Grisolia JM, Willis KG. (2015)

[Consumer choice of theatrical productions: a combined revealed preference-stated preference approach.](#)

Empirical Economics

DOI: 10.1007/s00181-015-0948-5

Copyright:

This is the authors' accepted manuscript.

The final publication is available at Springer via <http://dx.doi.org/10.1007/s00181-015-0948-5>

Date deposited:

05/05/2015

Embargo release date:

17 April 2016

This work is licensed under a [Creative Commons Attribution-NonCommercial 3.0 Unported License](http://creativecommons.org/licenses/by-nc/3.0/)

**Consumer choice of theatrical productions:
A combined revealed preference-stated preference approach**

José M. Grisolia

Department of Applied Economics
Universidad de Las Palmas de Gran Canaria
35017 Las Palmas
GC, Spain

&

Kenneth G. Willis*

School of Architecture, Planning & Landscape
University of Newcastle
Newcastle upon Tyne. NE1 7RU.
UK.

Email: Ken.Willis@ncl.ac.uk

Tel: +44 (0) 191 222 7807

*Corresponding author

Abstract

This paper investigates the value of attributes of theatrical productions using a joint revealed preference-stated preference (RP-SP) method. SP models have advantages over RP models, requiring less data and avoiding multicollinearity problems which often confound RP analysis. However, the advantage to joint

RP-SP model is that theatre-goers choices are anchored to real behaviour. The RP-SP model reveals the most important determinant of choice and willingness-to-pay (WTP) to be the type of show. The Royal Shakespeare Company (RSC) strongly influenced choice and WTP. Reviews of productions by theatre critics influenced choice. A mixed logit model revealed considerable heterogeneity in theatre-goer tastes for types of show, and variation in taste for the attributes of shows by socio-economic and demographic profile of theatre-goers.

Keywords: Theatre, revealed preference-stated preference, mixed logit model

JEL classification: Z11, D12, C25

Acknowledgments

This research was funded by the Arts and Humanities Research Council (AHRC) and Arts Council England (ACE) under their Fellowship on the economic impact of arts and humanities. The authors would like to thank María Francisca Yáñez from Universidad Catolica de Chile, and Marco Boeri from Queen's University Belfast, for their advice in the estimation of the model and willingness-to-pay; and Jo Kirby, marketing director at the Theatre Royal, Newcastle, for her support in the data collection and useful comments during the work.

**Consumer choice of theatrical productions:
A combined revealed preference-stated preference approach**

1. Introduction

Theatre-goers pay a ticket price for a theatrical production which comprises a bundle of attributes. These attributes include the type of show, type of production, the professionalism of the cast, etc.. There is no separate market for these individual attributes. However, people's preferences and willingness-to-pay (WTP) for these attributes of theatre productions can be ascertained by (1) asking consumers directly (a stated preference approach), or (2) inferring what people are prepared to pay, from how they actually behave in making trade-offs between theatrical productions with different attributes and ticket prices (a revealed preference approach).

Revealed preference (RP) and stated preference (SP) methods both have strengths and weaknesses. Economists often prefer revealed preference data because it is based on what consumers do, rather than what they say they will do. However, hypotheses about the attributes of theatrical productions may not be testable using RP if attributes are not separable: there may be insufficient variation in attributes and attribute levels, and there may be multicollinearity between attributes (e.g. between reputation of the theatre, famous artists, reviews, and ticket prices).

A SP method can overcome many of the problems encountered in RP models. SP methods comprise contingent valuation (CV) and discrete choice experiments (CEs). In CV the bundle of attributes remains fixed and price varies to allow a demand curve to be estimated. In CEs the attributes as well as price varies, and this allows the value of each attribute and attribute level to be estimated, as well as the value of the good as a whole. Moreover, the experimental design for a CE can be devised to produce an orthogonal bundle of attributes, thus eliminating the issue of multicollinearity. An experimental design for a CE model can also induce variations in attributes that may take a long time to observe in the RP market. If revealed data does not encapsulate the range of attribute levels, an CE can include such attribute levels in the generated data set. By presenting different combinations of attributes to an individual, and asking the individual to choose, say between pairs of combinations or alternatively to rank different choice sets, it is possible to extract the individuals' preferences and utility for specific attributes (Willis, 2002).

An RP approach may require information on a large number of theatrical productions to encompass enough variation in attribute levels to assess demand and marginal WTP for attributes of theatrical

productions. Werck and Heyndels (2007) used a panel of 59 Flemish theatres, over the period 1980-2000, to investigate demand (attendance) as a function of own price, price of substitutes, income, and characteristics of the cultural production (size of production, Dutch-speaking playwrights, adaptations of old productions, etc.). Zieba (2009) estimated price and income elasticities through an analysis of audience numbers to 178 German theatres over 40 years (1965-2004). The attributes of the theatrical production included admission price, disposable income, price of substitutes (symphony concerts), theatre reputation, guest performance, technical ability of artists, and standard of costumes and stage design. SP obviates the need to collect such large data sets to estimate consumers' preferences and WTP for theatre attributes.

RP and SP approaches have a number of similarities. First, both have a foundation in the theory of consumer demand, based on Lancaster (1966), which postulates that utility to consumers of any good (e.g. a theatrical production) is derived from the characteristics or attributes of the good. Second, both are also based on random utility theory (RUT) which hypothesizes that individuals will make choices based on the characteristics of the good (an objective component) along with some degree of randomness (a random component). The random component arises either because of randomness in the preferences of the respondent or the fact that the researcher does not have the complete set of information available to the respondent. Third, both RP and SP approaches reflect the same underlying choice process: individuals choose one theatrical production from a number of theatrical productions available to them. Finally, both RP and SP models of an individual's choice of theatre show can be estimated using discrete choice models.

Combining RP and SP data has a number of advantages. RP data embody the market equilibrium; and RP-SP data contain realism that might not be attained in an SP study alone. The inclusion of RP responses in the questionnaire also makes the respondent consider the SP task more thoughtfully, since the individual can judge the SP options in relation to his/her revealed preferences (Train and Wilson, 2009). A RP-SP model can achieve higher estimation efficiency; and be used to improve the model predictive ability (Johnson, 2004).

The purpose of this article is to analyse factors that determine theatre demand using a model with joint RP and SP data; and to estimate WTP for the different attributes of a theatre production. The aim is also to explore the difference in tastes based on the socioeconomic information of theatre-goers using a random parameter model. The rest of the paper is organized as follows: a theoretical background outlining the basic theory of discrete choice models and joint RP-SP data; a review of the demand for theatre; a section explaining the data and questionnaire design; the model results; followed by a section on WTP estimates, before some conclusions are drawn.

2. Theoretical background

Discrete choice models are based on Lancaster's (1966) theory of consumer demand which postulates that each good provides utility that can be measured in terms of the attributes of the good. It is assumed that individual n can choose between J alternatives (in this case theatre shows) from $i = 1$ to J . Since the study adopts a stated preference choice experiment, the respondent will face T choice situations from $t = 1$ to T . Thus, the utility of alternative j for individual n in the choice situation t can be expressed in terms of the following expression:

$$U_{njt} = \beta X_{njt} + \varepsilon_{njt} \quad (1)$$

Where X_{njt} is a vector of observed variables and β is a vector of K coefficients to be estimated. The second term is stochastic and represents the part of the utility which is not observed by the researcher. Assumptions made about the distribution of the random error part lead to different types of model. The simplest model is the multinomial logit (MNL) which is derived by placing restrictive assumptions on the random component of the utility: error disturbances are assumed to be independently and identically distributed (IID) according to a Type 1 extreme value distribution. For linear indirect utility, it can be proven (McFadden, 1973) that the probability of the individual utility of alternative j in the choice situation t is the largest among those in the choice set C facing individual n is:

$$P_{nj} = \frac{\exp(\beta' x_{njt})}{\sum_j \exp(\beta' x_{njt})} \quad \forall j, K \in C \quad (2)$$

A mixed logit (MXL) is a more general model that overcomes restrictions of MNL (see, Train, 2003; McFadden, 2000) introducing variation in the parameters amongst the population. That is, the MXL considers one parameter per individual. Its specification is the similar to the MNL, but it assumes that the vector of β_n parameters is now random and depends on the individual n

$$U_{njt} = \beta_n X_{njt} + \varepsilon_{njt} \quad (3)$$

In a stated preference choice experiment, like the one implemented here, individuals face a series of T choice situations. Assuming that individual parameters β_n are known, the probability of the sequence of choices is the product of the logit and represented by $P(y_n | \beta_n)$. However, the modeller does not know β_n and therefore the probability that the individual n chooses the sequence of options y_n will be the conditional probability associated to the value of β

$$P(y_n) = P(y_n | \beta_n) P(\beta_n = b) \quad (4)$$

For a continuous variable this probability is calculated with an integral where the logit probability is weighted with $f(\beta_n)$ which is the density function of β_n .

$$P(y_n) = \int P(y_n|\beta_n)f(\beta_n) \quad (5)$$

The researcher can specify the distribution of β_n (e.g. normal, log-normal, uniform, etc.) which best fits the data and which produces the most statistically significant parameter for each variable; although the distribution should conform to economic theory.

Estimation with RP-SP does not simply involve pooling the data because the scale factor of the indirect utility function may differ between the data sets (Hensher et al, 1994). The scale parameter is inversely related to the variance of the random term in the utility function. Traditionally, there are two ways of estimation (see, for instance Ortuzar and Willumsen, 2001): one is to use a nested logit model; and the other, which is applied here, is to scale the SP part with the RP, giving:

$$U_i^{RP} = \theta X_i^{RP} + \alpha X_i^{RP} + \epsilon_i \quad (6)$$

$$\mu U_i^{SP} = \mu(\theta X_i^{SP} + \phi X_i^{SP} + \eta_i) \quad (7)$$

Equation (6) represents the utility of RP alternatives, and equation (7) the utility of SP. μ is the scale factor of the SP part of the utility. There are some variables and parameters of both functions that are common and some which are specific. Finally α , θ and ϕ are parameters to be estimated. Vector α represents those parameters that are specific for RP data, θ a vector of parameters for the common attributes and ϕ parameters attributes only found in the SP part. The factor μ should be expected to be between zero and one because it is assumed that SP data may have more noise than RP.

2.1 Willingness to pay

In welfare economics and for policy purposes it is useful to estimate the willingness to pay (WTP) for each attribute. WTP is usually calculated as the ratio of the attribute and the cost coefficient. WTP is the ratio of the two marginal utilities which, for the k attribute is:

$$WTP = \frac{\partial V / \partial X_k}{\partial V / \partial P} = \frac{\beta_k}{\beta_c} \quad (8)$$

Where β_k is the coefficient of attribute k , and β_c is the coefficient of cost. However this method is only correct for fixed parameters. In the case of random parameters different methods need to be applied (see Sillano and Ortuzar, 2005) since the ratio of two random parameters is not easy to analyze (Armstrong and Ortuzar, 2001). For instance, for the case of two normal variables, although it is known that distributes Cauchy (Arnold and Brockett, 1992) its mean and deviation are unknown. Fortunately, WTP can be obtained by inserting this ratio in the utility function and estimating it directly. This parameter will have its own distribution avoiding any further problem (Train and Weeks, 2005; Scarpa et al., 2008).

Thus, for instance in the case of parameter k , this can be replaced by the product of WTP and parameter

of cost in the utility function like this

$$\beta_{cost} \cdot WTP_k = \beta_k \quad (9)$$

Alternatively WTP can be obtained in preference space running simulations or by fixing the cost coefficient. A recent paper (Hole and Kolstad, 2012) compares both methods recognizing that preference space, although it might fit better the data, differences are negligible and recommend using several methods. In our case, since price deviation is really significant we prefer to undertake WTP space which is common practice nowadays.

3. Literature on theatre demand

Early research on the demand for the performing arts considered demand mainly as a function of price. Over time more sophisticated empirical models were developed (see Withers et al, 1980; Throsby and Withers, 1979; Throsby, 1994; Corning and Levi, 2002; and Akdede and King, 2006; among others). In these models quality also entered the demand function as well as price. Throsby (1983) included quality through a set of characteristics or variables associated with the good: repertory classification (classic work, modern work); author (known, unknown); standard of performance (acting, dancing, singing, playing instruments); standard of production and design.

Abbe-Decarroux (1994) used five criteria to describe quality: repertoire classification (classic play, modern play, contemporary and atypical); reputation of the playwright (known/ unknown); reputation of the play (measure through reviews); reputation of the director; and whether the play was an in-house production or not. He argued that the quality of the play is anticipated and, therefore, there is always a risk factor because consumers do not have complete information prior to the show¹. Colbert et al, (1998) analyzed factors determining theatre demand through market segmentation and price discrimination. They identified two kinds of consumers: those rich in time but poor in money, who were sensitive to price; and those rich in money but poor in time, whose demand was much more inelastic with respect to price. Choice could also be determined by the quality of production, whether an in-house production, the existence of substitute products, and the size of the theatre company.

Urrutiaguer (2002) argued “[quality] cannot be ignored for single products like works of art. Each theatrical presentation, for example, is a singular combination of the artistic and the technical team’s work led by the director who interprets the play”. In his model quality is defined through reviews, repertory classification, and the prestige of the venue. Werck and Heyndels (2007) defined demand for

¹ Abbe-Decarroux and Grin (1992) find that this risk might be a factor of attraction of certain audiences like youngsters since theatre can be more risky and risqué than other performances like opera or concerts.

theatre in terms of the language of the play, the age of the playwright, whether the play is an adaptation or not, the number of actors and whether the production was new or a remake; whilst Zieba (2009) described quality through three indicators: the ratio of guest performances over the total performances; the quality of the artist; and the quality of the costumes and design. The various factors influencing demand for theatre, are documented in Table 1.

The perception of quality ex-ante is an important factor in terms of determining demand for theatre (Abbe-Decarroux, 1992). The expected cost of failure to correctly assess quality ex-ante is high for theatre goers, in terms of money and time if the production fails to live up to expectations. Individuals often seek information on productions before deciding whether or not to attend a performance. This assessment of the quality is based on a set of features such as the type of play, author, cast, director, and assessment of experts (namely ‘critics’) through reviews.

RP studies such as that by Werck and Hyndels (2007) and Zieba (2009) have estimated WTP for theatre productions, and the relationship between ticket prices and theatre attendance. SP studies such as that by Willis and Snowball (2009) estimated WTP for different genres, contexts, and language in the South African National Arts Festival. But to our knowledge, this is the first paper that uses a RP-SP model to estimate the value of theatre productions.

TABLE 1 ABOUT HERE

4. Data and questionnaire design

Data was collected from people attending productions at the Theatre Royal, the main theatre in Newcastle. This theatre represents around 380 shows per year, has a 1224 seating capacity, and is the regional home of the Royal Shakespeare Company. 700 questionnaires, with pre-paid reply envelopes, were distributed to a random sample of theatre-goers to the Theatre Royal over a five week period during April and May 2009. 421 questionnaires were returned by post. Unfortunately 68 individuals omitted to answer at least one of the key socioeconomic questions (gender, education level, occupation, particularly income level) required for the model, and these individuals were not included in the final dataset for the joint RP-SP model which comprised 353 individuals. An additional 89 individuals left the RP question unanswered, and 3 did not respond to the SP part. For those answering the SP part, a very small number of individuals did not answer all 10 choice sets, so for these few individuals there were less than 10 choice sets per respondent. Most questions related to the SP choices, but actual choices were also recorded with price paid, as well as personal characteristics of the theatre-goer.

4.1 Revealed Preference

Most studies of theatre demand based on RP use a standard aggregate demand model², and not a discrete choice model (DCM). Aggregate demand models cannot analyze individual's decisions and WTP. The DCM in this paper is the first theatre based discrete choice RP study.

The questionnaires, distributed over five weeks, and covered people attending six shows, and four different types of production: ballet (modern), drama, family show, and a musical. These shows are listed in Table 2, with some descriptive statistics from the sample of respondents, and characteristics of shows.

TABLE 2 ABOUT HERE

Assembling RP data can be problematic. In SP the attributes and attribute levels are defined, but in RP the attributes need to be measured, and, except for price, most variables are qualitative.

Prices in theatres depend on the choice of seat, type of show, and time of booking. The Theatre Royal has 12 seat price categories depending on location. The questionnaire asked the respondent how much s/he paid for the ticket. What is not known is how much s/he would have paid for shows not attended but which s/he considered as alternatives to the show attended. This is a challenge in RP modelling (Grisolia and Ortuzar, 2010). To avoid an excessive multiplication of alternatives that might make the experiment unmanageable, it is reasonable to suppose in choosing another show, the respondent would choose the same seat zone, assuming stable seating preferences. Also prices theatre goers are willing to pay for seats are determined by personal characteristics: age, income, status (student, friends of theatre), etc. which are permanent as well. Therefore if the subject pays a certain price category for his real choice, it is reasonable assume that s/he will choose the same seat category for other shows. Once the individual reveals his ticket price, the seat location for that show or production can be identified.

An important issue in RP models is the availability of alternatives, since a DCM evaluates the probability of purchasing one alternative in relation to other alternatives not chosen. In some RP models this is not a problem. In transport alternative modes of transport for the individual are well known. Neither is it a problem in SP where all individuals face specified alternatives. But in the RP theatre case, it is not clear what these alternatives were at the time the theatre-goer chose and booked a show. The RP model requires information on alternatives not selected. Such information was only available to the researchers for Theatre Royal shows not selected. It was important therefore to identify individuals who selected a show from those available at the Theatre Royal; and to exclude those who considered a whole range of

² E.g. where the number of people attending different shows is modelled as a function of the characteristics of the shows.

other alternative theatres and shows throughout the region for which the researchers had no information (Table 3).

TABLE 3 ABOUT HERE

Individuals who chose the venue (Theatre Royal), and then considered which play(s) to attend during the season, from the selection available at the Theatre Royal, were included in the RP model. Response 1 in Table 3 identifies these individuals who selected a show(s) from the six productions in Table 2 during spring 2009, as does Response 6. Other individuals who ignored alternatives in decision-making (Response 2), or selected a play on impulse (Response 3), or who attended because someone else had made the decision (Response 4) were excluded from the RP sample. Some respondents selected the Theatre Royal show after considering plays at other theatres (Response 5). Since the authors had no information on these plays, and their characteristics, this group also had to be excluded from the RP model. However, all respondents excluded from the RP model were included in the SP model.

Some 60% of individuals (Responses 1 and 6) were suitable candidates for inclusion in a RP model. The number in categories 3 and 5 are negligible. Categories 2 and 4 are individuals that did not make a comparison between plays.

An analysis of open ended answers (Response 7 in Table 3) reported in Table 4 provided further insights into respondents decisions to attend the play. Many respondents referred to the ticket as a gift. These individuals were excluded from the RP sample, although the gift of the ticket may have been for a play they wished to see. Many people simply stated “I wanted to see this play” which is the second most popular category. It is also clear that reviews, television, publicity and other communication channels led influenced their decision. Some referred specifically to their desire to see “these great actors”; others stated they are attending the theatre on recommendation (from friends or others). This clearly demonstrates the importance of ‘word of mouth’ in making decisions to see a particular show (Grisolia & Willis, 2011). A small number attended the play for educational reasons. Finally, some respondents referred to a personal connection with the play.

TABLE 4 ABOUT HERE

‘Reviews’ are difficult to quantify for RP models. Many reviewers do not provide a quantified classification system. The star rating system was adopted in this study. Although it is ordinal, it was treated as cardinal and additive, to produce averages from at least four different theatre reviewers. The review sources used newspapers (*The Daily Telegraph*, *The Journal*, *The Guardian* and *The Independent*)

and more specialist magazines (*Whatsonstage*, *Croitontoday.co.uk*, *Edinburgh out*). Two of the six shows achieved high ratings: “An Inspector Calls” had an average of 5 over five reviews) and “For King & Country had an average of 4 over five reviews. These are equivalent to the category of reviews ‘*very good* and *must see*’ in the SP analysis.

The cast of some shows included famous actors: “Waiting for Godot” included Ian McKellen, Patrick Stewart, Simon Callow and Ronald Pickup (described as “an absolutely stellar cast”³); whilst the musical “Johnson & Co” included another prominent actor: Allan Stewart. The author of the play can also have a considerable influence on demand (Abbé-Decarroux, 1994). Of the plays in the sample, at least two were classic plays: “An Inspector Calls” written by JB Priestley, and “Waiting for Godot” written by Samuel Beckett.

4.2 Stated preferences

SP attributes and levels were identified from discussions with Theatre Royal management, and by exploring attributes and levels with three focus groups. The attributes chosen were: price, type of show, context, reviews, type of production, cast and writer. Table 5 shows attributes and levels for the SP choice alternatives.

Prices of tickets were set £15, £22, £30 and £45, to encompass Theatre Royal ticket prices and expressions of WTP from focus group participants. The ‘type of show’ was selected to reflect those usually presented at the Theatre Royal: drama, comedy, opera and musical.

Content reflected the period in which the work was written. The word “classic” was avoided since it also has connotations of high quality. Instead 1900 was set as the delimiter: whether the work was written before 1900 or after 1900. The Royal Shakespeare Company (RSC) forms an important element in Theatre Royal productions. Including the RSC as an attribute was problematic because it fixed the type of cast (famous), the author (known), and the context (pre-1900). Therefore it was included as a level in the attribute *context*.

Reviews of shows have been shown to be an important variable (Grisolia and Willis, 2012). Reviews were categorised as they are usually expressed in newspaper and magazine ratings. Four levels plus a base level of “none available” were used. The levels were: poor, average, very good, and must see.

Type of production or style of production was also included. This categorised the interpretation of a play, which can affect public choice. The experimental design included two levels: a traditional production –

³ Peter Lathan in *The British Theatre Guide*

defined in the information to respondents as “a play where costume and scenarios reproduce the time where the play was written and the way it was conceived by the dramaturge (i.e. Hamlet with costumes of XVII cent.)”; and a modern adaptation – defined as “a free adaptation where costumes might be modern, and scenarios, background and other aspects of the play might be altered. It could be a free interpretation by the director”.

Cast assessed the effect of a famous cast on demand. Cast had two levels: “unknown” (although they could be professional actors), and “famous”. The author or writer attribute considered whether the writer affected demand for the production. Again writer had two levels: known and unknown to the general public.

The alternative specific constant was type of show. In the case of the RP and SP model these were drama, ballet, musical, comedy and family show, with drama specified as the reference alternative that was normalized to zero.

TABLE 5 ABOUT HERE

A labelled experiment was chosen; that is, an experiment in which one or more choice alternatives within the choice set is labelled (Hensher et al, 2006). In our case the labels were the basic shows that mentioned: drama, comedy, opera and musical. Figure 1 illustrates an a example of a choice card.

FIGURE 1 ABOUT HERE

Our design was not balanced in terms of levels of attributes. A balanced design guarantees that attributes levels appears the same number of times (Rose, 2010). Although this property is desirable, it has not been concluded to be necessary (Kanninen, 2002). In our case we sacrificed balance for the sake of realism since levels of attributes were determined by the reality of the different realistic combinations of attributes and levels (e.g. the vast majority of “theatre reviews” were either “must see” or “very good”), and the need of respondents to understand the choice experiment and find the choice card combinations credible.

Once the attributes and levels were set, an experimental design was employed to determine the combination of attribute levels for each choice alternative. A Bayesian D-efficient experimental design (Bliemer and Rose, 2008; Ferrini & Scarpia, 2007) was used. This type of design aims to maximize the amount of information the experiment can capture from the combinations of attributes and levels. Using

priors from focus groups and previous research models of choice of theatre shows, we ran 100,000 simulations looking for the minimum D-error of the inverse Fisher matrix.

Research has shown that between 6 to 13 choice tasks (Caussade et al., 2005) seems to be the optimal number to present to respondents, because this range minimises the error variance of the estimates. In our case we had to be cautious because the questionnaire was administered after attendance at shows, and therefore it was more likely that individuals abandon the task before completion. We tested different numbers of choice sets for this research at the Theatre Royal, as well as in Northern Stage, in several focus groups and found 10 choice sets was a good compromise between complexity and empirical gains.

5. Discrete choice econometric models

The models were estimated using Biogeme⁴ (Berlaire, 2003; 2008). Multinomial logit (MNL), mixed logit (MXL) and mixed logit with socio-economic variables (MXLSE) were estimated based on the RP, SP, and joint RP-SP data sets. The RP model is explained first, followed by the SP model, and then the joint SP-RP which is a MXL model with socio-economic variables. Random parameters were estimated assuming a normal distribution. All models are documented in Table 6.

TABLE 6 ABOUT HERE

The RP model included type of show (ballet, musical, family), cast, and reviews. Since only differences in utility matter, drama is the reference point against which the utility of other types of show are measured. Alternative specific constants represent different types of show. Only one type of show parameter is significant: Ballet with a positive coefficient of 2.23. The most prominent variable is ‘reviews’, which here represents ‘very good’ and ‘must see’: this coefficient is 2.89 and is the highest and the most significant in the RP model, followed by cast (2.22). The RP model identifies two factors that most influence theatre demand, apart from type of show: these are good reviews and a well-known cast. Price has the right sign but it is only significant at 80%. The difficulties estimating the RP are attributable to the limited sample of only 264 individuals across six shows. Other attributes such as the ‘context’ of the play or the ‘type of production’ were not statistically significant in the RP model.

The experimental design allowed more variability in attributes in the SP model. Thus many more variables have a statistically significant impact on choice, including price. The SP coefficients closely mirror those of the RP-SP model. However, the RP-SP results might be preferred over the SP results because the RP-SP model also includes actual real choices made by individuals; and also because the RP-SP model includes more statistically significant parameters to explain theatre-goers’ tastes. The log-

⁴ This is a free package software which can be downloaded from <http://transp-or.epfl.ch/page63023.html>

likelihood of the three models is not directly comparable because of differences in sample size and number of parameters.

A scale factor of 0.942 was estimated, which was not found to be statistically significantly different from 1, using a t-test and also the test proposed by Swait and Louviere (1993). As a result, since there is no gain in scaling SP data, it was pooled, and this is the RP-SP model shown.

The main attributes of the plays in the RP-SP data model are displayed in Table 6. Excluding socio-economic variables and the standard deviation for the random parameters, the most prominent positive attribute is RSC with a contribution to the utility of 0.507 and a statistical significance of 5.60. This result supports policy towards the RSC: RSC plays at the Theatre Royal are always fully-booked, and the results here clearly indicate the popularity of the RSC amongst theatre-goers. It shows a general appreciation of RSC as indicative of high quality theatre.

After RSC, a 'review' indicating the show is 'very good and a must see' is the second most importance factor in the utility function. The importance of 'reviews' in choice of show was noted by Grisolia and Willis (2010) from a survey of audiences at another theatre: Northern Stage. This attribute has almost the same magnitude as the RSC with a coefficient of 0.472 and a high significance *t*-ratio of 6.45. A very good 'review' clearly has an enormous impact on the choice of show.

Modern production, refers to a play in which characteristics, language, expression, background and other aspects have been interpreted freely by the director; rather than keeping the original costumes and context when the work was written. This attribute had a positive coefficient, 0.466, clearly statistically significant, indicating the average theatre-goer prefers a modern production. A famous cast also contributes positively to the choice of production, with a coefficient of 0.415, and highly statistically significant. The coefficient for a play written after 1900 by a known author has a value of 0.394: audiences prefer modern plays written by recognized playwrights. An 'average review' also contributes positively to choice and demand, with a coefficient of 0.360; although a 'very good and must see' review multiplies the influence of this attribute in the demand by a factor of 1.3 compared to an 'average' review.

A play written before 1900 by a known author has a positive effect on choice, compared to a play written before 1900 by an unknown author. The coefficient for this attribute is 0.196, and clearly significant. Modern plays written by a known author have a positive effect on utility (0.394) compared to a modern play written by an unknown author (0.175). The attribute 'modern play written after 1900 by unknown author' only signifies the utility of a modern play. Recall that this is in comparison with the baseline: a

play written before 1900 by an unknown author. Clearly audiences prefer modern plays written by celebrated authors, leaving aside Shakespeare which is, itself, a genre.

In terms of ‘type of show’, drama is the base or reference case. Thus all coefficients relating to type of play are interpreted with reference to drama. Other types of production (musical, comedy, ballet, opera, and family show), have a negative coefficient. This does not mean that theatre-goers reject these genres, only that they provide less utility on average than drama productions.

Price is negative, as expected, and also clearly significant. Other factors with a negative coefficient include a poor review (Reviews 1), with a coefficient of -0.103. Its influence is notably less than a ‘must-see’ review, and also less significant. Thus while people take cognizance of a poor review they give it less weight in their choice decision.

A musical, with a coefficient of -0.327, is preferred less than drama the most popular genre. This is followed by comedy (-0.430), ballet (-0.645), opera (-1.60), and the least preferred is a family show (-2.81). This may be partly explained by the sample, which did not include an opera which appeals to specialised audiences. In terms of ranking, drama is most popular, followed by musical, and comedy, with family shows and opera appealing to a more specialist market.

Heterogeneity can be evaluated in two ways, by using socioeconomic variables of theatre-goers to explain variability in taste, and by capturing heterogeneity through a mixing distribution where taste is allowed to vary over respondents. The former is often named systematic heterogeneity in contrast to the later which, does not follow a known pattern and might be called non-systematic or random heterogeneity (Ortuzar and Willingsen, 2011). Socio-economic variables are included by interacting these with an attribute; whilst a mixed logit (MXL) model maps out differences in taste across respondents by estimating a distribution of coefficients for an attribute according to a specified function.

Systematic heterogeneity was tested by the inclusion of variables such as age, income, education, and families with dependent children. The specific coefficients reflect the attribute level multiplied by socio-economic or demographic variable. Seven interactions (highlighted in italics) were found significant, as revealed in Table 6.

Age of respondent was banded into four ranges and was found to significantly interact with Opera, Musical, and Comedy for individuals less than 30 years old. Those aged less than 30 interacted negatively with ‘famous cast’. People below the age of 30 years find comedy (positive coefficient) appealing, and musicals unappealing and opera more so. Young audiences obviously feel more

connected to comedy, compared to opera. It is interesting to notice this and might reflect a future decline in the demand for classic representations like opera.

Everyone with a degree was included in the group: 'highly educated'. Education interacted with *Musical* and *Comedy*. In all cases the coefficients were negative, particularly for musical and comedy. *Ipsa facto* this suggests a preference for drama for highest educated group.

An interaction was also observed between household composition (families with dependent children) and demand for particular types of show, notably comedy and family shows, indicating a greater demand for comedy and family shows from households with dependent children.

The random parameters in the model, apart from price, related to the type of play, because type of show where most heterogeneity in preferences is concentrated: tastes differ by type of show more than other objective characteristics. Thus, a musical, with a mean coefficient of -0.327 has a large deviation of 1.09; indicating that 61% of the sample considered a musical negatively in relation to a drama, but 39% considered it better than drama. This standard deviation is statistically significant.

A coefficient mean and deviation of -1.89 and 1.60 respectively for opera implies that 88% of people have a negative coefficient and prefer drama to opera; whereas the rest of sample consider opera preferable to drama. Both mean and standard deviation coefficients are highly significant. For comedy the coefficient mean of -0.430 has a deviation of 0.389 which indicates that 89% of the sample has a negative coefficient and 11% positive coefficient for this genre. For price the coefficient mean is -0.012 and deviation -0.0089 indicating that 91% of the sample have a negative coefficient.

Less than 10% of the sample considered the RSC negatively. Conversely more than 90% of the sample had a positive coefficient for the RSC. The coefficient mean was 0.507 with a standard deviation of 0.411. Aside for price, this was the smallest deviation in relation to the parameter mean for all the attributes; indicating a major beneficial perception of the RSC, with a strong concentration and homogeneity of opinion on this.

6. Willingness to pay

Willingness to pay for different attributes was obtained using willingness to pay space models as explained in the methodological section. For all parameters, a Normal distribution was assumed. Table 8 shows WTP for the main attributes without interaction terms. These are GBP (in 2009 prices) per show with reference to a drama, non RSC, production without reviews.

TABLE 7 ABOUT HERE

WTP for comedy and musicals are negative compared to drama productions. WTP to see RSC is positive compared to other drama productions. The standard deviation of the random parameters are all highly statistically significant for comedy, musical, and RSC. A musical is valued negatively at £27.47, relative to drama, but this allows for a wide difference in the population as indicated by the high deviation of this WTP. Comedy appears more popular, although not so popular as drama, since mean WTP is lower than drama by £10.72, and there is considerable variability in the sample (st dev £38.35). *Family* and *Opera* are not reported because there were no opera shows in the sample; and whilst there was a family show it only accounted for 4% of respondents.

In general the WTP values look large but this is probably the result of two factors: First, the model is anchored with real choices and it might be that respondents paid little attention to prices whenever they selected a play, and mainly based their choice on their tastes, type of play, cast and other attributes before price. Second, in reality, for those shows considered in the sample, differences in prices were small. This high WTP might be the result of high inelasticity in theatre demand as suggested in other studies (see Zieba, 2009).

FIGURE 2 ABOUT HERE

The RSC provides, not only the highest WTP, £63.07, but also the lowest std. deviation, indicating general approval of RSC as a quality product with a high WTP. Negative values of WTP are located in the extreme of the distribution (Figure 2), whereas in the WTP population distribution of comedy and musical shows tastes differ much more, as can be seen in the distribution of values in the histograms.

For the non-random parameters, discarding those non-significant attributes such as *reviews 1* and *modern play unknown author*, the analysis shows: WTP for ballet is negative at £48.48 which should be understood as a compensation for changing from drama to ballet. This WTP is not quite significant at the 95% level, but reflects the fact that ballet is a very distinct genre that might not appeal as widely as drama. Also, the portion of ballet attendees was not well represented in the sample. The rest of the WTP values are for characteristics of the play such as famous cast, a known author, and, whether the play was modern. In general, modern adaptations, modern plays rather than classics, a famous cast, a known author and, especially and RSC production are valued most highly. Reviews also play an important role with a clear scaled premium of £38.80 and £54.15 for ‘average’ and ‘must see’ reviews.

For illustration purposes WTP is estimated for SP and RP models (Table 8). RP values were derived from the MNL model as a simple ratio; whereas for SP, which is a MXL, simulation was used⁵. WTP values from the RP model are not significant due the price parameter. For the SP model WTP is similar to the join RP-SP model except for comedy, musical, RSC and Review-poor.

6.1 A social valuation for RSC

The Royal Shakespeare Company (RSC) is a British theatre company, based on Stratford-upon-Avon, whose productions are shared with audiences through touring and residences over the UK, and the world to provide the best possible experience of Shakespeare and live theatre. Founded in 1959 by theatre director Peter Hall, this company, as they claim in their web page is “probably the most famous classical theatre company in the world”⁶.

In 2008/09 the RSC received a public subsidy of £15.2 million GBP (RSC, 2009), which amounted to 48.4% of income; compared with £10.1 million from box office sales (32.3% of income). The remaining income, from donations, etc., amounted to £5.1 million in 2008/09. The RSC is a marketed good. People pay to see the RSC but this revenue does not cover RSC total costs. A social valuation analysis is required to assess whether the RSC justifies the public subsidy. A possible way to undertake this analysis might be to consider the effect of RSC as a policy change; and measure the welfare change as a compensating variation (CV) or an equivalent variation (EV), calculated as the amount of money given or taken from an individual to leave him as well off as in his original position or his changed position (Deaton and Muellbauer, 2007). Welfare valuations estimate changes in social benefits as the sum of revenue plus consumer surplus as a result of certain change. To translate this idea in discrete choice models we follow Louviere et al (2000) or more recently Zhao et al (2012), which is based in the seminal work by Small and Rosen (1981), and is described by the following expression:

$$CV = \frac{1}{\lambda} \left[\ln \sum_{j=1}^J e^{V_j^1} - \ln \sum_{j=1}^J e^{V_j^0} \right] \quad (9)$$

Where V_j^0 and V_j^1 represent the utilities before and after the quality change being measured and the parameter λ is the marginal utility of income which, is represented by minus the coefficient of the price attribute (Jara-Díaz, 2007).

In our case the baseline situation comprises the baseline attributes: drama or comedy written by an unknown author, before 1900, with no famous actors and poor reviews. In contrast superscript 1 would

⁵ This is a free statistical package available at <http://www.r-project.org/>

⁶ www.rsc.org.uk

represent an RSC show with must-see reviews and a famous cast. Shows other than comedy or drama were not considered in the analysis. To apply this formula the betas from RP+SP model were used to calculate the utility functions according to equation (9). The RSC scenario can then be compared with the worst (drama), to simulate a policy change. Since some of the parameters are random, we took draws from normal distributions using R. Applying this formula to our case we obtain an average of £45.91 GBP as a CV measure for this policy. This represents CV per individual. The RSC gives around 858 performances per year and more than 535,000 tickets were sold in 2007/08 (RSC, 2008). This would suggest a social value of the RSC of £24.5 million if we assume this value for every single ticket sold.

This approach raises the issue of the number of people that value the service of the RSC. This is a classic problem in environmental economics (See for instance Hanley et al, 2003). The figure we have used represents the private CV for the total performances in one year. Such a social valuation excludes other external benefits such as education, social capital formation and contribution to national culture. Indeed, people who have never attended a RSC show might be happy to support RSC work. However, considering only the user-value of theatre attendees we show that social valuation might cover the total expenditure of RSC and justify public funds. However, since the RSC was inserted as a level in the attribute “context”, this suggests taking a cautious interpretation of these results.

7. Conclusions

An advantage to joint RP-SP model is that people’s choices are anchored to their real behaviour. The inclusion of RP data also allows the possibility of enlarging the type of plays without expanding the complexity of the SP experiment. However, in this study the RP sample of six plays was limited in the variance it introduced into the RP-SP model. A better understanding of the effect of actual choice and demand in the combined RP-SP model would require a larger number of shows in the RP sample. The disadvantage is that a larger sample of respondents would be more costly to obtain. However, RP might be a feasible a large sample could be obtained from electronic booking data.

The RP-SP model clearly revealed the most important determinants of choice and WTP to be the type of show. Drama is the most popular, followed by musical, comedy, opera and family shows. An extremely important factor is the RSC, which strongly influences choice and is highly statistically significant.

After the RSC, ‘reviews’ are important determinants of choice and theatre demand. A ‘poor’ review did not have an unduly negative impact on choice of show; but good reviews, and ‘very good and must see’ reviews had a strong positive influence on choice. Other attributes influencing choice in a positive ways were a modern production, modern play by a known author, and a show with famous cast.

The study also revealed considerable heterogeneity in tastes. This was assessed by investigating how tastes varied across the characteristics of shows, using a MXL model; and by investigating how tastes varied by the socio-economic and demographic profile of theatre-goers. The socioeconomic characteristics of theatre-goers had a considerable effect on choice: younger people preferred comedy and disliked opera. Young people were less interested in whether a cast was famous compared to the average theatre-goer. Theatre-goers with higher education exhibited less interest in comedy and musicals, and more interest in drama. As might be expected, families with dependent children were more engaged by comedies and family shows. The effect of price on choice was greater for low and medium income individuals, and this group were willing to pay less for the attributes of shows than the average theatre-goer.

The study revealed considerable non-systematic heterogeneity with respect to the type of show (musical, opera, and comedy), the RSC, and price. Much of this heterogeneity in tastes is explained through differences in the tastes, attitudes, and preferences of theatre-goers.

These results can be used by theatre managers to inform policy towards theatrical productions and ticket prices. Also since tastes are shaped at an early age, demand may change over time through audience ageing: demand for classic genres may decline and comedies may expand.

References

- Abbe-Decarroux, F. (1994). The perception of Quality and the Demand for Services. *Journal of Economic Behaviour and Organization* 23(1): 99-107.
- Abbe-Decarroux, F. and Grin F. (1992). Risk, Risk Aversion and the Demand for Performing Arts. In R. A. Towse and A. Khakee (eds.), *Cultural Economics*. pp. 125-140. Springer Verlag, Berlin.
- Akdede, S. H. and King J.T. (2006). Demand for and productivity analysis on Turkish public theatre. *Journal of Cultural Economics* 30: 219-231.
- Arnold, B and Brockett P. (1992) On the distribution whose components ratios are Cauchy. *The American Statistician* 46: 25-26.
- Bierlaire, M. (2003). BIOGEME: A free package for the estimation of discrete choice models. *Proceedings of the 3rd Swiss Transportation Research Conference*. Ascona, Switzerland.
- Bierlaire, M. (2008). [biogeme.epfl.ch]. An introduction to BIOGEME Version 1.7.

- Bliemer, M. C. J. & Rose J. M. (2008). Construction of experimental designs for mixed logit models allowing for correlation across choice observations. 87th Annual TRB Meeting, Washington, D.C., January 2008, USA.
- Börjesson, M. (2008). Joint RP-SP data in a mixed logit analysis of trip timing decisions. *Transportation Research Part E* 44: 1025-1038.
- Boxall, P.C., Englin J., and Adamowicz W.L. (2003). Valuing aboriginal artefacts: a combined revealed-stated preference approach. *Journal of Environmental Economics and Management* 45: 213-230.
- Caussade, S., Ortuzar, J. de D., and Rizzi L. a. (2005). Assessing the influence of design dimensions on stated choice estimates. *Transportation Research B* 39: 621-640.
- Colbert, F., Beauregard C., and Valle L. (1998). The importance of ticket prices for theatre patrons. *International Journal of Arts and Management* 1: 8-15.
- Corning, J. and Levy A. (2002). Demand for live theatre with segmentation and Seasonality. *Journal of Cultural Economics* 26: 217-235.
- Deaton, A. and Muellbauer J. (2007). *Economics and Consumer Behaviour*. Cambridge University Press, Cambridge.
- Ferrini, S. and Scarpa R. (2007). Designs with a priori information for non-market valuation with choice experiments: a Monte Carlo study. *Journal of Environmental Economics and Management*, 53: 342–363
- Grisolía, J. M., and Ortúzar J. de D (2010). Forecasting vs. observed outturn: Studying choice in faster inter-island connections. *Transportation Research Part A: Policy and Practice* 44(3): 159-168.
- Grisolía, J.M. and Willis K.G. (2011). An evening at the theatre: using choice experiments to model preferences for theatres and theatrical productions. *Applied Economics* 43: 3987-3998.
- Grisolía, J.M. and Willis K.G. (2012). A latent class model of theatre demand. *Journal of Cultural Economics* 36(2): 113-139.
- Grisolía, J.M., Willis K.G., Wymer C., Law A. (2010). Social engagement and regional theatre: patterns of theatre attendance. *Cultural Trends Volume* 19(3): 225-244
- Gujarati, D. (1992). *Essentials of Econometrics*. McGraw-Hill, New York.
- Hanley, N., Schläpfer F., and Spurgeon J (2003). Aggregating the benefits of environmental improvements: distance-decay functions for use and non-use values. *Journal of Environmental Management* 68(3): 297-304.
- Hensher, D.A., Rose J.M., and Greene W. (1994). Stated Preference Analysis of Travel Choice: the state of practise. *Transportation* 21: 107-133.

- Hensher, D.A., Rose J.M., and Greene W. (2006). *Applied Choice Analysis: a premier*. Cambridge: Cambridge University Press.
- Hensher, D.A., Stopher P.R., and Louviere J.J. (2001). An exploratory analysis of the effect of numbers of choice sets in designed choice experiments: an airline choice application. *Journal of Air Transport Management* 7(6): 373-379.
- Hole, A. R., and Kolstad J.R. (2012). Mixed logit estimation of willingness to pay distributions: a comparison of models in preference and WTP space using data from a health-related choice experiment. *Empirical Economics* 42(2): 445-469.
- Jara-Díaz, S.R. (2007). *Transport Economic Theory*. Elsevier Science, Amsterdam.
- Johnson, F.R. (2004). Combining Revealed and Stated Preferences to Predict Uptake and Adherence. RTI Health Solutions, Research Triangle Park, NC.
- Kanninen, B.J. (2002). Optimal Design for Multinomial Choice Experiments. *Journal of Marketing Research* 39: 214-217.
- Lancaster, K. (1966). A new approach to consumer theory. *Journal of Political Economy* 74 (2): 132-157.
- Levy-Garboua, L. and Montmarquette C. (2002). The demand for the arts. In R. Towse (ed.) *Handbook of Cultural Economics*. Edward Arnold, London.
- Louviere J.J., Hensher D.A., and Swait J.D. (2000). *Stated Choice Methods: Analysis and Application*. Cambridge University Press, Cambridge.
- McFadden, D. and Train K. (2000). Mixed MNL models for discrete response. *Journal of Applied Econometrics* 15(5): 447-470.
- Oczkowski, E. (1994). A hedonic price function for Australian premium table wine. *Australian Journal of Agricultural Economics* 38(1): 93-110.
- Ortuzar, J. de D. and Willumsgen L. (2001). *Modelling Transport*. John Wiley, Chichester.
- Powe, N.A, Garrod G.D., and Willis K.G. (1995). Valuation of urban amenities using a hedonic price model. *Journal of Property Research* 12: 137-147.
- Rose, J. M. and Bliemer M.C.J. (2004). The Design of Stated Choice Experiments: the state of practice and future challenges. Institute of Transport Studies Working Paper ITS-04-10. University of Sydney. Institute of Transport and Logistic Studies. Sydney.
- Rose, J. (2005). *Designing Stated Choice Experiments*. Design Workshop. Universidad Catolica de Chile.

- Rose, J. M. and Bliemer M. C. J. (2010). Stated choice experimental design theory: the who, the what and the why. *Podium presentation presented at the 3rd Conjoint Analysis in Health Conference*. Newport Beach, CA. 2010.
- Royal Shakespeare Company (2008). *Annual Report and Accounts 2007/2008*. RSC, Stratford on Avon.
- Royal Shakespeare Company (2009). *Annual Report and Accounts 2008/2009*. RSC, Stratford on Avon.
- Scarpa, R., Thiene M., Train K. (2008). Utility in willingness to pay space: a tool to address confounding random scale effects in destination choice to the Alps. *American Journal of Agricultural Economics* 90(4): 994-1010.
- Sillano, M. and Ortuzar J de D. (2005). Willingness-to-pay estimation with mixed logit models: some new evidence. *Environment and Planning A* 37(3): 525-550.
- Small K.A. and Rosen H.S. (1981). Applied welfare economics with discrete choice models. *Econometrica* 49, 105-130.
- Swait, J. And Louviere J. (1993). The Role of the Scale Parameter in the Estimation and Comparison of Multinomial Logit Models. *Journal of Marketing Research* 30 (3): 305-314.
- Throsby, C.D. (1994). The production and consumption of the arts: a view of cultural economics. *Journal of Economic Literature* 32(1): 1-29.
- Throsby, C.D. and Withers G.A. (1979). *The Economics of the Performing Arts*. Edward Arnold, London.
- Throsby, D. (1990). Perception of quality in demand for the theatre. *Journal of Cultural Economics* 14(1): 65-82.
- Train, K. (2003). *Discrete Choice Models with Simulation*. Cambridge: Cambridge University Press.
- Train, K. and Weeks M. (2005). Discrete choice models in preference space and willing-to-pay space in R. Scarpa and A. Alberini (eds) *Applications of simulation methods in environmental and resource economics*. Chapter 1, pp 1-16. Springer, Dordrecht.
- Train, K.E. and Wilson W.W (2009). Monte Carlo analysis of SP-off-RP data. *Journal of Choice Modelling* 2(1): 101-117.
- Urrutiaguer, D. (2002). Quality judgements and demand for French public theatre. *Journal of Cultural Economics* 26: 185-202.
- Werck, K. and Heynelds B. (2007). Programmatic choices and the demand for theatre: the case of Flemish theatres. *Journal of Cultural Economics* 31: 25-41.
- Willis, K.G and Snowball J.D. (2009). Investigating how the attributes of live theatre productions influence consumption choices using conjoint analysis: the example of the National Arts Festival, South Africa. *Journal of Cultural Economics* 33: 168-183.

- Willis, K.G. (2002). Stated preference and the estimation of environmental values. *International Journal of Environmental Studies* 59(6): 635-646.
- Withers, G. (1980). Unbalanced Growth and the Demand for Performing Arts: An Econometric Analysis. *Southern Economic Journal* 46: 735-742.
- Zhao, Y., Kockelman K., and Karlström A. (2012). Welfare calculations in discrete choice settings: An exploratory analysis of error term correlation with finite populations. *Transport Policy*, 19(1): 76-84.
- Zieba, M. (2009). Full income and price elasticities of demand for German public theatre. *Journal of Cultural Economics* 33: 85-108.

Table 1: Most important variables in theatre demand determination

Variable	Sub-Variable	Description	Author ¹
Price and price of substitutes			Corning et al. (2002); Colbert, (1998); Abbe-Decarroux, (1994); Zieba (2009) and others
Quality assessment	Reputation of the theatre	Perception of the quality of the theatre (through loyalty of attendance)	Urrutiaguer (2002)
	Reputation of the director	Whether the director manages a theatrical institution or not	Urrutiaguer (2002)
	Quality of the design and costumes		Zieba (2009)
	Quality review	Review of media using a “cardinal” scale From 1 (very poor) to 5 (excellent)	Corning et al. (2002); Colbert, (1998) ;Abbe-Decarroux (1994)
	Reputation of the author, play, producer and cast	known / unknown	Abbe-Decarroux (1994);
	In-house production	Whether it is an in-house production	Colbert, (1998); Abbe-Decarroux (1994)
	Size of the company		(Colbert, 1998); Akdede et al. (2006)
	Quality word of mouth	From 1 (poor) to 5 (must see)	Grisolia and Willis (2009)
Type of play	Repertoire classification*	a) classic play (written before 1900) b) modern play (written after 1900-decease of the author) c) contemporary play (written after 1900- living author) d) atypical play (circus, revenue, collective creation)*	Corning et al. (2002);Abbe-Decarroux, (1994); Urrutiaguer (2002)
Other variables	Time of performance	Matinee Evening - Preview: the very first performance of a show - Opening: billed as especial event and - Regular: not all shows had a preview or opening	Corning et al. (2002)
	Time of performance-week	weekend /weekday	Corning et al. (2002)
	Substitutes products	Whether or not there are substitutes available	(Colbert, 1998)
	Subscriber	Whether the responder is a subscriber or not	Corning et al.,(2002) Colbert, (1998) Felton,(1989)
	Socioeconomic variables: income, education level, time availability and others		Corning et al.(2002); Werck and Heynelds (2007); Swanson et al. (2008)

¹ This list of authors is not exhaustive, but merely to provide a selection of authors who have addressed these particular issues.

² Abbe-Decarroux (1994) did not find the variable *repertoire classification* to be significant, along with the reputation of the play. However he found that reputation of the author and producers were very significant. Other authors might observe different findings

Table 2: Alternatives and attributes in the RP part of the questionnaire

	Type of play	Show	min price (£)	Max Price (£)	Average price	Reviews	Cast
1	Drama	For King & Country	8	25	16.5	v. good	
2	Ballet	Eternal Light Tour	9.5	22	16.5		
3	Drama	An Inspector Calls	12	25	17.54	must see	
4	Family show	Le Grand Cirque Fantasy	12.5	33.5	25.80		
5	Musical	Jolson & Co	14	29	19.54		famous
6	Drama	Waiting for Godot	10	40	27.06		famous

Table 3: Responses to survey question on decision alternatives

	Statements	Results
1.	“I checked the season leaflet for the Theatre Royal and I picked this play”	42.62%
2.	“I saw an advert, I thought it was interesting and I decided to come here without checking any other play in other theatres”	12.13%
3.	“I had the impulse to go to the theatre, so I just came over without checking other plays”	0.66%
4.	“I didn’t really make the decision. I am accompanying someone who really wanted to see this play”	14.10%
5.	“I wanted to go to the theatre this day so I checked plays in different theatres and I chose this one”.	3.28%
6.	“I usually attend plays in Theatre Royal and I thought this one was interesting”.	6.56%
7.	Other situation (please state):	17.38%

Table 4: content analysis of the open question

Categories in the open question	Results
Gift	31.11%
See the play	17.78%
Communication (tv, press, emails, marketing...)	17.78%
Actors	8.89%
Recommendation	8.89%
Education	4.44%
Personal connection to the play	4.44%
Other categories	6.67%

Table 5: Attributes and levels of the SP questionnaire

Variable	Levels
• <i>Price (pounds)</i>	15, 22, 30, 45
• <i>Type of show</i>	Drama (baseline) Comedy Musical Opera
• <i>Context</i>	Written before 1900 (baseline) Written after 1900 RSC
• <i>Reviews</i>	Non available (baseline) Poor Average Very good Must-see
• <i>Type of production</i>	Modern Traditional
• <i>Cast</i>	Unknown (baseline) Famous
• <i>Author</i>	Unknown (baseline) Known

(*) Baseline means that the other variables are introduced in the function using dummies and this one is expressed by default with the value of the utility (i.e. the basic value would represent a drama, written pre-1900, with no reviews, modern interpretation, with an unknown cast, by an unknown author, and shown in Theatre Royal)

(**) Venues are analysed in terms of an alternative specific constant. Since the model only works with differences (only differences matter in utility), one of the alternatives is used arbitrary as the reference, in this case the Theatre Royal

Table 6: RP, SP and join SP-RP models

c	Name (<i>SE dummy in italics</i>) and random parameters in bold	Join RP+SP		SP		RP	
		Value	t-stat	Value	t-stat	Value	t-stat
Type of show	Drama (reference)						
	Ballet	-0.646	-2.58			1.04	2.23
	Musical (mean)	-0.327	-2.57	-0.267	-2.09	-0.370	-0.60
	Musical (standard deviation)	-1.07	-11.77	-1.13	-11.49		
	<i>Musical * high educated people</i>	-0.860	-4.69	-0.990	-5.49		
	Opera (mean)	-1.89	-11.40	-1.87	-11.71		
	Opera (standard deviation)	-1.60	-9.28	-1.59	-9.53		
	<i>Opera * youngsters (below 30)</i>	-0.891	-2.46	-0.911	-2.69		
	Comedy (mean)	-0.430	-5.45	-0.424	-5.31		
	Comedy (standard deviation)	0.389	3.95	0.409	4.01		
	<i>Comedy * high educated people</i>	-0.381	-3.55	-0.396	-3.67		
	<i>Comedy * youngsters (below 30)</i>	0.302	2.81	0.341	3.03		
	<i>Comedy * families with dependent children</i>	0.277	2.25	0.277	2.30		
	Family (mean)	-2.81	-3.92			-0.979	-4.70
	<i>Families with children * Comedy + family show</i>	0.277	2.25				
Classic versus modern, known and unknown author	Show written before 1900 and known author	0.196	3.09	0.200	3.12		
	Modern play (written after 1900) and known author	0.394	5.89	0.436	6.49		
	Modern play (written after 1900) and unknown author	0.175	1.98	0.180	1.93		
Type of production	Modern production	0.466	7.45	0.503	7.62		
Cast	Cast	0.415	9.37	0.428	9.45	2.22	5.09
	<i>Cast * youngster (below 30)</i>	-0.208	-1.97	-0.184	-1.71		
Price	Price (mean)	-0.0122	-5.81	-0.0121	-5.84	-0.0248	-1.54
	Price (standard deviation)	-0.00899	-2.01	-0.0125	-3.49		
Reviews	Reviews 1 : poor	-0.103	-1.09	-0.125	-1.30		
	Reviews 2 : average	0.360	4.72	0.311	3.87		
	Reviews 3: very good + must see	0.472	6.45	0.394	4.92	2.89	6.36
RSC	RSC (mean)	0.507	5.60	0.530	5.61		
	RSC (deviation)	-0.411	-2.95	0.369	2.14		
Final log-likelihood		-4381.200		-4034.526		-383.880	
Pseudo-R ²		0.152		0.152		0.188	
Adj. pseudo-R ²		0.147		0.147		0.176	
Observations		3662		3434		264	
Individuals		353		350		264	
Parameters k		27		23		6	

Table 7: WTP for main attributes

(£ per show in reference to drama before 1900 by unknown author with no reviews)

Name	Join RP+SP		SP model		RP model	
	Value	t-stat	Value	t-stat	Value	t-stat
Comedy	-10.72	-1.47	-58.91	-4.91		
<i>Comedy (standard deviation)</i>	38.35	5.55				
Musical	-27.47	-2.55	-35.96	4.73	-14.92	0.54
<i>Musical (standard deviation)</i>	-111.24	-19.99				
RSC	63.07	6.93	81.21	5.99		
<i>RSC (standard deviation)</i>	36.08	2.58				
Ballet	-48.48	-1.86			41.94	1.29
Family Show					-39.48	1.61
Cast	57.78	11.19	56.81	5.63	89.52	1.62
Classic show known author	19.94	3.32				
Modern play known author	36.43	4.90				
Modern play unknown author	6.56	0.65				
Modern production	58.54	15.47				
Reviews 1 poor	-5.30	-0.67	-16.91	5.32		
Reviews 2 average	38.80	5.57	43.3	15.92		
Reviews 3 (must see and very good)	54.15	7.31	55.12	4.38	116.53	0.94

Figure 1

Type of play	Drama	Comedy	Musical	Opera
Price	£ 45	£ 22	£ 22	£ 30
Context	After 1900	Before 1900		After 1900
Reviews	Must see	Average	Very good	Non available
Type of production	Modern adaptation	Modern adaptation		Traditional production
Cast	Famous	Famous	Unknown	Famous
Writer	Known	Known	Unknown	Known
I would choose... (tick one)	☐	☐	☐	☐

Figure 2