MAJOR INFLUENCES ON THE DEMAND FOR OPERA TICKETS

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According to Opera America, the service organization for professional opera companies in the Americas, earned income covers just over half of the expenses of opera companies. In spite of a recent Lou Harris poll (1988) which indicates that a majority of U.S. tax payers would be willing to pay somewhat higher taxes to support the arts, it appears unlikely that we will have the opportunity to do so in the foreseeable future. Furthermore, with federal and foundation support for the arts declining, it becomes imperative for performing arts organizations to explore all available avenues for expanding their earnings base. The threat of extinction has become more than an idle one: both the Dallas Ballet and the Nashville Symphony have suspended performances this season for lack of funds. The obvious place to start would be at the box office in these or in any performing arts organizations.

Several studies of the demand functions of performing arts organizations exist (Houthakker and Taylor, 1970; Withers, 1980; Touchstone, 1980; Lange and Luksetich, 1984; Throsby and Withers, 1987; Greckel and Felton, 1987). All but the last of these look at the demand for the performing arts in the aggregate, or in a particular performing medium. Results differ with respect to both price and income elasticities of demand, but there seems to be a consensus among the other authors that, for the larger performing organizations at least, the price elasticity of demand is inelastic. The verdict differs with respect to the importance of income as a factor in influencing demand. Withers (1980) found it to be of some significance, while Lange and Luksetich did not. The Greckel/Felton paper, on the other hand, examined the demand functions for two individual performing organizations in Louisville, Kentucky: the Louisville Orchestra and the Louisville Bach Society. The rationale for pursuing a microeconomic approach was mainly that, as artistic and financial decisions are made at the local

level, it is important to find out what the experiences of have been and discover the impacts upon the individual companies. The significant factors associated with demand and some of the elasticities differed sufficiently between the two organizations to warrant further pursuit of this line of investigation.

In order to eliminate differences due to the type of performance, twenty opera companies in the U.S. were chosen for study with the help of the Opera America staff. Companies were selected based on the likelihood of their having reliable data and on ensuring a diversity of budget groups and geographical regions. The intent was to develop a model of the demand for opera tickets. Price and income elasticities were calculated, and some of the other important influencing factors were identified. Finally, an attempt was made to develop an algorithm for forecasting future demand for tickets at the company level.

The Model

Following conventional microeconomic demand theory, opera attendance is considered to be dependent on the price of admission, consumer incomes, and tastes. In addition, the model includes variables which attempt to capture the influences of the health of the local economy, of the number of performances offered, and of efforts at marketing the product. The model can be expressed as:

$$\frac{ATT_{it}}{POP_{it}} = f(P_{it}, Y_{it}, U_{it}, N_{it}, R_{it}, M_{it})$$

where

ATT_{it} = the number of attendees of the i^{th} company during the i^{th} season

POP_i = the population of the i^{th} company's market area

P_i = the real average ticket price of the i^{th} company

Y_i = the real per capita income for its geographical area

U_i = the unemployment rate for its geographical area

N_i = the number of performances offered during its regular-season

R_i = the popularity rating of its season offerings

M_i = its real marketing expenses.

Average ticket price would ideally be calculated as a weighted average; i.e., by multiplying the proportion of ticket purchasers at each price level by the price of the ticket, and adding the products. Companies do not carry out such a calculation, so the average ticket price was arrived at by dividing income from ticket sales by the number of attendees, using separate calculations for subscribers and single ticket holders. The results were not always credible.

Hypothesizing that season subscribers make their plans based in part on the expected health of the economy and hence their ability to afford a season subscription, the local unemployment rate was included in the model. Not being sure about the time horizon people use to form their expectations, four different rates were tried, one for the current calendar year, one calculated to coincide with the season, a lagged rate, and a leading rate. For example, for the 1986-87 season, we would have tried the unemployment rate for calendar year 1986, an unemployment rate calculated to coincide with the season (July 1986 to June 1987), the 1985 unemployment rate, and the 1987 rate. With unemployment being a lagging indicator, the season rate and the leading rate were the only ones that proved to be significant.

In order to capture the influence of taste, we calculated a popularity rating. The "popularity" of each opera performed was rated on a scale of from one to five, with five being most popular. A rating for the season was then calculated as the average of the rating of each of the operas in that season's repertoire. We expected attendance to be positively associated with per-capita income, the number of performances, the popularity rating, and marketing expenses; and negatively associated with ticket prices and the unemployment rate in the general economy.

We would have liked to include a variable to reflect the availability of leisure time since, according to pollster Lou Harris (1988), the availability of time has a much more important influence on attendance than the cost of tickets. In addition, a quality index reflecting what kind of performances the operas were receiving might have yielded meaningful results. Finally, we would have liked to include the price of a substitute, such as symphony concerts, in each company's locality. Unfortunately, no such information was available. Besides, with data for only seven seasons for most companies, we were rapidly running out of degrees of freedom.

Data and Method

Each of the twenty companies selected was contacted first by phone, and then immediately sent a detailed letter describing the research project. Most seemed enthusiastic about the project and flattered at being asked to participate. Each was requested to furnish data about subscriber and single ticket attendance and income for as far back of possible, but not beyond the 1975-76 season. One question asked about the extent of marketing areas.

Of the twenty companies contacted, only five companies responded, two of those with either sketchy or spurious information. Opera America eventually came to the rescue with data on at least subscriber attendance for eleven more companies as far back as the 1979-80 season. Since all ticket sales were lumped together for seasons prior to that one, there was no purpose in trying to go back any farther. The information on ticket income and marketing expenses had to be obtained from other sources. Demographic and economic data for each of the twenty geographic areas were collected from the usual government sources.

Initially, simple regressions were run between *total* attendance and each of the independent variables for the three companies for which data on both subscriber and single attendance were available. Not one of the six independent variables proved to be significantly associated with total attendance. Separate regressions were then run for *subscriber* attendance and *single ticket* attendance. All the results for single ticket attendance continued to be insignificant, while some of the results for subscriber attendance turned out to be highly significant.

Our results were not a complete surprise. If the amount of leisure time is indeed an important variable which has been left out of the equation, subscribers and single ticket holders are bound to be quite different populations. Subscribers have basically decided to fit their schedules around attending the performances, while single-ticket holders fit attendance around their schedules. Furthermore, their reasons for attending opera performances may be quite different.

Once this dichotomy became evident, all attention was directed to the subscribers. For each company, simple regressions were run against each of the six independent variables in order to identify those most likely to be significant. The original data, as well as single and double logarithmic transformations were used. Once the likely explanatory variables had been identified, ordinary least squares multi-

ple regressions with backward elimination were run using only the most likely candidates to arrive at the best model.

The Results

Table 1 lists the remaining companies in the sample in order of the average price per performance of a subscription ticket, with San Francisco Opera charging the highest price, $38, and Opera Carolina the lowest at $12.50. The rankings are not surprising. With the exception of Baltimore, the companies having the largest budgets also charge the highest prices, presumably in order to be able to put on the grandest performances. Interestingly, except for the San Francisco Opera, these are not the companies with the highest number of subscribers per capita, which are for the most part found in cities with smaller populations. Table 1 also lists price elasticities of demand where they were found to be significant. The discussion will return to these below.

Table 2 shows the results of the separate regressions of subscriber attendance per 100,000 population with each of the independent variables for each company. No two companies ended up with exactly the same combination of potentially significant variables. Even where companies shared some of the same variables, the significance levels varied widely. Sometimes there was not even agreement about the sign of the regression coefficient. For each independent variable, there was at least one company which ended up with the "wrong" sign. For example, the price coefficients for the Chicago Opera Theater and the Dallas Opera turned out positive.

The results of the multiple regressions are shown in Table 3. Of the original twenty companies, only seven remain for which meaningful associations could be obtained. Real ticket price proved significant for only three of the seven companies, Houston, San Francisco, and San Diego. All three companies charge noticeable higher admission prices than the remaining four companies. By using a double logarithmic transformation of the model, price elasticity coefficients emerge. The results are very interesting in that they reveal elastic demand for the San Francisco Opera (1.62), unit elasticity for the San Diego Opera (1.00), and inelastic demand for the Houston Opera (.64). (See Table 1.) It appears that the San Francisco Opera has raised prices sufficiently to penetrate the elastic portion of its demand curve. One might wonder how a one-dollar difference in ticket prices between Houston and San Francisco could have that much of an impact. But the San Francisco Opera performed 14 operas during the 1985-86 season,

TABLE 1

SUBSCRIBER ATTENDANCE AND AVERAGE TICKET PRICES

Company	Budget Group*	1985 Subscriber Attendance per 100,000 Population	1985 Average Subscriber Ticket Price	Price Elasticit of Demanc
San Francisco Opera	1	10,036	$38.09	-1.62
Houston Grand Opera	1	1,617	37.11	- .64
Washington Opera	1	1,036	36.25	
Baltimore Opera	2	633	32.07	
Dallas Opera	1	1,696	30.93	
San Diego Opera	1	1,458	28.01	-1.00
Pittsburgh Opera	1	2,123	22.81	
Chicago Opera Theater	3	195	20.23	
Tulsa Opera	2	2,389	19.81	
Kentucky Opera	2	1,904[1]	19.44	
Portland Opera	2	2,081	18.51	
Arkansas Opera Theatre	3	606	15.65	
Opera Carolina	2	2,383	12.51	

*Budget Groups

1 - $3 million and above

2 - $1 million to under $3 million

3 - $350,000 to under $1 million

[1] 1986 attendance

TABLE 2

SIMPLE REGRESSIONS OF SUBSCRIBER ATTENDANCE PER 100,000 POPULATION

Company	Real Subscriber Ticket Price		Real Per Capita Personal Income		Unemployment Rate			Number of Performances		Popularity Rating		Real Marketing Expenses	
	R^2	F	R^2	F		R^2	F	R^2	F	R^2	F	R^2	F
Arkansas Opera Theatre								.27	1.82 (.235)	.53	4.44 (.103)	.45	2.45 (.215)
Baltimore Opera										.51	3.09 (.177)		
Chicago Opera Theater	.72	12.70 (.016)			SUR	.19	1.18 (.327)					.63	8.64 (.032)
Dallas Opera	.17	1.05 (.352)	.27	1.82 (.235)	NYUR	.20	1.27 (.310)						
Houston Grand Opera	.53	5.59 (.064)	.48	4.70 (.082)	SUR	.23	1.52 (.273)	.60	4.46 (.125)			.68	8.60 (.043)
Kentucky Opera	.28	2.31 (.180)								.47	5.26 (.062)		
Opera Carolina	.65	9.48 (.028)	.40	3.40 (.125)	NYUR	.41	3.52 (.119)	.93	38.73 (.008)				
Pittsburgh Opera			.36	2.84 (.153)				.87	19.50 (.022)			.33	2.50 (.175)
Portland Opera	.33	2.45 (.179)	.24	1.61 (.260)	SUR	.17	1.00 (.363)					.21	1.36 (.295)
San Diego Opera	.88	65.35 (.000)	.64	17.45 (.002)	NYUR	.27	3.78 (.080)	.36	5.59 (.040)			.57	6.64 (.050)
San Francisco Opera	.94	73.74 (.000)			NYUR	.20	1.28 (.309)					.34	2.55 (.171)
Tulsa Opera	.34	3.04 (.132)	.50	5.99 (.050)	SUR	.33	2.96 (.136)						
Washington Opera								.73	8.14 (.065)				

Numbers in parentheses indicate the significance of F.

SUR - Season Unemployment Rate; NYUR - Next Year's Unemployment Rate.

TABLE 3

MULTIPLE REGRESSIONS OF SUBSCRIBER ATTENDANCE PER 100,000 POPULATION

Company	n	R^2	F	DW	Constant	Real Ticket Price	Real Per Capita Personal Income	Next Year's Unemployment Rate	Number of Performances	Popularity Rating	Real Marketing Expenses
Houston Grand Opera	6	.99	201.12 (.0006)	2.93	3971.11 (.0000)	-162.10 (.0015)					-.0016 (.003)
Kentucky Opera	8	.47	5.26 (.06)	2.48	1081.77 (.010)					192.03 (.060)	
Excluding '85-'86	7	.81	21.53 (.006)	2.18	1173.60 (.0003)					178.95 (.006)	
Opera Carolina	5	.93	38.73 (.008)	1.55	-554.46 (.241)				367.24 (.008)		
Pittsburgh Opera	5	.87	19.54 (.022)	3.38	642.36 (.082)				82.26 (.022)		
San Diego Opera	7	.99	58.48 (.017)	3.01	6040.24 (.014)	-374.06 (.017)		-129.82 (.066)	58.45 (.076)		-.01 (.039)
San Francisco Opera	7	.94	73.74 (.0004)	2.47	18152.82 (.0000)	-675.58 (.0004)					
Tulsa Opera	8	.50	5.99 (.050)	1.98	-14.04 (.083)		3.55 (.050)				

Numbers in parentheses indicate significance levels.

while Houston put on seven and San Diego four. Consequently, the total cost of a subscription would have been significantly higher for a San Francisco subscriber.

The implication for the San Francisco Opera is that it would take in more dollars at the box office if it lowered its subscription price, provided it has empty seats to accommodate the extra subscribers. The San Diego Opera, meanwhile, seems to have found its optimal price, and should not raise prices by more than the rate of inflation. Houston Opera, on the other hand, could profit at the box office by raising prices, but may not wish to do so because of the detrimental effect on attendance.

Real per capita income proved to have no significant relationship to subscriber attendance for any of our companies. In light of the aforementioned conflicting findings of past research about the importance of income as an explanatory variable for the demand for tickets, our results would tend to corroborate the conclusion that income is relatively insignificant.

The expected unemployment rate appears to have had a significant effect on the attendance of the Tulsa Opera and the San Diego Opera. In Tulsa, a one percent increase in next year's expected unemployment rate has been associated with a drop in subscriber attendance of 153 per 100,000 population. This relationship can be expected to operate in reverse as well; that is, a one percent decrease in unemployment would lead to an increase in subscribers.

The number of performances appears to be particularly influential for Opera Carolina, but also important for the Pittsburgh Opera and the San Diego Opera. For Opera Carolina, an additional performance is associated with additional attendance by 367 subscribers per 100,000 population. Whether or not that would generate sufficient income to pay for the expense of an additional performance is something the company would have to determine. Surprisingly, only for the Kentucky Opera Association was the content of the season significantly associated with subscriber attendance. In other cities, popularity ratings appear to have had little effect on subscriber attendance. Marketing expenses proved to be significant only for the Houston Grand Opera and for the San Diego Opera, unfortunately in the wrong direction, although the size of the impact is estimated to be minuscule. In each case, a $1,000 increase in marketing expenses would reduce subscriber attendance by one person per 100,000 population. Nevertheless, if one assumes that the purpose of spending money to market one's product

is to increase demand, the fact that this variable proved either insignificant or to have a negative effect should give directors of marketing some cause for concern.

Conclusions

One of the main reasons for undertaking this project was to ascertain whether it might be possible to develop a model of attendance that could be used for forecasting this variable. Here, one fervently wishes for twenty or thirty years of reliable data. But working with what is available has not resulted in total failure. While forecasts can only be made for those companies for which we have been successful in fitting a model, the predicted values for past years, as shown in Table 4, demonstrate a fairly decent fit at least for Houston, San Diego, and San Francisco, and a fair fit for Kentucky and Tulsa. The usefulness of the model to predict future attendance, of course, depends in part on whether the variables continue to be related in the future as they have been in the past.

What else can we conclude from all this? I believe this study has demonstrated, first, that companies, even when engaged in the same performing medium, are sufficiently diverse to warrant separate treatment. Second, it is equally important to treat subscribers and single ticket holders as different populations. Third, the significant explanatory variables for subscriber attendance vary from company to company. Fourth, some companies may have succeeded in raising ticket prices to the point where the price elasticity of demand is now elastic. One would wish to examine the experiences of some of the other large companies, such as the Metropolitan Opera and the Lyric Opera of Chicago, as well as some of the major orchestras, to see if this is the case. Fifth, income does not appear to have a significant effect on subscriber attendance. Sixth, marketing expenditures do not appear to have had a significant effect on subscriber attendance either, and where they have, the effect has been negative. Finally, it appears to be possible to forecast subscriber attendance accurately enough to be useful to management, at least in the case of several of the companies studied. As is usually the case, this paper raises more questions than it answers, opening the way to further avenues of research.

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TABLE 4

ACTUAL AND PREDICTED SUBSCRIBER ATTENDANCE PER 100,000 POPULATIC

Houston Grand Opera

Season	Actual	Predicted
79-80	2595	2648
80-81	2866	2804
81-82	2498	2511
82-83	3010	--
83-84	1809	1774
84-85	2021	2052
85-86	1617	1618

Kentucky Opera

Season	Actual	Predicted
79-80	1786	1889
80-81	1833	1845
80-81	1749	1755
82-83	1767	1800
83-84	1947	1845
84-85	1479	1486
85-86	1381	--
86-87	1904	1845

San Diego Opera

Season	Actual	Predicted
79-80	3179	3111
80-81	3233	3266
81-82	2666	2652
82-83	2536	2575
83-84	2044	1968
84-85	2121	2208
85-86	1458	1458

San Francisco Opera

Season	Actual	Predicted
79-80	12526	12393
80-81	11276	11545
81-82	7929	8076
82-83	10508	9740
83-84	9605	9792
84-85	9842	10009
85-86	10036	10166

Tulsa Opera

Season	Actual	Predicted
79-80	3421	3005
80-81	3187	3173
81-82	2363	2746
82-83	2584	2242
83-84	2284	2578
84-85	2415	2578
85-86	2389	2395
85-86	2546	2471

Note: The author wishes to thank Ellen Blassingham and Jane Keegan of Opera America for their generous help, as well as the San Diego, Portland, and Arkansas Operas for providing much needed data. She would also like to thank Norman Gill for his invaluable assistance. Thanks go as well to Indiana University Southeast for its financial support of this research. Needless to say, any blunders are entirely my own.

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