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THE IMPACT OF LOCAL GOVERNMENT CULTURAL POLICIES ON THE SALES OF TICKETS FOR PRIVATE MUSIC CONCERTS IN JAPAN

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Abstract: This paper attempts to examine the effect of public cultural policy on the sales of tickets for private music concerts in Japan. In particular, it focuses on how the introduction of the Designated Manager System (DMS) in 2006 influenced the sales of tickets for private music concerts. The hypothesis that both local governments' cultural investments and the DMS have increased the sales of tickets for private music concerts is examined. Data from the Private Music Live Entertainment 2000–2008 is used to investigate the factors which influence on the sales of tickets for private music concerts. The results support the non-crowdingout hypothesis.

Key words: crowding in, crowding out, demand, music concerts, privatization.

JEL Classification Number: H32, H41, H42.

1. INTRODUCTION

As a result of the cultural policy in the 1990s, over 2200 public halls have been constructed all over in Japan and the huge cost of maintaining these halls have become a heavy burden for local governments. The 1990s' cultural policy which invested in cultural facilities fairly all over Japan has been reexamined since the promulgation of a law for promoting art and culture (*Bunka Geijutsu Shinkou Hou*) in 2001. Recently, in Japan, a movement to enact a law for public halls (*Gekijo Hou*) has gained momentum. Based on these recent circumstances, it has been argued that public hall hubs should be established in Japan and public investments be made in them. In order to address this issue, it is necessary to assess the effect of the recent public investments in public halls.

Both the effectiveness of investments in public halls and the appropriate roles of the public sector and private sector have become recent policy issues. In 2006, the Designated Manager System (DMS) was introduced to public halls as a part of the *Koizumi* Government's structural reforms. Generally, it was considered that there was a

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lot of wasteful expenditure associated with Japanese public halls, so it was rather natural that the DMS was applied to public halls. One of the main purposes of the DMS was to reduce the public sector's role so the private sector could play a greater role. Around the time of the introduction of the DMS, the privatization of the managers of public halls also became an issue, and the appropriate roles of the public sector and private sector and the interactions between them were discussed intensively.

However, there are very few studies measuring the effect of these public policies in Japan. This paper aims to examine the impact of the local governments' cultural policy related to public halls on the private sector especially the consumption of live private music entertainment. According to the *PIA* Institute, live music entertainment refers to all music concerts except drama or musicals, for example, popular music (excluding musicals), classical music, *enka* ballads, and jazz are all treated as music concerts. To be concrete, this paper examines the impact and crowding-out effects of the DMS on the consumption of live private music entertainment using econometric methods.

The existing research related to this paper can be classified into the following two broad groups: econometric studies and sociological studies. Econometric studies are mainly related to the estimation of demand functions and the estimation of stochastic frontier models. There are many studies estimating demand functions, but here the focus is on studies related to "cultural" goods. Arima (2006a, 2006b, 2008, 2010, and 2011) estimates demand functions for activities related to art and culture in Japan using micro data constructed by the Japanese government. Arima's analysis is an age period cohort analysis. Zieba (2009) estimates a demand function for German public theaters to examine the income and price elasticities of demand. Zieba (2011) examines the determinants of the demand for theatre tickets in Austria and Switzerland. However, the aims of these studies are not to examine the impact of cultural policies. The existing papers which examined the existence of crowding-out mainly investigate the impact of public policy on private grants in the U.S. For example, Dokko (2009) examines whether or not the federal government's funding of the arts through the National Endowment for the Arts crowds out private charitable contributions to the arts in the U.S. Schmitz (2010) examines whether or not the system crowds out private foundations in the U.S.

Recently, some studies estimate a demand function and measure inefficiencies using a stochastic frontier approach. For example, Fillipini and Hunt (2009, 2011) estimate a demand frontier for aggregate energy incorporating an inefficiency approach. In this case, using different vintages of consumer goods or consumer goods with different levels of embodied technology will lead to different energy uses. With all other things equal, the agent with the lowest energy use is the most efficient energy user, and all other uses can be deemed to be inefficient.

Some empirical studies estimate stochastic frontier models for music halls. Taniguchi (2011) measures the technical, allocative, and productive efficiency of Japanese public halls via stochastic frontier analysis and data envelop analysis. Last and Wetzel (2010) estimate the efficiency of German public theaters using four models: a fixed-effects model, a random-effects stochastic frontier model, a true random-effects stochastic frontier model, and a true random-effects with a Mundlak formulation. However, these

studies analyze the supply side not the demand side.

Most studies of the DMS are sociological studies that tend to discuss the DMS system from an ideological perspective. Nakaya (2005) summarizes the situation facing public halls before the DMS was introduced, and points to the importance of assessing the work of designated managers after the DMS was introduced. Nakaya (2005) has become a kind of handbook for local governments and art managers. From the view point of political sociology, Kobayashi (2006) points out the difficulties in assessing the activities in the cultural sector and considers the problems that might arise after the introduction of the DMS. Cultural Policy Network edi. (2004) estimates the changes in public cultural facilities in Japan after the introduction of the DMS. Kobayashi (2006) writing right at the time the DMS was introduced expresses a negative opinion concerning economic assessments of public facilities via economic indicators because she thinks that the public facilities for art and culture have some value which is not measurable by economic indicators. Nakagawa and Matsumoto (2007) also express their negative opinion against the assessment of the DMS using economic techniques. While this is certainly true, policies for art and culture that totally ignore profit or cost considerations are unrealistic. However, some recent studies assess or discuss the impact of the DMS on the performance of designated managers of public halls during their initial contract term. Taniguchi (2011) measures the impacts of the DMS on the technical, allocative, and productive efficiencies of public halls, via Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA). Her study concludes that the impact of the DMS on productive efficiency is not clear for the first contract term. Taniguchi (2011) analyses the impact of the DMS on the supply side, but the impact of the DMS on the demand side is not analyzed.

The key contributions of this paper are: verifying the hypothesis that local governments' cultural expenditure leads to a crowding out of the demand for private sector concerts; and estimating a reduced form equation for the number of ticket sales for private music concerts in Japan. This is the first application of Stochastic Frontier Analysis (SFA) to demand functions for art and culture related activities in Japan.

The rest of this paper is organized as follows. Section 2 summarizes the local governments' cultural policies in Japan. Section 3 discusses the relationship between the local governments' cultural policies and the consumption of live private music entertainment in Japan. Section 4 details the models to be estimated and their interpretation. Section 5 gives details of the data used in this paper. Section 6 presents the empirical results, and section 7 contains some brief concluding remarks.

2. CONSUMPTION OF LIVE PRIVATE MUSIC ENTERTAINMENT AND THE LOCAL GOVERNMENTS' POLICY IN JAPAN

This section explains the relationship between private concert suppliers and the public sector to show how cultural policy can potentially affect the demand and the supply of private concerts. Then, the potential impact of the DMS on the private sector is considered.

Recently, local governments' cultural investments are mainly used for the maintenance and upkeep of existing cultural facilities and for undertaking cultural events. This study focuses on the latter. By the way, Nakagawa (2004) categorizes local governments' cultural policies in Japan into 4 groups; cultural policies to spread art and culture, based on the idea that the public sector should distribute art and culture to all inhabitants as a social welfare policy; cultural policies to activate local economies; cultural policies to build up an identity for a community, using the identical art and culture as one resource; and cultural policies to disturb the existing order and to introduce new discoveries or new value added into communities (pp. 94–98, ll. 5–7). Nakagawa (2004) gives concerts at public halls produced by local governments as a typical example of the first category and criticizes local governments that only in most of cases buy packaged concerts. The point of Nakagawa (2004) is that most Japanese local governments have not made efforts to provide effective concerts to increase the demand for art and culture. One aim of the introduction of the Designated Manager System (DMS) in 2006 was to reduce the inefficiency in local governments' cultural investments.

Now, the possible impacts of the DMS on the demand side are discussed in detail. Not only public art managers, but also private art managers use public halls in Japan. Most live music entertainment is planned by private art managers or artists who do not own their own hall. In Japan, most live music entertainment is supplied by combining the "hardware" of the public sector and the "software" of the private sector. Therefore, a change in the public policy related to public halls has the possibility of having an effect on the private sector. In order to realize a balanced supply between the private and public sectors, it is important to analyze the effects of public policy on the private sector's consumption of private music concerts.

The DMS was introduced to public halls in 2006 to enable private art managers to manage public halls. Local governments can choose whether they introduce the DMS into the public halls which the local governments established. Prior to the introduction of the DMS, the Entrusted Manager System (EMS) existed. The EMS enables a local government to choose either the direct management of a public facility or the management of the facility by an extra-government organization of the local government. The key difference between the EMS and the DMS is that the DMS enables private managers to be employed to manage the public halls. In 2006, the DMS introduced to public halls except the case of the testing introduction. According to the minutes of the General Affairs Committee of the House of Representatives (*Shugiin Soumu Iinkai*), the purpose of the introduction of the DMS is to supply public services which are more suitable to needs of local residents (Kobayashi (2006), p. 4, ll. 16–18). According to a survey by Association of Public Theaters and Halls in Japan (2009), the percentage of public halls that had introduced the DMS was 40.2% in 2006, and this increased to 47.6% in 2009. Now, about 50% public halls have introduced the DMS. The introduction of the DMS made the managers of public halls more cost conscious. One evidence which supports this is that the proportion of public halls charging some sort of piece of user fee has increased, and 69% of halls charged some sort of user fee in 2009 (Association of Public Theaters and Halls in Japan (2009)).

Both positive and negative impacts of the DMS on the demand for private music concerts are possible, and these effects are explained in the following. One positive effect of the DMS on the private sector is that the private marketing of public events to popularize music may lead to an increase in the consumption of private music concerts; this positive effect leads to the upward shift of demand function. Some public concerts are produced to increase the total demand for music concerts. Figure 1 shows that public halls supply 9.9 concert events per year on average. The number of public music concerts is not so large, compared to the number of private music concerts. Non-profitable concerts are mainly supplied by the public sector, and these make up about 40% of all public concerts including both classical music and popular music. According to a survey by the Association of Public Theaters and Halls in Japan (2009), about 45% of the classical music concerts were non-profitable, and 40% of the popular music concerts and the other concerts were non-profitable in 2009. These non-profitable concerts will have no effect on the demand for private concerts unless an audience turns up. Even if an audience does turn up and the participants are all "new," then there may still be no effect on the demand for private concerts.

Another possible positive effect of the DMS is to decrease the ticket prices for private concerts through price competition. Then, lower ticket price will increase the demand for private concerts as long as the private managers try to keep the quantities of supply for private music concerts; this positive effect may lead to the shift of demand function by the shift of supply curve. The consumers who have the lower income could enjoy private music concerts more often. To increase the audience, the DMS has the possibility of lowering the prices of the concerts which are managed by DMS institutions. If the ticket prices for private music concerts are reduced, the audiences of private music concerts expand to include some consumers who have lower income.

Alternatively, if as a result of the introduction of the DMS system, people turn up to public concerts and they are drawn away from private concerts rather than being new participants, then there will be a negative effect on private concerts. This negative effect is possible when public concerts and private concerts are substitutes. Generally, it assumed that the public sector will try to provide music concerts to complement private music concerts, so that public cultural expenditure will not lead to any crowding-out effects. However, if public concerts are privatized as a result of the introduction of the DMS, the possibility of crowding-out effects cannot be denied. Another possible negative effect is that an increase in the cost of concerts may result from the introduction of the public system charging the private sector for the use of public halls. This negative effect has not occurred yet since the DMS was introduced. Figure 2 shows that the average ticket price has decreased since 2006. For this reason, this negative effect is not considered in this paper.

Considering the circumstances mentioned above, it is assumed that the positive effects of the DMS are stronger than negative effect. Econometric methods will be used to verify whether or not this is the case.

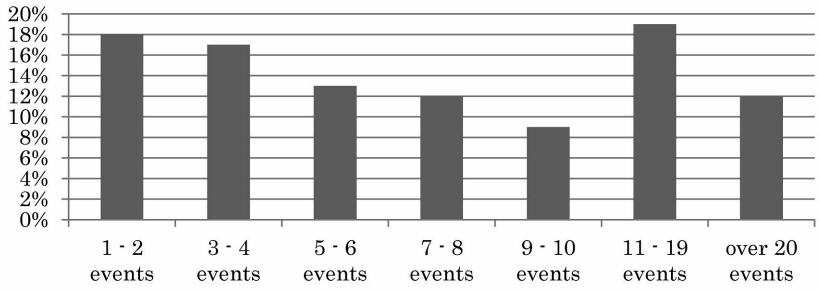
3. THREE CHANNELS WHERE CULTURAL POLICIES HAVE INFLUENCES ON DEMAND

This section explains how the DMS may lead to the increase of the demand for private music concerts; one effect is the development of potential audiences by new marketing; another effect is caused by lower ticket prices. In this section, the channels where the DMS affects the demand for private music concerts are discussed theoretically. Then it will be clear that the different effects of the DMS and cultural expenditures among the local governments can be observed on both the supply side and demand side. In other words, this paper attempts to measure the impacts of the supply side on the demand side, which are different among local governments, where perfect competition between the public and private sectors are assumed.

There are three channels through which local governments' cultural policies influence the demand for music concerts. First, Figure 3 shows where the DMS and cultural expenditures shift the demand function upward. The DMS and the public cultural expenditures would shift the demand function upward from DD to D′D′ directly (Figure 3) because some public music concerts are intended to expand the number of consumers of music concerts as a cultural policy. The former positive effect of the DMS in section 2 is categorized in this channel. This increase of demand is defined as a crowding-in effect in this study. There might be some differences in the crowding-in effects among 47 local governments' cultural policies, because the content of the cultural policies differs among the 47 local governments. This study attempts to capture the differences of the impacts of cultural policies on the demand for private music concerts as an inefficiency term.

Secondly, Figure 4 shows the mechanisms through which the local governments' cultural policies lead to crowding-in effects indirectly via a shift in the supply curve. The latter positive effect in Section 2 is categorized in this channel. Assume that the local governments invest in the promotion of culture and then public music concerts are supplied at prices that are lower than the prices for private music concerts. Then supply curve shifts from S_1S_1 to $S_1'S_1'$. In order to prevent customers switching to public concerts, private music suppliers will respond to the lower ticket prices of public concerts by decreasing the ticket prices for private music concerts. Then the supply curve for private music concerts shifts from S_2S_2 to $S_2'S_2'$. The distance between S_2S_2 and $S_2'S_2'$ is defined as the inefficiency which can improve by the cultural policy. This movement along the demand curve results in a shift of the equilibrium point from E_2 to E_2'. This increase of demand is also defined as crowding-in effects. Here, it is assumed that the public music concerts which are the substitutes for private music concerts lead to this effect.

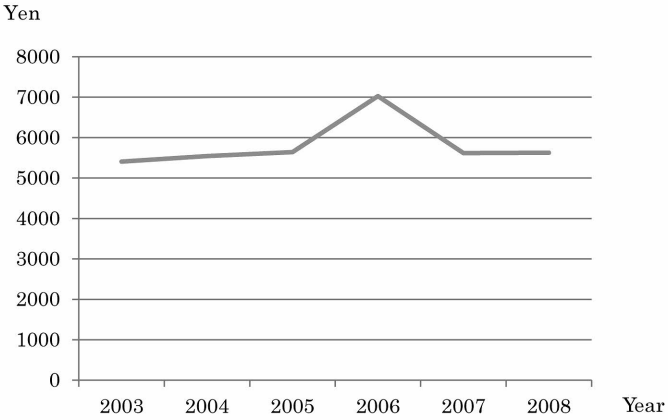
Thirdly, on the other hand, Figure 5 shows the mechanism of no effects in the sales of tickets for private music concerts by neither the DMS nor the cultural expenditure. Assume that the local governments invest in the promotion of culture and then public music concerts are supplied at the prices (P') that are lower than the prices of private music concerts (P). In the case of perfectly inelastic demand in the market for public



Average: 9.9 events/year

Source: Constructed using data in the Association of Public Theaters and Halls in Japan (2009).

Figure 1. The Numbers of Events and Performances in Public Halls in a year.



Source: Constructed using data in the Private Music Live Entertainment (2008).
Note: This average price is the estimated average price of the concert tickets (= sales / attendance), where "Sales" includes not only the sales of the concert tickets, but also concert-related goods like CDs.

Figure 2. Average Ticket Price.

music concerts, the ticket price would be lower ($P > P'$) while the demand for private music concerts would remain at X^*. Thus, a lower ticket price for public concerts does not lead to any increase in the sales of tickets for private music concert in the case of perfectly price inelastic demand for private concerts.

While third channel cannot be examined directly by checking any estimated coefficients, the existence of crowding-in effects via the first channel or via the second channel can be examined by the checking the coefficient of the DMS dummy, and by the checking whether the coefficient of the local governments' cultural investment is positive or not in supply function.

4. METHOD

4.1. A Definition of Inefficiency of Cultural Policies

Generally, the efficiency concept is used to measure the inefficiency of production when either a production function or a cost function is estimated. However, some existing studies have applied the efficiency concept to the estimation of demand functions. The first applications of the inefficiency concept to an analysis of the demand side are Fillipini and Hunt (2009, 2011). These studies estimated a "demand frontier" for aggregate energy using a panel data set on 29 countries over a 28 year period from 1978 to 2006. Fillipini and Hunt's (2009, 2011) analysis indicates that inefficiencies in energy demand (higher energy demand than otherwise would be the case) are caused by the use of outdated technologies or machines which are associated with higher electricity consumption compared to newer technologies or machines.

In Fillipini and Hunt (2009, 2011), all the standard factors which influence energy demand are used as explanatory variables in the aggregate demand for energy, so that inefficiencies of energy demand are measured as the unobservable effect of using outdated technologies or machines. Thus, Fillipini and Hunt (2009, 2011) indicate that it is possible to apply the concept of inefficiency to an analysis of consumer demand.

In this study, the differences in the position of the demand functions among 47 prefectures during the estimation period are treated as being caused by inefficiencies of demand. In Figure 3, a more efficient cultural policy would cause a large upward shift in the demand function. This may be observed as the difference in the inefficiency terms in a stochastic frontier model.

4.2. The Estimated Model

As discussed in Section 4.1, the difference of the impact of local governments' cultural policies may be observed in the demand function as an inefficiency term. Then, the aggregate demand function for private music concerts can be written as follows:

$$\ln Q_{it} = a \ln P_{it} + \sum_{r=1}^{m} b_r \ln E_{it_r} + c + w_{it} + \varepsilon_{1it} \tag{1}$$

where Q_{it} is the total number of people attending private concerts in the i-th prefecture in year t, P_{it} is the average price of the private concerts in the i-th prefecture in year t, E_{it_r} are the other factors which influence the demand in the i-th prefecture in year t, w_{it} is a measure of technical inefficiency, ε_{1it} is disturbance that is assumed to follow a normal distribution, and a, b_r, and c are coefficients.

The aggregate supply function for private music concerts can be written as follows:

$$\ln Q_{it} = d \ln P_{it} + \sum_{r=m}^{n} f_r \ln E_{it_r} + g + h\mathrm{dms}_{it} + z_{it} + \varepsilon_{2it}\,, \quad (n > m) \tag{2}$$

where dms_{it} is the ratio of the number of public halls in the i-th prefecture at time t that have introduced the DMS to the total number of public halls in that prefecture, z_{it} is a measure of technical inefficiency, ε_{2it} is disturbance that is assumed to follow a normal distribution, and d, f_r, g, and h are coefficients Given the definition of dms_{it}, its value

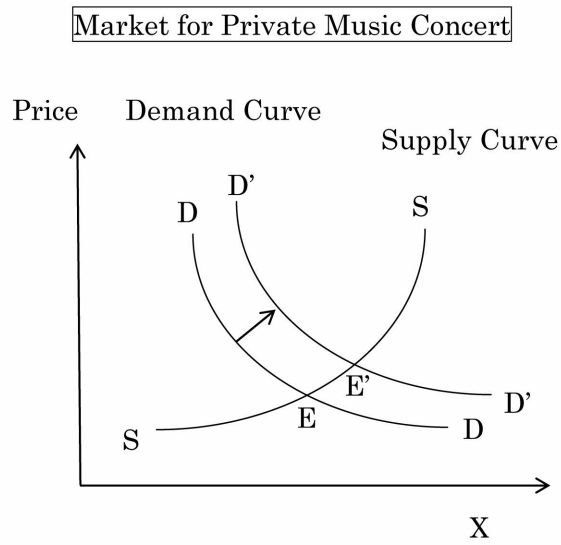


Figure 3. The Crowding-in Effects of Local Governments' Cultural Policy I.

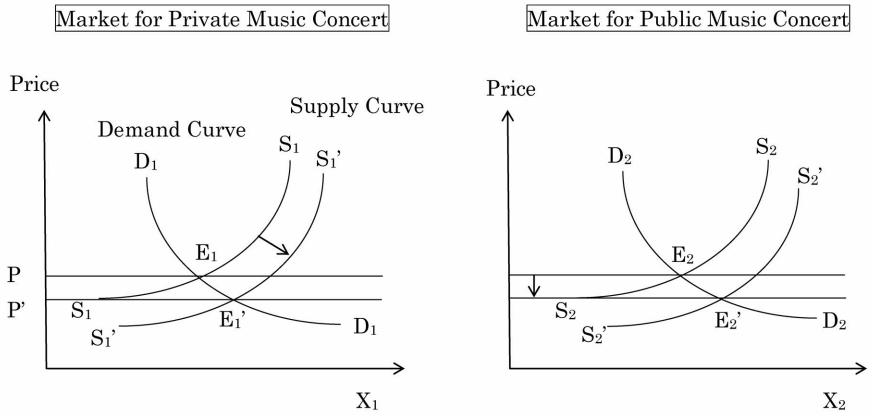


Figure 4. The Crowding-in Effects by Local Governments' Cultural Policy II.

obviously lies between zero and one. It is worth noting that the DMS is assumed to directly affect only the supply of music concerts and not their demand.

Therefore, the estimated reduced equation for the number of people attending private concerts can be obtained from equations (1) and (2) as follows:

$$\ln Q_{it} = \sum_{r=1}^{n} \beta_r \ln E_{it_r} + \gamma + \delta \mathrm{dms}_{it} + e_{it} ,$$

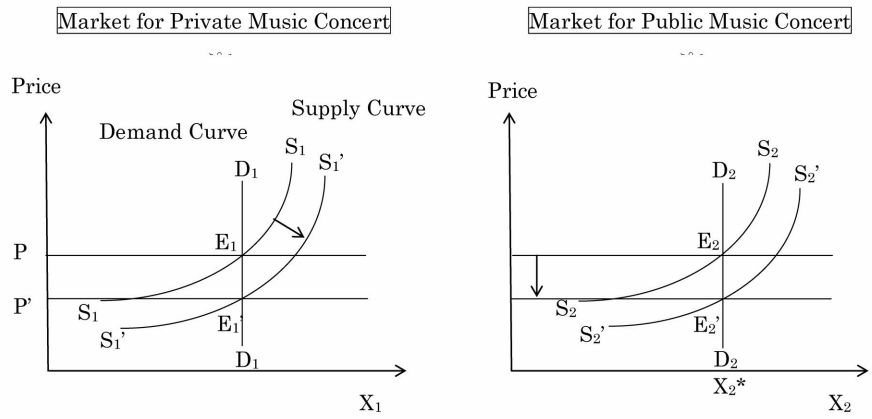


Figure 5. The Crowding-out Effects by Local Governments' Cultural Policy.

$$e_{it} = \frac{a\,(z_{it}+\varepsilon_{1it}) - d(w_{it}+\varepsilon_{2it})}{a-d} = \left(\frac{a}{a-d}z_{it} - \frac{d}{a-d}w_{it}\right) + \left(\frac{a}{a-d}\varepsilon_{1it} - \frac{d}{a-d}\varepsilon_{2it}\right) \equiv u_{it}+v_{it}\,, \tag{3}$$

where β_r, γ, and δ are coefficients. In equation (1) and (2), it is assumed that w_{it}, z_{it}, and e_{it} have identical distributions. Since "a" is the coefficient of the own price in a demand function, it is expected that $a < 0$. Because "d" is the coefficient of the own price in a supply function, it is expected that $d > 0$. Therefore, both $\frac{a}{a-d}$ and $\frac{-d}{a-d}$ are positive. Both z_{it} and w_{it} are assumed to take on only non-positive values because they measure technical efficiency. For these reasons, $\left(\frac{a}{a-d}z_{it} - \frac{d}{a-d}w_{it}\right) = u_{it}$ is always negative. The discussion of the possible assumptions for the distribution of u_{it} is contained in the next paragraph.

The variables will be included in $\ln E_{it_r}$ are the total number of the private music concerts per capita, per capita income, the financial power of a prefecture, and local governments' cultural expenditure on events and education. Because the consumers can match their schedules more easily, it is considered that considered that the total number of concerts per capita increases the demand for private music concerts. The higher consumers income must increase the demand for private music concerts. It can be assumed that the local governments which have stronger financial power more effective cultural policies bacause these local governments tend to be in urban area and can cooperate academic organization earsily. The local governments' cultural expenditure on events and education will increase the demand for music concerts.

To try and capture various aspects of the "inefficiencies" in (3), five models are assumed: (A) the pooling Stochastic Frontier (SF) model; (B) the random-effects SF model; (C) the true random-effects SF model; (D) the fixed-effects SF model; and (E) the Battese and Coelli (1992) Time Varying Stochastic Frontier (TV-SF) model. These

models can be defined as follows:

Model A: Pooling SF Model

$$\ln Q_{it} = \sum_{r=1}^{n} \beta_r \ln E_{it_r} + \gamma + \delta \,\mathrm{dms}_{it} + u + v_{it}\,,$$
$$u \sim HN(0,\sigma_\mu^2)\,, \quad v_{it} \sim N(0,\sigma_v^2) \tag{4}$$

Model B: Random-Effects SF Model

$$\ln Q_{it} = \sum_{r=1}^{n} \beta_r \ln E_{it_r} + \gamma + \delta \,\mathrm{dms}_{it} + u_i + v_{it}\,,$$
$$u_i \sim HN(0,\sigma_\mu^2)\,, \quad v_{it} \sim N(0,\sigma_v^2) \tag{5}$$

Model C: True Random-Effects SF Model

$$\ln Q_{it} = \sum_{r=1}^{n} \beta_r \ln E_{it_r} + \gamma_i + \delta \,\mathrm{dms}_{it} + u_{it} + v_{it}\,,$$
$$u_{it} \sim HN(0,\sigma_\mu^2)\,, \quad v_{it} \sim N(0,\sigma_v^2)\ \gamma_i = \gamma + w_i\,, \quad w_i \sim N(0,\sigma_w^2) \tag{6}$$

Model D: Fixed-Effects SF Model

$$\ln Q_{it} = \sum_{r=1}^{n} \beta_r \ln E_{it_r} + \gamma + \zeta_i + \delta \,\mathrm{dms}_{it} + u_i + v_{it}\,,$$
$$u_i \sim HN(0,\sigma_\mu^2)\,, \quad v_{it} \sim N(0,\sigma_v^2) \tag{7}$$

Model E: Battese and Coelli Time Varying SF Model

$$\ln Q_{it} = \sum_{r=1}^{n} \beta_r \ln E_{it_r} + \gamma + \delta \,\mathrm{dms}_{it} + u_{it} + v_{it}\,,$$
$$u_{it} = \exp\{-\eta(t-T)\}u_i \quad u_i \sim HN(0,\sigma_\mu^2)\,, \quad v_{it} \sim N(0,\sigma_v^2)\,, \tag{8}$$

where u, u_i, and u_{it} are each a measure of technical inefficiency, v_{it} is standard disturbance, γ_i is the random effect to deal with latent heterogeneity, w_i is the disturbance of γ_i, and ζ_i is the individual fixed effect. T is the number of periods in the balanced panel data, and HN denotes a half-normal distribution that generates a non-negative random variable.

Since the pooling model in equation (4) totally ignores the panel nature of the data, it is not considered to be a "panel" model, In equation (4), the null hypothesis of no inefficiency can be tested by testing whether or not $\sigma_\mu^2 = 0$. Similarly, in equation (5),

the hypothesis of no inefficiency can be tested by testing whether or not $\sigma_\mu^2 = 0$. It should be noted that equations (4) and (5) are non-nested models, so it is not possible to choose between them by using standard testing procedures. Equation (5) is nested within equation (6) so that if the parameter controlling the distribution of the random parameter γ_i , σ_w^2 is significant in equation (6), the true random-effects model, then equation (6) is judged to be more appropriate than the random-effects model given in equation (5). Equation (5) is nested within equation (8), and if the null hypothesis that $\eta = 0$ is accepted, equation (5) is preferred to equation (8). If $\sigma_\mu^2 = 0$ is accepted, there is no inefficiency. In this case, we revert to standard panel analysis by estimating a pooling model, a fixed-effects model and random-effects model.

5. DATA

A balanced panel data set consisting of annual data from 2003 to 2008 on all 47 prefectures in Japan is used in this paper. Tables 1 and 2 provide definitions and descriptive statistics for each variable, respectively. The data on live private music entertainment in Japan are drawn from the "White Paper on Live Entertainment 2004–2009" which is constructed by *PIA* Research Institute[1]. This statistical data is defined as Growth Domestic Entertainment (GDE) by *PIA*. It can be said that GDE data is reliable because *PIA* Research Institute has examined the reliability of the marketing data and has estimated the unobservable marketing data on live entertainment. GDE data has been constructed according to the following standards. The sample data includes data on all private entertainment which required payments and were advertised in public in Japan. In other words, all public entertainment, free entertainment and secret concerts are excluded. The data on private live entertainment is the number of tickets which are sold by *PIA*, while the other data includes estimated values.

The data on local governments' cultural expenditures in Japan are drawn from "the Conditions of the cultural administration in the local area in Japan" (*Chihou ni okeru Bunkagyosei no Jokyo ni tuite*) which is a survey conducted by the Ministry of Education, Culture, Sports, Science, and Technology in Japan. The annual data on population are drawn from the 2003, 2004, 2006, 2007, and 2008 "Population Estimates" (*Jinko Suitei*) and the 2005 "National Census" (*Kokusei Chosa*) which are conducted by the Statistics Bureau and the Director-General for Policy Planning of Japan. The data on the local governments' financial power (*Tannendo Zaiseiryoku Shisu*) are drawn from the "Tables for the Local Governments' Financial Indicators" (*Todoufuken Zaiseishisuhyo*) which is constructed by the Statistics Bureau and the Director-General for Policy Planning of Japan. The data on the introduction of the DMS to public halls are drawn from the 2003–2008 "the membership list of public halls in Japan" (*Zenkoku Kouritsu Bunka Shisetsu Kyougikai KaiinMeibo*) constructed by the Association of Public Theaters and

[1] By the way, *PIA* Corporation is the largest company selling tickets for live entertainment in Japan. *PIA* has over 19,000 shops including distributors all over Japan. Using such a large marketing network, *PIA* has aggregated the marketing data which they obtained from their shops and has constructed a dataset on live private music entertainment.

Table 1. Definition and Description of Variables

Variable	Description
att_p_c	concert attendance
num_con_p	the total number of the concerts per capita
ave_in	per capita income
finan_p	financial power
cul_ex	local governments' cultural expenditure on events and education
dms_ratio	= public halls with DMS / all public halls

Table 2. Descriptive Statistics

Variable	Mean	Std.Dev.	Minimum	Maximum
ln att_p_c	−2.547	0.704	−4.180	−0.436
ln num_con_p	−1.702	0.648	−2.937	0.196
ln ave_in	7.903	0.145	7.604	8.450
ln finan_p	−0.857	0.412	−1.610	0.413
ln cul_ex	12.459	1.056	8.605	16.045
dms_ratio	0.200	0.220	0.000	0.813

Notes: The total number of sample size is 282 (= 6 years data for 47 prefectures).

Halls in Japan. In this paper, the definition of a public hall is any facility which belongs to this membership list, and includes, for example, community centers, music halls, all-purpose halls, theaters, and libraries with halls.

6. RESULTS AND DISCUSSION

Table 3 reports the results of estimating equation (3) by panel methods without an efficiency term, while Table 4 shows the estimation results when an efficiency term is incorporated. LIMDEP 9.0 is used in estimating all models. A reduced form model for the number of concert tickets sold was estimated using a standard fixed effects model, a fixed effects model with robust standard errors, and a random-effects model. In addition to these non-frontier models, five frontier models which have been explained in Section 3 (Models A–E) were estimated but LIMDEP 9.0 could not compute estimates for the fixed-effects model (Model D). Therefore, the pooling SF model (Model A), the random-effects SF model (Model B), the true random-effects SF model (Model C), and the Battese and Coelli (1992) TV-SF model (Model E) are examined as frontier models.

In all models, the estimated coefficients of the number of concerts and financial power have the expected positive sign, and are statistically significant. The tickets of music concerts have sold well in those prefectures which have strong financial power like Tokyo, Osaka, and Nagoya. The estimated coefficients on average income take different signs across models. The estimated coefficients of the average income have the expected positive sign in Models 2, 3, B, and C, and are statistically significant only in Models B and C. In contrast, the estimated coefficients of the average income are negative, but insignificant in Models 1, A, and E. The estimated coefficients on local

governments' cultural expenditure are positive in Models 1, 2, A, B, C, and E but are mostly in significant In Model 3, the estimated coefficient on local governments' cultural expenditure is negative but insignificant. This suggests that local governments' investments in cultural events and education do not have crowding-in nor crowding-out the demand for private music concerts. The estimated coefficients of the ratio of the public halls with DMS are positive in all models and significant in Models 3, B, and C. This suggests that the introduction of the DMS has contributed to increasing the audiences of private concerts.

The results of estimating the usual panel models (Models 1, 2, and 3) indicates that the fixed effect model (Models 3) is supported since the F test testing the null hypothesis that individual fixed effects are absent rejects the pooling models with a p-value of 0.000, and the Hausman test rejects the random effect models in favor of the fixed effect model with a p-value of 0.024. Therefore, Models 3 is the most appropriate among the non-frontier models. This implies that technical inefficiencies may be caused by the characteristics of individual prefectures.

Since the estimates of λ are positive and significant in Models B, C, and E, this suggest that there is statistically significant inefficiency. When the results for the pooling SF model (Model A) and the random effects SF model (Model B) are compared, the random-effects SF model (Model B) appears to be the more acceptable model because although the two models contain the same number of parameters the log likelihood of Model B is much better than Model A. When the results for pooling SF model (Model A) and the Battese and Coelli (1992) TV-SF model (Model E) are compared, the latter model (Model E) appears to be the more acceptable model. This is because the log likelihood of Model E is better than Model A. However, the results for Model E suggest that Model E is not accepted because the Wald test of the null of hypothesis of $\eta = 0$ accepts the null hypothesis. When the results for the random-effects SF model (Model B) and the true random effects SF model (Model C) are compared, the true random-effects model (Model C) appears to be the more acceptable model. The results for Models B suggest that the true random-effects model is supported because the estimated means for γ_i and the estimated Scale parameters for w_i are statistically significant. Therefore, Models C is the most appropriate among frontier models.

In choosing between Model 3 and Model C, Model 3 is more appropriate because the log likelihood of Model 3 is far better than Model C. Therefore, the fixed-effects model (Model 3) is the most appropriate among all models. In Model 3, the estimated coefficient for average income does not have the expected sign, but is statistically insignificant. In Model 3, the estimated coefficient of the local governments' cultural expenditure is negative but insignificant. This suggests that there are neither crowding-in effects nor crowding-out effects. The impacts of local governments' cultural investment seem to be almost zero during the estimation periods. In Model 3, the estimated coefficient of the ratio of the public halls that have introduced with the DMS is positive and statistically significant. This result suggests that the introduction of the DMS has increased sales of tickets The DMS seems to have succeeded in increasing the sales of tickets for live private music entertainment.

Table 3. Estimated Results of the Panel Models

Model	Model 1	Model 2	Model 3
Estimation Method	Pooling	Random-effects	Fixed-effects
Dependent Variable			
ln att_p_c			
Explanatory Variables			
ln num_con_p	0.674	0.792	0.854
	(0.037)***	(0.054)***	(0.079)***
ln ave_in	−0.121	0.511	0.342
	(0.270)	(0.339)	(0.504)
ln financial	0.611	0.254	0.055
	(0.107)***	(0.119)**	(0.149)
ln culture_expenditure	0.045	0.013	−0.002
	(0.023)**	(0.022)	(0.025)
dms_ratio	0.050	0.109	0.191
	(0.105)	(0.080)	(0.089)**
constant	−0.495	−5.209	
	(2.177)	(2.728)*	
Log likelihood	−94.605	−12.313	74.773
F test	Reject Pooling Model (0.00)		
Hausman (1978) test		Reject Random-effects Model (0.024)	

Notes:
(1) For each variable, the first line is the coefficient estimate, and the second line is the standard error.
(2) The models entitled robust standard errors are just fixed effect models with the standard errors that have been computed to make them robust.
(3) *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
(4) The F test reports a p-value for the F-test of the null hypothesis of a pooling model against the alternative hypothesis of a fixed effect model. If the pooling model is rejected, a fixed effects model is accepted.
(5) The Hausman (1978) test reports a p-value for the Hausman test of the null hypothesis of a random effects model against the alternative hypothesis of a fixed effect model. If the random effects model is rejected, a fixed effects model is accepted.

7. CONCLUDING REMARKS

This paper attempts to examine the effect of public cultural policy on private music concerts in Japan, in particular, the possible crowding-in effects of cultural policy and the influence of the Designated Manager System (DMS) on the demand for live private music entertainment. Three channels through which the ticket sales for private music

Table 4. Estimated Results of the Stochastic Frontier Models

Model	Model A	Model B	Model C	Model E
Estimation Method	Pooling SF	Random-effects SF	True random-effects SF	Battese & Coelli TV-SF
Dependent Variable				
ln att_p_c				
Explanatory Variables				
ln num_con_p	0.674	0.792	0.862	0.674
	(0.037)***	(0.044)***	(0.024)***	(0.022)***
ln ave_in	−0.121	0.443	0.572	−0.121
	(0.267)	(0.248)*	(0.151)***	(0.168)
ln financial	0.611	0.208	0.251	0.611
	(0.106)***	(0.136)	(0.064)***	(0.072)***
ln culture_expenditure	0.045	0.012	0.013	0.045
	(0.023)**	(0.024)	(0.013)	(0.014)***
dms_ratio	0.050	0.131	0.103	0.050
	(0.103)	(0.064)**	(0.050)**	(0.122)
constant	−0.495	−5.158		−0.495
	(13.927)	(1.946)***		(1.357)
constant: means for γ_i			−5.739	
			(1.204)***	
constant:Scale parameters for w_i			0.300	
			(0.013)***	
σ_v	0.338	0.204	0.171	0.300
σ_u	0.000	0.544	0.185	0.260
$\sigma = \left(\sigma_v^2 + \sigma_u^2\right)^2$	0.338	0.581	0.004	0.397
$\lambda = \sigma_u / \sigma_v$	0.000	2.662	1.083	0.867
	(50.958)	(0.836)***	(0.396)***	(0.160)***
η				0.010
				(0.132)
Log likelihood	−94.605	−13.803	−11.742	−98.496

Notes:
(1) For each explanatory variable and λ, the first line reports the estimated coefficient, and the second line is the standard error.
(2) *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

concerts were influenced the local governments' cultural policies are assumed. In the first channel, the DMS shifts the demand function upward. In the second channel, the local governments' cultural policies lead to crowding-in effects indirectly, by shifting the supply curve to the left. In contrast to the second channel, in the third channel, the

downward shift of the supply curve leads the crowding-out effect since an inelastic demand is assumed. The first and second channels are examined, by estimating a reduced form equation for ticket sales which is derived from the demand function and supply functions for private concerts. To capture the differences of the performance of the local government's cultural policies, frontier models are also estimated in addition to the non-frontier models. The estimation results support the non-crowding-in hypothesis and show that the DMS has increased sales of tickets for private concerts. The results suggest the DMS has improved the local governments' cultural policies to increase ticket sales for music concerts. Since the behavior of the suppliers of private music concerts has not been examined, this study cannot deny the possibility that the privatization of the public sector may oppress the suppliers of the private music concerts.

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