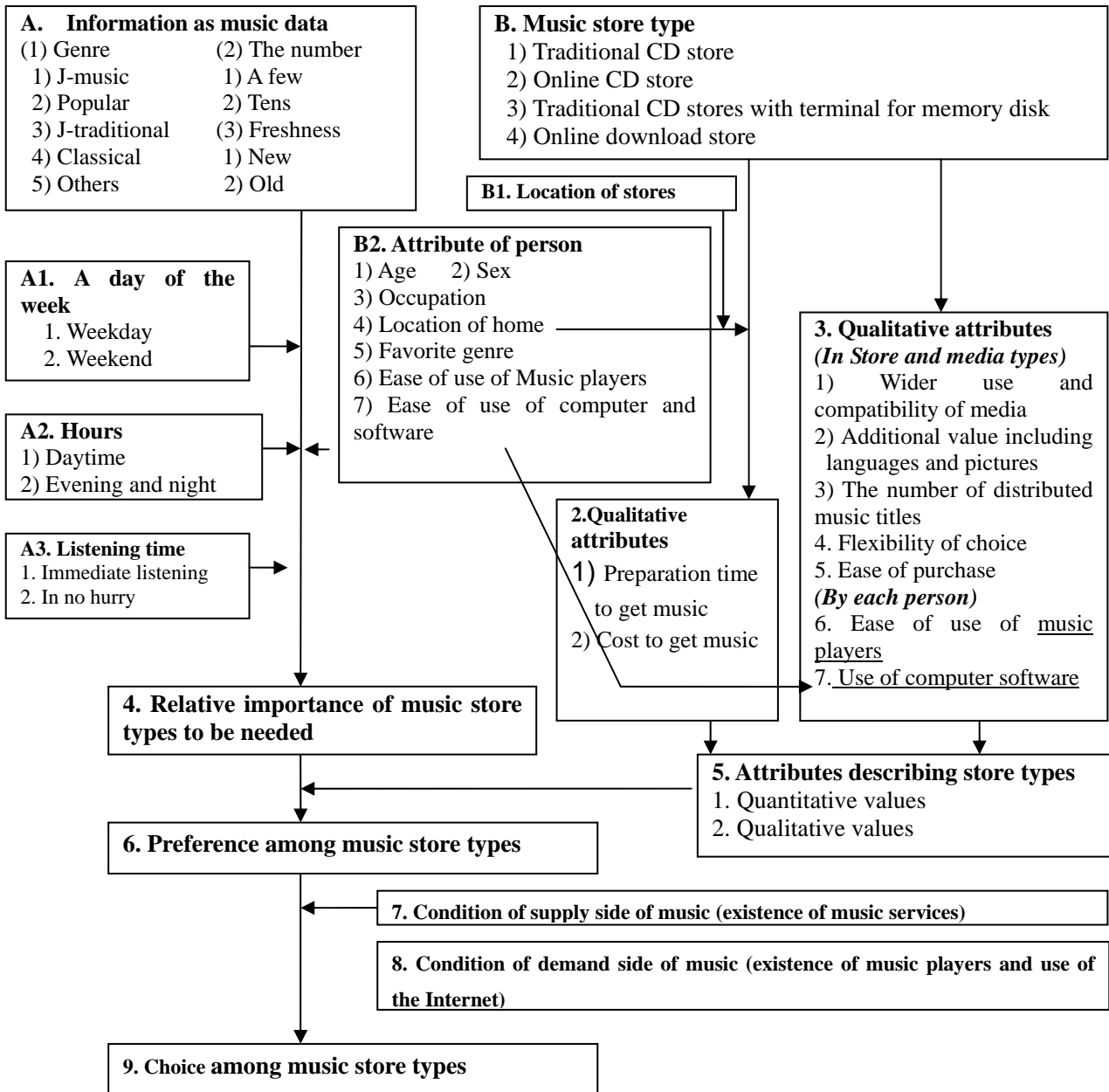


Figure 2: Choice Process between Online and Traditional Music Stores

demand sides (existence of music download services, music players and PC), a final ranking of traditional and online store choices can be made.

(2) Formulation of choice model using rank logit model

We consider the estimation of parameters in a rank logit model so as to explain the choice between online and traditional music stores. The rank logit model is derived from the logit model, and is used to explain a set of ranking using ordered data of alternatives (See Louviere, Hensher and Swait (2000), etc.).

The n th consumer of music, or a person which want to listen to music, considers a set of ranking of music store types $\{j_{1n}, j_{2n}, \dots, j_{Kn}\}$ ($j_{kn} \in J$). Here, j_{kn} is the k -th preferred music store type, and is selected from a set of all music store types J : traditional CD store, online CD store, traditional CD stores with terminal downloading to memory disk, and online

download store.

The probability for a particular ranking of preference is written as follows.

$$P_n(j_{1n}, j_{2n}, \dots, j_{Kn}) = \prod_{k=1}^K P_{kn}(j_{kn} | J_{kn}) = P_{1n}(j_{1n} | J_{1n}) P_{2n}(j_{2n} | J_{2n}) \dots P_{Kn}(j_{Kn} | J_{Kn})$$

Here, the consumer of music recognizes the most preferred music store type, then the next most preferred store type, and so on. The k -th ranking alternative can be picked out of the set of music store types $J_{kn} = \{j_{kn}, \dots, j_{Kn}\}$ ($j_{kn} \in J$), which exists except for the set of music store type $\{j_{1n}, \dots, j_{k-1n}\}$ which the consumer has preferred more.

The probability j_{kn} for selecting the k -th preferred store type from the set of music store types J_{kn} is written as follows:

$$P_{kn}(j_{kn} | J_{kn}) = \frac{\exp U_{jkn}}{\sum_{j \in J_{kn}} \exp U_{jkn}}$$

The utility of the consumer for selection of the k -th music store type from a set of music store types J_{kn} is written in the form:

$$U_{jkn} = \sum_{i=1}^{\ell'} \theta_i x_{ijk} + \sum_{i=\ell'+1}^{\ell} \theta_i x_{ijkn},$$

where θ_i is a parameter. The intrinsic attributes x_{ijk} of music store type ($i = 1, 2, \dots, \ell'$) include:

1) wider use and compatibility of media, 2) additional value including language and picture information, 3) the number of distributed music titles, 4) flexibility of choice, and 5) ease of purchasing process. The personal attributes assigned to music store type are: 6) Ease of use of music players and 7) use of computer software and the Internet.

The consumers $n = 1, \dots, N$ each have a ranking of music store types: traditional CD store, online CD store, traditional CD store with terminal box downloading to memory disk, and online download store. By maximizing the logarithm of the joint probability function L , which is multiplied by the probability of all consumers $n = 1, \dots, N$, each parameter θ_i can be obtained. This maximum likelihood method can be used as follows.

$$\begin{aligned} L &= \prod_{n=1}^N P_n(j_{1n}, j_{2n}, \dots, j_{Kn}) = \prod_{n=1}^N \prod_{k=1}^K P_{kn}(j_{kn} | J_{kn}) = \prod_{n=1}^N \prod_{k=1}^K \frac{\exp U_{jkn}}{\sum_{j \in J_k} \exp U_{jkn}} \\ &= \prod_{n=1}^N \prod_{k=1}^K \frac{\exp \left(\sum_{i=1}^{\ell'} \theta_i x_{ijk} + \sum_{i=\ell'+1}^{\ell} \theta_i x_{ijkn} \right)}{\sum_{j \in J_k} \exp \left(\sum_{i=1}^{\ell'} \theta_i x_{ijk} + \sum_{i=\ell'+1}^{\ell} \theta_i x_{ijkn} \right)} \end{aligned}$$

It is assumed that each consumer ($n \in N$) is similar to all the others with same personal attributes. To analyze this society, the sampling number from the society is decided from the number and proportion of people with every combination of individual personal attributes.

(3) Analytical Results

The rank logit model is used to estimate parameters of the model of choice between traditional and online stores. We find the values of parameters and give summary statistics in **Table 4**. The sample size is 1128, and the efficient sample size is 840. This information is obtained by means of questionnaires to 47 university students of age 18-22 years in 2004. The student recognizes a scenario, which is described from the combination (5^2) of situation factors: weekday or weekend, daytime or nighttime, immediate listening or not, a few or tens

Table 4: Result of the model estimation

Parameters θ_i	Parameter estimates (t-statistics in parentheses)
General attributes	
Preparation time to get music	0.672 (2.507)
Cost to get music	----- (-----)
Wider use and compatibility of media	0.377 (0.190)
Additional value including language and picture information	0.047 (0.049)
Distributing music titles	0.739 (0.106)
Ease of purchasing process.	0.577 (0.732)
Personal attributes	
Ease of use of music players	----- (-----)
Use of computer software and the Internet	0.187 (2.861)
Summary statistics	
The number of persons	47
Sample size	1128
Efficient sample size	840
The rate of hit-goodness	60.71 %
Log likelihood at convergence	-765.01

of songs, newly released or not. By considering an orthogonal array of experimental design, 8 scenarios can be presented. From the sample ranking data on traditional or online store choice depending on each scenario, parameters in the basic model can be estimated. It is found that when they choose either traditional or online stores, they consider the time taken to access the music. It is also significant whether they are accustomed to use of computer software and the Internet. The rate of hit-goodness is 60.71%.

4. Conclusion

This paper has proposed an economic model to explain the effects on the music market of permanently running on-line music shops. This economic model can explain the choice between on-line and traditional music shops. We draw two conclusions:

- (1) Music is a part of information goods; music includes written or spoken languages, rhythmical sounds, and still and mobile pictures. The language information includes 'score', 'words of a song', 'episode by composers, songwriters and players'. Singing songs or playing musical instruments creates sound information. A record or compact disc package includes jacket pictures of players as picture information as well as 'episode by composers, songwriters and players' as language information.
- (2) This model can explain the present competition between traditional and online music stores. When we choose either traditional or online stores, we consider the time taken to access music. It is significant whether or not we are accustomed to using computer software and the Internet.

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