

Demand Estimation for the Newly Built Art Museum in the Cultural-and-Leisure Market

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February 10, 2012

Abstract

The aim of this study is to empirically analyze the demand for the newly built art museum in the cultural-and-leisure market. We apply the BLP approach and analyze based on the data from 2005 to 2009. The estimation result shows that the art museum which holds the exhibition with higher frequency, and the art museum which is located in a convenient place to the public transportation is attractive to the visitors. Moreover, the result shows that the cooperation exhibition with oversea museum attracts the visitors as well. The BLP approach deals with the price endogeneity problem. However, based on the result of the estimation, it has been proved that the price endogeneity problem didn't exist in the case of art museum. Furthermore, even the price is higher, the visitors tend to visit the art museum if the exhibition attracts them.

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Chapter 1

Introduction

1.1 Motivation

The aim of this study is to empirically analyze the demand for the newly built art museum in the culture-and-leisure market. This study applies the BLP approach for the demand estimation. The art museum is considered as a leisure facility in the study. The consumers make their decision whether to go to the art museum while considering other leisure facilities at the same time. As a result, the competitors of the art museum includes not only other art museums, but also other leisure facilities. Based on the estimation, it is possible for us to clarify the consumer preference toward the choice of the art museum.

1.2 The Structure of the Study

Chapter 2 discusses about the basic idea of the study, which focusing on the concept of the value of art, the art museum service, the cultural-and-leisure market, and the previous approach for the demand estimation. In Chapter 3, we apply the BLP approach for the choice model of the art museum in the cultural-and-leisure market. Chapter 4 is the empirical analysis, including the method we defined the market area, the characteristics of the art museum which is used in the analysis, and the result of the estimation. Chapter 5 is the conclusion of the study.

Chapter 2

Basic Idea

2.1 Art Museum Service

The aim of this study is to empirically estimate the demand of art museum. As a result, it is necessary to clarify what kind of service the art museum serve the consumer. The museum service is considered as not only the works of preservation of art pieces or the exhibition, but also the art museum service supply the consumer a package of service containing the supplement service like the gift shop to give the consumer the experience of shopping, and also some other entertaining services.

According to Kotler(1998), the museum involves a mix of five elements :

- The physical facilities;
- The collections and exhibitions;
- The interpretative materials (labels,brochures,catalogues);
- Supplemental programs (lectures, performances, social events)
- Services (food service, gift shop,etc.)

Gilmore and Rentschler (2002) introduced a concept of museum and classified the museum service into 3 types : (i) education, (ii) accessibility, and (iii) commu-

nication. The museum itself is a service package which holds with collection and the physical facilities.

Firstly, education is served from the museum collection and exhibition, which is the center of museum service. The permanent collection is a key point to attract visitors, but also the exhibition takes an important role to attract repeat visitors and new visitors.

Secondly, accessibility is related to individual's willingness to visit to museum. In his study, accessibility means not only the transportation accessibility, but also the convenience of museum facilities. In order to improve the accessibility of the museum, the museum should create visitor-friendly environment and improve flexibility of opening hours, as well as, the facilities for disable. These improvement of museum facilities contributes to create diverse services which meet the needs of different types of visitors.

Thirdly, communication proficiency of museum affects the willingness of the visiting. The communication service is delivered by museum staffs. For example, the knowledge to guide visitors plays an important rule of the communication proficiency of the art museum. Good communication service is helpful for museum to build up the base of repeat visitors.

Todd and Lawson (2001) pointed out that museum services provide educational experience and entertaining experience for the visitors. He supposed that the visiting behavior depends upon how the services well matched to visitors' lifestyle, rather than the contents of collection and display. Visitor made their choice of visiting based on their lifestyle. For example, a person who is looking for a suitable place to spend their leisure time with his children will decide to visit a museum, which serves a child-friendly environment. Each person has different motivation to visit the museum. Jansen-Verbeke and van Rekom (1996) also emphasized the importance of to understand different preferences for spending leisure time. Museum

services should meet the different preferences and needs. Burton (2009) highlighted the importance of museum collections' development, interpretation, and display. The museum is served as a leisure, educational and cultural service. They also addressed that choice model is one of the appropriate method to understand the what are the visitors looking for.

According to Kotler(1998), museum are in the business of caring, interpreting, and showing authentic objects. He specified that there are six types of museum-going experiences, including recreation, sociability, learning experience, aesthetic experience, celebrative experience, and enchanting experience. The museum operator should extend their service scope to fulfill the visitors' experience.

2.2 Art Museum and Cultural-and-Leisure Market

To estimate the demand of art museum, we should clarify the competitors of the art museums. Museums are competing with other museums and also other leisure attractions. When a person made a choice to visit the museum, not only other museums, but also other leisure attractions are considered simultaneously.

Kotler(1998) concluded that the museum business involves in the competition from 4 types of leisure activities. The first type is stay-at-home behavior, such as watching TV. The second type is the leisure activity like going to the shopping malls, restaurants, visiting theme park. The third type is the other cultural and educational activity other than going to the museums. The fourth type is the competition within museums.

- Stay-at-home behavior;
- Shopping malls, restaurants, theme park..;
- Other cultural and educational activities;

- Museums

Jansen-Verbeke and van Rekom (1996) considered that museum operator should develop a museum park strategy considering the competition with other leisure attractions. Burton (2008) also pointed out that the museum should provide a serial of leisure activities package in order to compete against other leisure activities.

Tian (1996) identified the target group of museum marketing and indicated that which group is most responsive to museum attraction. He concluded that the child-centered adults group who prefer to spend their time with children tends to respond more positively to the museum attractions. Discounts for this group are necessary.

Museum is competing with other museum and also other leisure services. Museum serves not only the educational service from collection and exhibition but also entertainment.

In conclusion, the museum is evaluated by its own characteristics. It can be classified into 3 types. The first is the museum itself. The museum service is contributed to physical attribute and the intrinsic value of the museum.

The second is considered as the museum staff. The staff is the deliver of the museum service to help the visitors have a satisfying experience during visiting. The staff has to be capable of the knowledge including the knowledge of the art to provide a probable guidance of the collection. And also the staff has to have enough knowledge of their museum to help the visitors clarify what is given in this museum and to help them schedule their visit. Also, the staff should react towards the feedback from the visitors to provide a better service which is suitable for the visitors. Furthermore, the staff has to aware of the competition situation of the museum, so that they will behave positively to attract the visitors and to leave a pleaseful image of the museum which will make the museum much more attractive as an leisure service.

The third is the marketing activities that the museum operator has done. In

order to compete with other leisure facilities, the museum provides a package of service. The package with transportation methods can offer a discount as to attract visitors due to the lower cost, also the package with other leisure facilities to attract the visitors because of the variety of the visit and also help the visitors to schedule the leisure time and maximize the fulfillment of their limited leisure time. Also, the museum should broaden the group of the repeated visitors so as to have a stable attendance. The membership system can reach this purpose. In addition, the advertisement activity is also vital to attract the visitation.

2.3 Value of Art

After previous articles, it is clarified that the art museum serves the consumer a package of services, including educational service, and entertaining services as well. Furthermore, when the consumer decide whether to visit the art museum they consider about other cultural-and-leisure service at the same time. However, the art museum has distinguished characteristics which is different from other services. Accordingly, to clarify the consumer choice behavior toward art museum, it is necessary to clarify what the distinguished feature the art museum holds. Furthermore, to clarify the choice behavior of consumer means that it is also needed to clarify what value that art museum holds with, and how to estimate the value it holds since it may influence on the choice of consumer.

2.3.1 The intrinsic value of art

According to the study of Ikekami(2003), the most distinguished characteristic of art goods is the intrinsic value they hold with. The intrinsic value is generally hard to evaluate in monetary or quantity measure, which indicates that the value exists originally inside the good itself no matter the good is consumed or not.

There is a specific feature of art goods which be referred as the non-consumption

or non-transferred character of the value. For art goods, even the consumer consumed the art goods, the value of art goods would not decrease or vanish eventually, on the contrast, the value maintains at the same level as original. This kind of character is considered as the intrinsic value of art. Moreover, there is still one more important feature of intrinsic value which called non-transferred character, which means even the art goods is copied the intrinsic value the good initially holds with still remains completely inside the goods and the intrinsic value would not transfer to the other. These two features contribute to the distinction of art goods beyond other goods.

2.3.2 Externality value of art

Beside intrinsic value, the externality value is also a distinguish feature of art goods. Not only for art goods, the externality value also takes an essential part in evaluation process for the object like environment goods, or historical heritage. The externalities of art goods include option value, existence value, bequest value, prestige value and education value.

- Option value: Even art good does not be consumed by the consumer it exists as an option when people tends to pursuit for the culture experience. The art good itself serves the option value to the whole society.
- Existence value: The existence value doesn't require the consumption by the consumer, which indicates that the value comes from only the object's existence no matter it is used or not. In other words, we can obtain satisfaction only from the existence of the art.
- Bequest value: The conservation of art contributes to the value for next generation is considered as bequest value.
- Prestige value: The existence of art brings prestige to the society.

- Education value: The educational function of art.

2.3.3 Use value and non-use value of art

Based on the concept of the characteristic of art, Fernsnd (1994) has also proposed a museum model to make a justification whether the subsidy toward museum is excessive to its social value or not. He classified the value of museum into two groups, including use value and a non-use value. Use value means the value which is contributed by the visitors who indeed visit to the museum and pay the entrance fee. For non-use value, Fernsnd(1994) took option value, bequest value, existence value into this catalogue. Besides use and non-use value, he supposed that the externality is also one of the element that consists of the value of museum. He considered the net multiplier effect of museums, the tourist's expenditures, value of education, international activities, research and publications are all externalities of the functions of museum. This study measures the value of the museum by the Travel Cost Method (TCM) and Contingent valuation methods(CVM). The first one is used to measure the use value, and the second is used to measure the non-use value. By using questionnaire the study made a comprehension of consumer's preference and how much they are willing to pay for the existence for the museum.

2.3.4 The consumer's cognitive value of art

As mentioned above, art good are characterized by non-homogenous, which means the value of art is not homogenous within different individuals. As Ikekami(2003) has pointed out that the utility of art goods relies on the own perception of consumers themselves. The perception in art is the accomplishment of consumer's education, culture experiences and learning process. Consumer who holds with comparatively higher perception in art may have higher motivation to pursue for art goods than others. Furthermore, consumer's request for goods changes all the

time follows the accumulation process of experiences or knowledge.

Based on the literature review, it is obvious that there are many types of interpretation of the value of art in many studies. The most widely used classification is to divide the art museum value into 2 groups, the use value of art museum, and the non-use value of art museum. The use value is considered as the value that the consumer can earn when he or she indeed visit the art museum. For example, the physical facilities of the art museum, the collection, or the exhibition may all contribute to the use value of art museum. The non-use value is considered as the intrinsic value. The intrinsic value exists originally in the art museum. For example, the prestige value, the option value, and the bequest value of art museum are classified into this group. Even the consumer did not actually visit the art museum the value still exists. Accordingly, these two kinds of value, use value and non-use value are quite different. Consequently, the different approaches to evaluate these two types value are necessary.

2.4 Demand Estimation for the Non-use Value of Art Museum

The non-use value of art museum includes the prestige value, existence value, education value, bequest value, option value. And the non-use value is considered as the intrinsic value of art. However, the intrinsic value is difficult to estimate in the quantity measure. Furthermore, as the previous chapter has discussed the intrinsic value of art is variant across consumers. However, this is still necessary to consider about the intrinsic value of art museum cause it is also contributed to the consumer's utility.

2.4.1 Contingent Valuation Method

The proper assessment of intrinsic value has been developed. Hitchen(2009) raised the example of the study carried out by Australia government. They delivered questionnaire to people over 17 years of age, and asked them several question concerning about art. The contents of the questionnaire includes their interest in various of art forms, their attendance at art events, their active participation in the arts, their perception of the general benefits or costs arising from the arts as experienced by the arts community at large, their opinion of government financial support for the arts, and their precise willingness or unwillingness to pay out of taxes for arts subsidies. However, the result is only the public's own valuation toward arts. But the study has pointed out that the willingness to pay is a useful measure to estimate the value of art toward consumers.

Santaga(2000) has proposed the contingent valuation method to determine the value of cultural public good. In this method, individuals are asked to answer about their maximum Willingness to Pay to support the operation of public cultural good. The contingent valuation method is widely used to estimate both the use value and non-use value of cultural public good and it make it possible to express the intrinsic value of art museum in quantity.

The contingent valuation method is widly used for the estimation of cultural good and environmental service. The method involves the questionnaire to directly ask people about their preference or individual characteristics or their willingness to pay for the service. The contingent valuation method is to analyze based on asking people what they will do but not to observe what they actually did.

2.4.2 Travel Cost Method

Jaap(2005) has developed the study that to use the travel cost method to estimate the art museum's value. In this aspect, the value is not the composition of use value

and non-use value but the value that the art museum holds with the aspects of how much the consumer is willing to pay for the art museum visiting.

Several studies has proposed the travel cost method to estimate the non-use value and use value of art museum. Travel cost method estimates the willingness to pay of consumers to visit the art museum. The cost spent on transporation, entry fee and the lose on the income for the hours that the consumer choose to visit the art museum instead of visiting the art museums are considered as the cost that the consumer has to spend to visit the art museum as well as the willingness to pary. However, there are several weakness of travel cost method.

According to Randall(1994), TCM has several problems which mainly come from the unobservable character of the travel cost. Although TCM measures the benefits of recreation facilities by the travel cost that may take, there are still several issues that have been argued.

First is the problem of the allocation of joint costs, which exits both on the supply side and demand side. The supply side makes investments in durable equipment which is used in travel and recreation. And it's difficult to properly allocate the costs of owning and maintaining the equipment to any particular trip or destination. For the demand side, TCM considers the trip as a single destination. For the case of multiple purpose trip, or the trip that to visit not only one destination, it's necessary to allocate the cost they took appropriately but it's difficult not only because the information which is necessary is hard to collect but also the difficulty to clarify that what kind of particular purpose lead to the choice of the trip to particular destination be made.

Secondly, TCM aims to estimate the cost of the chosen alternative (destination), but it is lack of the explanation of the decision making process of how the consumer determine which alternative be chosen. Since TCM has no proper consideration of the reasons that the others won't be chosen, the use of the estimation outcome by

TCM is limited. Apparently, TCM is not a sufficient method to understand the choice behavior.

Thirdly, the conventional TCM calculate the travel cost on the concept of the distance from the home to the destination, and the cost that per mile takes is exogenously given. Which reveals that the TCM considers that the decision making process is affect by the cost that takes, and has ignored that there is some probability that the recreational site may influence the choice behavior of the residential location or the choice of transportation methods as well.

Last, the opportunity cost is counted in the cost of travel, but as mentioned above, the cost is unobservable, and the joint cost leave us several problem to deal with.

In conclusion, TCM stands a unique way to estimate the demand of culture property, but it's not a sufficient way to help us understand the reality at all. As a result, it's necessary to use another way to restructure the underlying preference of culture properties.

2.5 Demand Estimation for the Use-value of Art Museum

2.5.1 Discrete choice model

The discrete choice model is useful to understand the consumer preference toward particular products. The logit model is widely used. The general logit model is written as follows:

$$\begin{aligned}
U_{is} &= V_{is} + \epsilon_s \\
V_{is} &= X_i \beta_s \\
V_{is} &= Z_s \alpha \\
V_{is} &= X_i \beta_s + Z_s \alpha \\
P_{is}(x) &= \frac{\exp V_s}{\sum_t \exp V_t}
\end{aligned} \tag{2.1}$$

where

S_i : feasible or accessible states, which may vary from one i to another.

V_s : the deterministic part of the utility.

ϵ_s : the random part of the utility, which aims to capturing the uncertainty including the unobserved characteristics of the alternatives, or the uncertain behavior of individual.

X_i : the individual characteristics.

β_s : the estimated coefficients.

Z_s : the alternative characteristics.

α : the estimated coefficients, constant across alternatives.

P_{is} : the probability that s is chosen.

The utility is contributed to the deterministic part V_s and ϵ_s the random part of the utility. For the determine part, there are primary 3 types of methods. The multinomial logit model, when the researcher is not accessible to the characteristics of the alternatives, and the choice is supposed to depend on the individual characteristics. β_s is the estimated coefficient which is not constant within alternatives

indicates that there is a specific variable which holds with varying effects on the probabilities of different alternatives. And the conditional logit model, which is assumed that the choice depend on the alternative characteristics. α is constant across alternatives indicating that there is a specific variable has the same effects on the choice probabilities of different alternatives. The third is the combination of the multinominal logit model and the conditional logit model which is called the mixed logit model.

According to McFadden, the random utility of outcome s is described as (2). In this derivation the general logit model reflects the maximization of the utility U_s . With random utilities U_a and a feasible choice set S_i , utility maximization implies choice probabilities as follows:

$$P_s = Pr(U_s > U_t), \text{ for all } t \neq s \in S \quad (2.2)$$

P_s is determined by V_s and ϵ_s . According to Mcfadden that P_s has satisfied the general logit model, if the disturbances ϵ_s are independently and identically distributed according to a type I extreme value distribution of the standard form (Gumbel distribution).

$$P_s = Pr(U_s > \check{U}^s) \quad (2.3)$$

$$\check{U}^s = \text{Max}(U_t, \acute{S}) \quad (2.4)$$

$$\acute{S} = S - s \quad (2.5)$$

U_s must exceed $\check{U}^s$, and $\check{U}^s$ is the maximum utility of all other alternatives.

According to Mcfadden, the disturbances ϵ_s are independent and identically distributed according to the type I extreme value distribution in standard form.

$$F(x) = \exp[-\exp(-x)] \quad (2.6)$$

$$Fs1(x) = Pr(Us \leq x) = Pr[\epsilon s \leq (x - Vs)] \quad (2.7)$$

$$Fs1(x) = \exp[-\exp(Vs - x)] \quad (2.8)$$

$$Fs2(x) = \exp[-\exp(\check{V} - x)] \quad (2.9)$$

However, the IIA property of the general logit model has been criticized. We can check the IIA property from the ratio of any two probabilities:

$$R_i(s, t) = \log\left(\frac{P_{is}}{P_{it}}\right) = V_{is} - V_{it} \quad (2.10)$$

R_i depends exclusively on the characteristics of the two alternatives concerned, and it is independent of the character of all the other states that are considered at the same time. Consequently, the introduction of a new alternative, or a deletion of an existing alternative, will leave the ratio unchanged. This property of the general logit model is known as the independence of irrelevant alternatives. However, IIA property also leads to an inappropriate outcome when a relevant alternative is introduced to the market. When a new alternative is introduced, the original probability ratio remains unchanged, the new alternative will change the market share from other alternatives in the same proportion, in fact, the existing alternative which is most similar with the new one will suffer the most loss of share. The general logit model is lack of the ability to explain this kind of situation.

2.5.2 BLP approach

Berry(1994) proposed the discrete-choice models of product differentiation. In his study, demand is described by a discrete-choice model. And he classified the market into 2 side, the demand side and the supply side. For the demand side, price is

correlated with unobserved demand factors which is considered as the endogeneity problem of the price. For the supply side, the price are determined by the firms. Berry also proposed that the aggregate of demand result in the market share of the real market data, and invert the market share equation into the model. The utility function is defined as follows:

$$U_{ij} = X_j\beta_i - \alpha p_j + \xi_j + \epsilon_{ij} \quad (2.11)$$

where X_j is the characteristics of the product that affect the demand, β_i is parameter, and ϵ_{ij} is the unobserved consumer-specific taste parameters, α is the utility of price which is invariant for all consumer. And ξ_j is the mean of the consumers' valuation of the unobserved demand characteristics with ϵ_{ij} deals with the distribution of the mean of the consumers' valuation of the unobserved demand characteristics. The utility depends on the characteristics of the product, consumer preferences. The taste parameter is defined as follow:

$$\beta_{ik} = \beta_k + \sigma_k \xi_{ik} \quad (2.12)$$

where β_k is the mean level of the taste parameter for product k , the ξ_{ik} is the distribution which follows the identically and independently distributed standard normal distribution.

$$U_{ij} = X_j\beta_i - \alpha p_j + v_{ij} \quad (2.13)$$

with

$$v_{ij} = [\sum x_{jk} \sigma_k \xi_{ik}] + \epsilon_{ij} \quad (2.14)$$

where v_{ij} deals with the error which is resulted in the effects of the random taste parameters. The mean utility level of product j is defined as follow:

$$\delta_j \equiv X_j\beta_i - \alpha p_j + \xi_j \quad (2.15)$$

The general logit model assumes that the utility depends on the attribute of the product and the characteristics of the individual, while the BLP approach proposed that the utility depends on the attribute of the product and the preference of the consumer, which means it may not include the character of individual like sex, income, education level. And BLP approach uses the actual market share data as the outcome of the aggregate of the demand. Also, he took the concern of the endogeneity problem which logit model does not capture it. Furthermore, the way to deal with the variation in consumer tastes is also different between logit model and BLP approach. Logit model captures the random part only by adding the ϵ and Mcfadden assumes that ϵ 's distribution follows the identically and independently of the normal distribution which results in the error of the competition of the appearing of the similar products in the market. Thus, for Berry's method, he added several parameter to deal with the unobserved characteristics and the unobserved consumer's taste, which is much more closed to the reality of the limitation of the researcher of the difficulties to capture the consumer's taste.

There are large amount of papers discuss about the BLP approach. According to Kenneth E. Train, the BLP approach is described as follows:

The utility consumer obtains from product is described as follows:

$$U_{njm} = V(p_{jm}, x_{jm}, s_n, \beta_n) + \xi_{jm} + \epsilon_{njm} \quad (2.16)$$

where s_n is the characteristics of customer, $V(p_{jm}, x_{jm}, s_n, \beta_n)$ is the function of observed variables. The most important part of the utility function is ξ_{jm} , which

is same for the all consumers, and represents the average, common utility that consumers obtain from the unobserved attribute from products. The endogeneity of price is considered in this utility function. The price depends on ξ_{jm} .

The utility function can also describes as follows:

$$U_{njm} = [\bar{V}(p_{jm}, x_{jm}, \bar{\beta}_n) + \xi_{jm}] + \tilde{V}(p_{jm}, x_{jm}, s_n, \tilde{\beta}_n) + \epsilon_{njm} \quad (2.17)$$

$\bar{V}$ is the part that varies over products but the same for customers, it is constant to all the consumers. The utility from observed attributes is captured by $\tilde{V}$, $\tilde{V}$ is the part that varies over consumers, and products.

Both $\bar{V}$ and ξ_{jm} are constant within consumers, and the following function is considered as the mean utility level of product :

$$\delta_{jm} = \bar{V}(p_{jm}, x_{jm}, \bar{\beta}_n) + \xi_{jm} \quad (2.18)$$

As a result, the utility is described as :

$$U_{njm} = \delta_{jm} + \tilde{V}(p_{jm}, x_{jm}, s_n, \tilde{\beta}_n) + \epsilon_{njm} \quad (2.19)$$

which is the same with equation(27).

In conclusion, the BLP approach estimate the choice behavior of consumer considering about the characteristics of products and the aggregate share of the product as the result of the consumer choice. The differences of individual like sex, income or other individual characteristics are not including in the model. In addition, the BLP approach deals with the price endogeneity problem in their study.

According to the literature review, there are several methods to estimate the non-use value of art museum, including travel cost method, contingent valuation method. These methods are capable of evaluating the non-use value of art museum which is seems to be difficult to measure in the quantity number. However, in this study, we solely use the macro data like the visitor number of each art museum. In addition, the individual data like the travel time, income or some other individual characteristics which is necessary for the travel cost method or contingent valuation method are not available. Basically, the questionnaire survey will be performed if the travel cost method or contingent valuation method are going to be carried out. As a result, the methods that are required for the individual data are not suitable for us. We apply the discrete choice model for the analysis of the use value of art museum, the non-use value estimation is not included in this study. Based on the estimation of use value of art museum, it is possible for us to clarify the consumer preference toward art museum.

Chapter 3

The Choice Model of Cultural-and-Leisure Service

3.1 Precondition

For the analysis, we focus on one particular target area, and select n major art museums located in the target area. Then we define the market area by considering about the necessary time that the household has to spend to go to art museums from their residence. Households those who can visit all of the art museums less than a fixed period of time by public transportation are included in the sampling for estimation. Household included in the sampling of estimation may take the art museums we selected into account when they try to decide how to spend their recreational expense. We assume that all visitors of the art museums are the households included in the sampling of estimation. The partial amount of household income is spent on the consumption of recreational service. The household chooses to spend their income to visit the n major art museums listed in the analysis, or chooses to visit none of them but spends their income on other leisure services. In the analysis, we consider solely the proportion of the household expenditure on the art museums to the household recreational expenditure.

3.2 Utility of Consumer

The study applies the BLP approach to estimate the demand of the art museum. consumer $i = (1, \dots, n)$ chooses an art museum s to visit from a set of alternatives $s \in S = (1, \dots, m)$, the leisure facility chosen by consumer i is s_i , and the utility of consumer i from visiting s is U_s . Consumer i chooses the leisure facility which holds the highest utility at the time.

The probability of choosing the leisure facility s is

$$P_s = PU_s > U_t, t \in S \quad (3.1)$$

That is, the probability of choosing s is same with the probability the utility of consumer i getting from s is larger than t at this moment.

Consumer i 's utility on the museum s is $U_{i,s}$ can be described with the equation 3.2.

$$U_{is} = X_s \beta_i - \alpha p_s + \xi_s + \epsilon_{is} \quad (3.2)$$

where X_s refers to observable characteristics of the museum s . β_i refers to individual i ' specific taste parameters on museum s . α is parameters on the marginal utility of price of museum s , which is invariant for all consumer. ξ_s refers to the consumers' valuation of the unobservable demand characteristics which deals with the intrinsic value of the art museum s and the $\epsilon_{i,s}$ refers to residual variance, which here deals with the distribution of the mean of the consumers' valuation of the unobserved demand characteristics.

The utility depends on the characteristics of the product, consumer preferences and. The taste parameter is defined as follow:

$$\beta_{ik} = \beta_k + \sigma_k \xi_{ik} \quad (3.3)$$

where β_k is the mean level of the taste parameter for characteristics k , σ_k is the parameter that determine the size of the distribution of k . the ξ_{ik} is the distribution which follows the identically and independently distributed standard normal distribution with the mean-zero.

$$U_{is} = X_s \beta - \alpha p_s + \nu_{is} \quad (3.4)$$

$$\nu_{is} = [\sum x_{sk} \sigma_k \xi_{sk}] + \epsilon_{is} \quad (3.5)$$

where ν_{is} deals with the error which is resulted in the effects of the random taste parameters. The mean utility level of product j is defined as follow:

$$\delta_s \equiv x_s \beta - \alpha p_s + \xi_s \quad (3.6)$$

As a result, the utility is described as

$$U_{is} = \delta_s + \nu_{is} \quad (3.7)$$

3.3 The Endogeneity Problem

The discrete choice model which is generally used assumed that the explanatory variables are independent of the unobserved parts of the alternatives. However, in BLP approach the explanatory variables are considered as endogenous, which

means that, the explanatory variables are not independent of the unobserved parts of the alternatives.

Art museum's value to a consumers can divide into 2 types. The first is the intrinsic value we have mentioned in previous parts, including option value, existence value, bequest value, prestige value, and education value. No matter the consumer has indeed visited the alternative or not, the intrinsic value contributes to the utility of the customer. However, although the intrinsic value contributes to the utility of the customer, it's unobservable to the researchers. As a result, we're going to put the intrinsic value into the unobservable part of the alternatives. The intrinsic value has effect on the explanatory variables. For instance, the prestige value or the education value of the museum, which is unobservable to the researcher and we put into the unobservable parts of the models. But in fact, the prestige value of the education value of the museum has an effect on the price of the museum. Which means, the prestige value and or the education value of the museum are correlated to the price. This situation indicates that price is endogenous.

The second part is the use value, which the consumers gained the utility from the experience of the visiting to the museum. Accordingly, we use the attribute of the museum's amenity to estimate this kind of utility. The attributes like the number of the collection, the admission fee, which compare to intrinsic value it's easier to observe for the researcher. However, there are parts of the amenity that we cannot observe but still have an influence on the utility. For the art museum, we can take the quality of exhibition, or the distinguishing features of the architecture itself as examples. These kinds of characteristics are vital but unobservable to the researchers. Furthermore, it's possible that they have influence on the explanatory variables like price as well.

It's also important to take the marketing activities into account when we estimate the utility of the alternatives. The marketing activities divide into 2 types.

The first type is the marketing activities like coupons, which have an direct effect on the price. This type of marketing activities are observable to the researcher. However, the second type of the marketing activities are those which have no direct relationship with price but indeed affect the price. If the operator raises promotion activities to promote and provide some discounts at the same time, the marketing activity has a negative correlation with price. If the operator holds an educational activity, the operator has to afford additional cost for the activity and may has to raise the price. In this situation, the marketing activity has an positive correlation with price. However, the non-price marketing activities are unobservable to the researcher but are not independent of the price. Accordingly, to have an appropriate estimation of the choice behavior of the consumer ,it's necessary to consider about the endogeneity problem of price.

3.4 Market Share Function

Each consumer chooses to visit the alternative that he can obtain the highest utility.

$$U(x_j, \xi_j, p_j, v_i, \theta_d) > U(x_k, \xi_k, p_k, v_i, \theta_d) \quad (3.8)$$

$$A_j(\delta) = \{v_i | \delta_j + v_{ij} > \delta_k + v_{ik}, \forall k \neq j\} \quad (3.9)$$

The consumer will choose the alternative j to visit since he can obtain the highest utility. As a result, the market share of j , is the probability that v_i falls into the region A_j . The market share function is described as follow :

$$d_j(\delta(x, p, \xi), x, \theta) = \int_{A_j(\delta)} f(v, x, \sigma_v) dv \quad (3.10)$$

The BLP approach estimates not only demand side, but also supply side in the market. Until now, we have conducted the demand side. The consumer chooses the

alternative to visit that he can obtain the highest utility. The result of the utility maximization behavior leads to the market share of the alternative.

The market share is the result of the consumer's behavior and also the firm's behavior. It's the key point of the BLP approach which connects the demand side and supply side of the market.

3.5 Market Size and the Outside Good

The market share of the alternative is described as:

$$q_j = Md_j(x, \xi, p, \theta_d) \quad (3.11)$$

However, we should consider about the outside good, which means that the consumer may choose to visit the alternative that we didn't put into the alternatives or choose not to visit any alternatives. If the outside good is not included into consideration, the consumers are forced to choose one alternative to visit. Therefore, the existence of the outside good also indicates that the aggregate market share of the alternatives is not equal to the market size. This situation points out that there is a necessity to estimate the market size as well. However, the BLP approach assumed that the market size is observed.

In this study, we define the market as the cultural-and-leisure market. The alternatives we considered in the model are the 7 major art museums in Kinki area. The choices that the consumer may make including visiting one of the alternatives or choosing to visit none of them.

3.6 The Supply Side

The firms are assumed to be price setters. Profit for firm is described as :

$$\pi_j(p, z, \xi, \omega_j, \theta) = p_j Md_j(x, \xi, p, \theta_d) - C_j(q_j, w_j, \omega_j, \gamma) \quad (3.12)$$

Assuming the existence of a pure-strategy interior equilibrium, the price vector satisfies the usual first-order conditions.

$$p_j = c_j + d_j / \frac{\partial d_j}{\partial p_j} \quad (3.13)$$

3.7 Estimation

As the model setting, the observed market share s_j is equal to the market share derived by the market share function S_s ,

$$s_j = S_j(\mathbf{x}, \mathbf{p}, \xi, \theta) \quad (3.14)$$

And we assume that the distribution of v_i is known. The market share only depends on the mean utility level. (refer to equation 33)

$$\mathbf{s}_j = S_j(\delta) \quad (3.15)$$

The previous equation can be inverted as

$$\delta = S_j^{-1}(\mathbf{s}) \quad (3.16)$$

which indicates that with the assumption of the distribution of v_i , the observed share market data determines the mean utility level of the good.

$$\delta_j(\mathbf{s}) = x_j \beta - \alpha p_j + \xi_j \quad (3.17)$$

The logit model: The utility function is described as

$$u_{ij} = x_j \tilde{\beta} - \alpha p_j + \xi_j + \varepsilon_{ij} \quad (3.18)$$

Assume that ε_{ij} is identically and independently distributed across products and consumers with extreme value distribution function $\exp(-\exp(-\varepsilon))$ and $\tilde{\beta} = \beta$.

The market share function is derived as :

$$S_j(\delta) = \frac{e^{\delta_j}}{\sum_{k=0}^N e^{\delta_k}} \quad (3.19)$$

Assume that the mean utility of outside good is zero(δ_0), with the previous equation we can have the next equation to estimate the mean utility.

$$\ln(s_j) - \ln(s_0) = \delta_j \equiv x_j - \alpha p_j + \xi_j \quad (3.20)$$

However, it's necessary to deal with the endogeneity problem of price to make a meaningful estimation. Here, we adopt the instrumental variables technique to deal with the endogeneity problem.

3.8 Instrumental Variable Technique

The instrumental variables techniques are widely used to deal with the endogeneity problem. The instrumental variable is necessary to satisfy these two conditions.

- Instrument relevance ($\text{cov}(Z, X) \neq 0$): the instrumental variable is correlated with explanatory variable
- Instrument exogeneity ($\text{cov}(Z, \epsilon) = 0$) : the instrumental variable is uncorrelated with ϵ .

It's very important to find a suitable instrumental variable for the estimation. For the homogeneous goods market, it is suggested to use the variable of prices, like the cost variable. Which is not included in the model but have relation with the

explanatory variables, and is uncorrelated with ϵ . In the case of the model which deals with the product differentiation market, and the explanatory variables are exogenous, the characteristics of other products are also possible to be used as the instrumental variables.

$$\delta_j = x_j\beta - \alpha p_j + \xi_j \quad (3.21)$$

Take the ξ as an unobserved error term and estimate α and β by running an instrumental variables regression of δ_j . In this study, p_j is considered to be endogenous because of the unobserved parts of the product which lead to the correlation between p_j and ξ_j .

In the IV regression models, there are 4 variables.

- explained variable : calculate from the market share data (Y_j)
- endogenous explanatory variable : price (p_i)
- exogenous explanatory variable : other explanatory variables(x_j)
- instrumental variable : Z_j

The most widely used technique to apply instrumental variable technique is Two-Stage Least Squares. The 2sls is used when the variable is correlated with the error term, which causes the endogeneity problem. The assumption of ordinary least square is that the error term is independent of the variable. When this assumption is not suitable, it is necessary to apply two-stage least squares. The assumption of the two-stage least squares is that there is a secondary predictor correlated with the endogenous variable but not correlated with the error term. This is considered as the contribution of instrumental variable. Considering the equation,

$$Y_i = \alpha + \beta X_i + u_j \quad (3.22)$$

X_i is considered as endogenous and correlated with the error term u_j . Then X_i is described as

$$X_i = \gamma + \delta Z_i + \nu_i \quad (3.23)$$

where γ and δ are the estimate by applying Z_i , ν_i is the part that is considered to be correlated with the error term, and the Z_i is independent of it. The estimate of γ and δ is,

$$\hat{\gamma} = \bar{X} - \hat{\delta} \bar{Z} \quad (3.24)$$

$$\hat{\delta} = \frac{(Z_i - \bar{Z})(X_i - \bar{X})}{\sum (Z_i - \bar{Z})^2} \quad (3.25)$$

Then, X_i is described as :

$$\hat{X}_i = \hat{\gamma} + \hat{\delta} Z_i \quad (3.26)$$

The instrument satisfied two conditions, which is the instrument must be independent of the error term, and the instrument must be correlated with the endogenous variable. As a result, the estimator get from the using of instrument is consider to be independent of the effect of the error term and thus to solve the possible inaccuracy caused by the endogeneity problem.

$$\hat{\beta}_{2sls} = \frac{\sum(\hat{X}_i - \bar{X})(\hat{Y}_i - \bar{Y})}{\sum(\hat{X}_i - \bar{X})^2} \quad (3.27)$$

The equation shows the result of estimation parameter by two-stage least squares. There are two steps for using two-stage least squares estimation for instrumental variable technique. First is to run the regression of explanatory variable X_i and Z_i to get $\hat{X}_i$, and then to use $\hat{X}_i$ and instruments to run the regression and get the estimation result.

Chapter 4

Empirical Analysis

4.1 Market Area

We set the target area as Kinki area in the analysis, and we choose several major art museums located in the target area. Then, we defined the market area by considering the necessary time that the consumer has to spend to go to the art museums from their residence. We referred to the area of the person trip survey, which is conducted by the Japan Government to investigate the transportation behavior in Kinki area. However, not the whole Kinki area is conducted. The area conducted includes the major urban area in Kinki area including Kyoto Prefecture, Osaka Prefecture, Kobe Prefecture and the peripheral cities including Otsu city, Nara city, Wakayama city. Moreover the cities that over 5 percent of the commuters commute to the major urban area and the peripheral cities within one day commuting distance are included in the survey.

In this study, we refer to the zones which is included in the person trip survey, and choose one primary station for each zone considered as the most frequently used transportation hub by the residents in the zone. After we decided the station, we calculated the time that is necessary from the station to the each art museum. The zone which spent less than 2 hours to all the art museums is considered as the market area in the study.

Table 4.1: Zones included in the Market Area-1

Area	Station
311 京都市北部	出町柳
312 京都市都心部	京都駅
313 京都市東部	山科駅
314 京都市南部	伏見駅
315 京都市西部	桂駅
211 亀岡市他	亀岡
221 向日市・長岡京市他	長岡京駅
222 宇治市	宇治
223 八幡市他	八幡市
224 城陽市他	城陽
225 精華町他	祝園駅
111 大津市・志賀町	大津
112 草津市・守山市他	草津
121 近江八幡市他	近江八幡
411 箕面市他	箕面
412 池田市	池田
413 豊中市	豊中
414 吹田市・摂津市	吹田
415 茨木市	茨木
416 高槻市・島本町	高槻
421 枚方市・交野市	枚方
422 寝屋川市	寝屋川市
423 門真市・守口市	門真市
424 四條畷市・大東市	四條畷
425 東大阪市	布施
426 八尾市・柏原市	八尾駅
431 松原市・美原町	河内松原駅
432 藤井寺市・羽曳野市	藤井寺駅
433 大阪狭山・富田林他	金剛駅
434 河内長野市	河内長野駅
441 堺市	堺東駅
442 和泉市	和泉府中駅
443 高石市・泉大津市他	高石駅
444 岸和田市・貝塚市	岸和田駅
445 泉佐野市他	泉佐野駅
446 泉南市・阪南市他	和泉砂川

Table 4.2: Zones included in the Market Area-2

Area	Station
511 大阪市都心 2 区	難波駅
512 大阪市準都心	天王寺駅
513 大阪市西部	弁天町駅
514 大阪市北部	淀川
515 大阪市東北部	京橋駅
516 大阪市東部	今里駅
517 大阪市東南部	平野駅
518 大阪市南部	阿倍野駅
611 尼崎市	尼崎駅
612 西宮市・芦屋市	西宮駅
621 伊丹市・宝塚市	宝塚
622 川西市他	川西池田
623 三田市	三田
633 明石市	明石
634 加古川市・高砂市他	加古川
711 神戸市東部	灘
712 神戸市都心部	三ノ宮
713 神戸市西部	須磨駅
715 北神	道場駅
811 奈良市・生駒市	奈良
812 天理市・大和郡山市	天理
813 王寺町他	王寺駅
821 大和高田市御所市他	大和高田
822 橿原市他	大和八木駅
823 桜井市他	桜井

4.2 Data

To estimate the model, it's necessary to collect the data to calculate the market share and the data that is considered to be capable of describing the characteristics of the museum.

For the data to calculate the market share, we use the data of the visitor number of each art museum from 2005 to 2009. And the admission fee of the art museum, including the admission fee for the permanent collection and the exhibition. Fur-

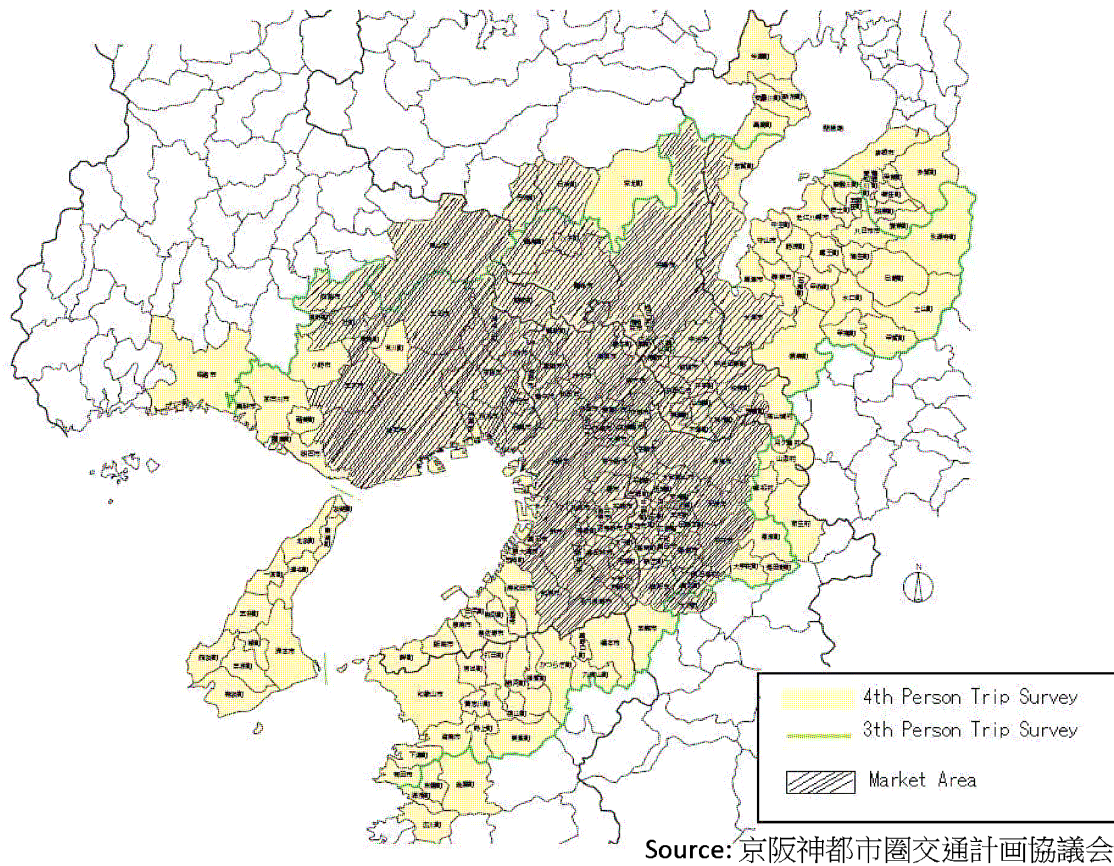


Figure 4.1: Market Area

thermore, it's necessary to consider about the pay rate. The elderly people over 65 years old who lived in Osaka city will not be charged for the admission fee. However, due to the reason that we don't have the data of the number of elderly people who visited to the art museum, we ignore this part in the analysis.

To calculate the market share, we consider the household expenditure in the market area spent on the recreational service each year. We use the data from the Family Income and Expenditure Survey from 2005 to 2009. There are several types of recreational service in the family income and expenditure survey, and the data fit the research most is classified into the category called the other recreational service.



Figure 4.2: The Location of the Art Museum

It contains the expenditure on recreational service and excludes the expenditure on accommodation charges, package tour, or the monthly fee for educational service like cram school. The expenditure on admission fee for cultural facilities, sports game, movie, theme park, monthly fee for television channels are classified into this category.

However, the data from the family income and expenditure survey is the average monthly expenditure per household, it's necessary to collect the data of the household number in the market area. The data available for us is the household number for Kinki area including Siga prefecture, Kyoto Prefecture, Osaka Prefecture, Hyogo Prefecture, Nara Prefecture, Wakayama Prefecture from 2005 to

Table 4.3: Art Museum and The Nearest Station

Art museum	Station
大阪市立美術館	天王寺駅
大阪市立東洋陶磁美術館	なにわ橋
国立国際美術館	渡辺橋駅
京都国立近代美術館	東山
京都市美術館	東山
兵庫県立美術館	灘
神戸市立博物館	三宮

Table 4.4: Basic Information of Market Area

Year	Household Number	Population
2005	6498052	15555500
2006	6532781	15631989
2007	6633098	15641401
2008	6708814	15653808
2009	6789528	15671565

2009.

$$s_j = \frac{M^{A_j}}{M^R} \quad (4.1)$$

$$M^R = N^H \times E \times 12 \quad (4.2)$$

$$M^{A_j} = N^{V_P} \times R_P \times p_p + N^{V_S} \times R_S \times p_s \quad (4.3)$$

where s_j is the market share of art museum j , M^R represents the market size. N^H is the household number. E is the monthly expenditure on recreational service per household. M^{A_j} is the revenue of the art museum j , N^{V_P} is the number of

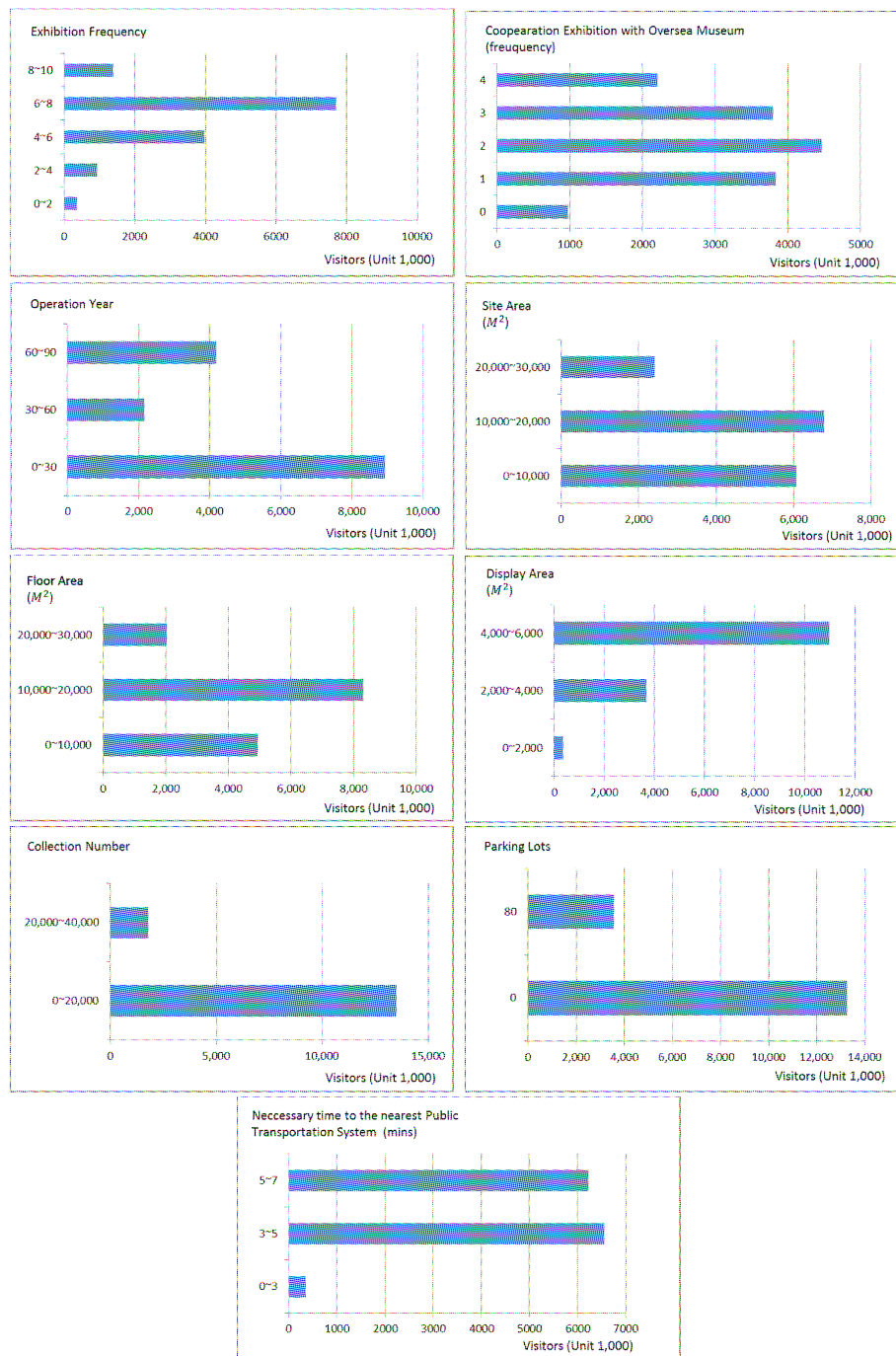


Figure 4.3: The Characteristics of the Art Museum

visitors of the permanent collection, R_P is the pay rate of permanent collection, p_p is the admission fee of permanent collection. N^{Vs} represents the visitor number of the exhibition, R_S is the pay rate of the exhibition, p_s is the admission fee of the exhibition.

Table 4.5: Collection Visitor Number

Art Museum	2005	2006	2007	2008	2009
大阪市立美術館	8000	8000	15000	20000	14000
大阪市立東洋陶磁美術館	23000	42000	0	30000	36000
国立国際美術館	687000	189000	246000	261000	16000
京都国立近代美術館	121000	274000	67000	265000	122000
京都市美術館	58000	45000	36000	54000	57000
兵庫県立美術館	74000	60000	77000	57000	83000
神戸市立博物館	0	0	0	0	0

Table 4.6: Exhibition Visitor Number

Art Museum	2005	2006	2007	2008	2009
大阪市立美術館	321000	466000	323000	325000	263000
大阪市立東洋陶磁美術館	62000	37000	62000	43000	18000
国立国際美術館	1102000	326000	498000	470000	959000
京都国立近代美術館	163000	450000	158000	366000	176000
京都市美術館	526000	334000	485000	157000	669000
兵庫県立美術館	407000	137000	313000	206000	623000
神戸市立博物館	318000	488000	485000	391000	117000

We set several variables to describe the characteristics of the art museum, including the operation year, we assume that the history of the art museum contribute to enforce the willingness for the visitors to visit the museum. The size of the art museum, including site area, floor area, display area, since the art museum provides the space for the visitors to enjoy the art, the environmental factors are necessary to describe the feature of the art museum. The permanent collection number that the art museum holds are set as the explanatory variable as well, although the quality

of the art takes an important role contributing to the attraction of the art museum, it's difficult for us to evaluate the quality of the pieces. For the traffic condition, we use the variable of the parking lots, and the necessary time the visitor took from the art museum to the nearest public transportation system by walk. Furthermore, it's expectable that the exhibition also attracts the visitors, not only the visitors come to the art museum for the first time, but also the repeat visitors. We collected the frequency of the exhibition of each art museum from 2005 to 2009. And also we collected the frequency of the art museum's cooperation exhibition with oversea museum from 2005 to 2009. For the surrounding environment of the art museum, we check whether there is other art museum in 500 meters.

Table 4.7: Explanatory Variable and Setting

Explanatory variable	Setting
Operation year	over70=1 otherwise=0
Site Area	over10000=1 otherwise=0
Floor Area	over 10000=1 otherwise= 0
Display Area	over4000=1 otherwise=0
Collection Number	over10000=1 otherwise=0
Parking Lots	if there is =1 otherwise= 0
Necessary Time to the Nearest Public Transportation System(mins)	over6=1 otherwise = 0
Other art museum within 500 meters	actual number
Exhibition	frequency
Coopeartion Exhibition with Oversea Museum	if there is =1 otherwise=0

4.3 Endogeneity Test

In the BLP approach, the price is considered as endogeneous. In this study, we apply BLP approach to estimate the demand of art museum. We have to test whether the price is endogenous or not to determine if it is necessary to use the

Table 4.8: Frequency of Exhibition

Art Museum	2005	2006	2007	2008	2009
大阪市立美術館	6	5	6	5	6
大阪市立東洋陶磁美術館	1	1	1	1	1
国立国際美術館	7	7	7	6	6
京都国立近代美術館	7	7	10	8	7
京都市美術館	5	6	8	5	4
兵庫県立美術館	5	5	5	4	6
神戸市立博物館	3	2	4	4	2

Table 4.9: Cooperation Exhibition with Oversea Musuem

Art Museum	2005	2006	2007	2008	2009
大阪市立美術館	2	1	3	0	0
大阪市立東洋陶磁美術館	0	0	0	0	0
国立国際美術館	4	3	3	3	1
京都国立近代美術館	3	2	4	2	2
京都市美術館	1	2	2	1	1
兵庫県立美術館	3	4	2	1	3
神戸市立博物館	2	1	2	2	1

Table 4.10: Price of Exhibition

Art Museum	2005	2006	2007	2008	2009
大阪市立美術館	1133	1060	933	1083	1200
大阪市立東洋陶磁美術館	800	800	800	800	800
国立国際美術館	942	678	952	845	881
京都国立近代美術館	800	1072	918	946	986
京都市美術館	1000	1050	857	1025	866
兵庫県立美術館	1314	1225	1200	1175	1283
神戸市立博物館	933	1400	1100	1150	1250

Instrumental Variable Technique to estimate the model.

We use the variable of the collection number as an instrumental variable, and perform the IV technique. First, it's necessary to check if the instrumental variable is correlated with the endogenous variable. We set the price as the explained

Table 4.11: The Characteristics of Art Museum-1

Art Museum	Operation Year	Site Area	Floor Area	Display Area
大阪市立美術館	1936	4237	17611	4070
大阪市立東洋陶磁美術館	1982	3092	3922	1088
国立国際美術館	2004	16085	13487	4064
京都国立近代美術館	1962	5001	9762	2285
京都市美術館	1933	24331	9349	5039
兵庫県立美術館	2002	19000	27461	4985
神戸市立博物館	1982	3053	10073	3124

Table 4.12: The Characteristics of Art Museum-2

Art Museum	Parking Lots	Time to the Public Transportation System
大阪市立美術館	0	7
大阪市立東洋陶磁美術館	0	0
国立国際美術館	0	5
京都国立近代美術館	0	1
京都市美術館	0	7
兵庫県立美術館	80	7
神戸市立博物館	0	5

Table 4.13: The Characteristics of Art Museum-3

Art Museum	Collection Number	Other Museum With 500 Meters
大阪市立美術館	7778	0
大阪市立東洋陶磁美術館	4056	0
国立国際美術館	5966	0
京都国立近代美術館	4600	1
京都市美術館	1129	1
兵庫県立美術館	8300	0
神戸市立博物館	40000	0

variable, and collection number as the explanatory variable to check if they are correlated with each other. We got t-value of 2.296, and have proved that the collection

Table 4.14: Google Hit number

Art Museum	2005	2006	2007	2008	2009
大阪市立美術館	13200	26400	29000	36800	62500
大阪市立東洋陶磁美術館	380	828	10800	12600	18300
国立国際美術館	23500	33100	44200	61300	102000
京都国立近代美術館	24100	43700	50300	70000	82200
京都市美術館	31800	51300	61600	76700	115000
兵庫県立美術館	18200	28600	34600	49300	86100
神戸市立博物館	14100	21500	25700	34000	53100

number is a suitable instrument for price. Then, we perform the IV technique by using two-stage least square.

Table 4.15: Result of OLS

Explanatory Variable	Estimate	t value	Pr(> t)
Operation Year	0.6184	2.617	0.013957
Exhibition Frequency	0.2195	3.654	0.001016
Cooperation Exhibition with Oversea Museum	0.8594	2.911	0.006860
Necessary time to the nearest public transportation system	-0.8191	-2.987	0.005686
Admission fee(exhibition)	0.0022	3.723	0.000844

Table 4.16: Result of IV

Explanatory Variable	Estimate	t value	Pr(> t)
Operation year	0.5414	2.0757	0.0469
Exhibition Frequency	0.1652	2.1548	0.0039
Cooperation Exhibition with overseas museum	1.1057	2.9100	0.0069
Necessary time to the nearest public transportation system	-0.57598	-1.5995	0.1206
Admission fee(exhibition)	0.0010	0.8379	0.4089

The result we got from IV and OLS didn't differ with each other much. Then, we perform the Hausman Test to compare the 2 methods, OLS and IV technique.

The null hypothesis is that the all exogeneous variables are uncorrelated with the unobserved parts.

$$HausmanStatics = (\beta_i - \beta_o)'(Var\beta_i - Var\beta_o)^{-1}(\beta_i - \beta_o) \quad (4.4)$$

where β_i is the coefficient measured by IV technique, and β_o is the coefficient measured by OLS.

We got a p-value of 0.97, which is not significant to deny the null hypothesis, which means that the variable is exogenous. The price endogeneity problem didn't exist in this study. Although the BLP approach suggests the instrumental variable technique in the study, however, the endogeneity doesn't exist in this study. As a result, we apply OLS estimation in this study.

4.4 Result

In the estimation, we use operation year, frequency of the exhibition, cooperation exhibition with over sea museum, and necessary time to the nearest public transportation by walk. The admission fee we used is the general admission fee for the exhibition, which means we didn't consider about the price variety for elderly people or the student and children. Even though, the price for the permanent collection and exhibition are quite different, since more than half of the visitors came to the art museum for the exhibition, we didn't use the admission fee for the permanent collection for the analysis.

The result shows that the visitors tend to visit the art museum which is older and has longer history, indicates that the visitor visited the art museum not only for the collection or exhibition, but also the historical experience. We set this explanatory as dummy variable, the operation over 70 years are set as 1. However, the operation year of the art museum cannot represents the history of the collection, as a result,

this result is not capable of describing the tendency of art within the visitors.

The explanatory variable the necessary time to walk from the art museum to the nearest public transportation shows that the visitors prefer the art museum which is not far away from the public transportation system. The accessibility of the art museum is taken into account for the visitor to decide whether to visit an art museum or not.

The next variable is the frequency of the exhibition the art museum held. Based on the result, we could easily find that the art museum held more exhibitions are popular than others. Furthermore, the next explanatory variable is the frequency of the cooperation exhibition with overseas museum. For instance, the museum in France or Italy, which are famous not only in Europe but also in Japan, this kind of exhibitions attracted lots of visitors and is proved by the analysis.

The price variable we used the admission fee for the exhibition. However, the result shows that even the price are higher, the visitor still prefer to visit the art museum if the exhibition attract him.

However, in this study, we apply the data of the visitor number of each museum, and the data of the household expenditure and household number of the zones we defined as the market area. To estimate the model, we combined two data to calculate the market share of the art museum. However, the result we got from this sampling process may lead to the inaccuracy estimation of the model. Several studies including Cosslett(1981), and Charles F. Manski and Steven R. Lerman (1977) have proposed the necessity of considering about the possible inaccuracy of the estimation caused by the choice-based sampling process. It is more persuasive if the estimation considering about the choice-based sampling problem.

Chapter 5

Conclusion

In this study, we apply the BLP approach to estimate the demand of the art museum in the cultural-and-leisure market. From the literature review, it is obvious that the competitor of the art museum includes not only the museum but also other leisure services. As a result, we consider about the household expenditure on recreational service and their expense on the art museums we selected in the analysis. We set the target area as Kinki area, and selected several major art museums located in the market area. Furthermore, we defined the market area based on the person trip survey. Households those who can visit all of the art museums less than a fixed period of time by public transportation are included in the sampling for estimation. We assume that all visitors of the art museums are the households included in the sampling of estimation. However, this assumption may lead to the possible inaccuracy of the estimation since we arbitrary calculated the market share based on the market area we defined. For a more accurate estimation, we should take the sampling problem into account as well. The result of the estimation shows that the art museum which holds the exhibition with higher frequency attracts the visitors. Furthermore, the cooperation exhibition with oversea museum is attractive to visitors. The transportation condition is also taken into account when the visitors make their decision whether to visit the art museum or not, the art museum which is convenient to the public transportation system is preferred. The BLP approach

deals with the price endogeneity problem in their method, but in the case of art museum the price endogeneity problem didn't exist. Furthermore, even the price is higher the visitors still tend to visit the art museum if the exhibition seems interesting to them. Based on this study, we clarified the consumer preference toward art museum.

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Acknowledgements

This study was carried out at Kobayashi Laboratory, Graduate School of Engineering, Kyoto University. I would like to thank Professor Kiyoshi Kobayashi, for his supervision of my study and gave me the the chance to study at Kyoto University, Kobayashi Laboratory. I would like to thank Associate Professor Kabuya Matsushima for his careful instruction and advices toward my study, and gave me great patience to support me, and took lots of time to teach me and discuss with me every week. I would like to thank Assistant Professor Masamitsu Onishi for his helpful guidance toward my study. I would like to thank Assistant Professor Mamoru Yoshida for his help and advice toward my study. I would like to thank Dr. Hayeong Jeong for her help and suggestion to my study and mental support in many aspects. I also have to thank for other lab members for encouraging me during the period of writing dissertation. Furthermore, I would like to thank for Osaka Municipality for supplying the essential data for the study. Finally, I wish to thank my family for their strong support of my study in Japan.