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Managerial Objectives of Symphony Orchestras

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This paper considers the managerial objectives of not-for-profit symphony orchestras in the United States. Using data compiled by the American Symphony Orchestra League, an empirical analysis reveals dual attendance (quantity) and performance quality concerns for Major and Urban Community orchestras; and quality-only concerns for Metropolitan orchestras.

It has long been an issue of some concern to economists as to whether the objectives and subsequent behavior of non-profit organizations deviate significantly from the objectives and behavior of profit organizations. This concern is not at all unexpected given that the applicability of the profit-maximization assumption of firm objective to for-profit firms has also been challenged. Indeed, the implications of alternative objectives with respect to firm behavioral patterns and society's welfare have been analyzed and discussed in some detail.[1]

An even greater degree of skepticism has been expressed regarding the applicability and efficacy of using the profit-maximizing assumption to analyze the behavior of non-profit organizations. Investigators such as Newhouse (1971) have suggested that non-profit organizations may have output and quality related goals. Others such as Throsby and Neilson (1980) have noted that when quality enters as a direct element in an organization's objective function the theoretical analysis of pricing and output decisions becomes much more complex.

Organizations in the non-profit performing and/or visual arts industries have characteristics that further complicate the analysis of the objectives and resulting decisions of these sorts of organizations. Specifically, a substantial proportion of the revenues received by many of them is in the form of donations and grants. These non-ticket revenues can be used to increase the quality of the programs, reduce the ticket prices or affect the number of performances. Presumably, the uses of grant and donation funds will vary accordingly with the objectives of the non-profit institutions. The various possible relationships between non-ticket revenues and decision variables of the non-profit arts firm depending upon the arguments of the objective function have been modeled by Hansmann (1981). The model yields potentially unambiguous comparative statics for the determination of dominant arguments of the objective functions of non-profit arts firms.

It is generally postulated that non-profit arts firms maximize output, as measured by attendance or events, or quality, or that they maximize some combination of the two. Such assumptions allow these institutions to make decisions on price, quality and the number of services, choosing the combination of decision variables most likely to maximize the objective function, subject, of course, to some budget constraint. The objective of this paper is to establish the existence, if any, of the dominant arguments of the objective functions of performing-arts firms. Determination of arguments in the objective function uses Hansmann's previously developed comparative statics.

The reduced-form equations for a simultaneous decision variable model of symphony orchestra behavior are reported and provide the first rigorous attempt to document the arguments of non-profit performing-arts firm's objective functions by the use of comparative statics. This information should aid in gauging an organization's performance relative to the goals of the industry. Furthermore, to the extent the goals of these firms can be established, information is also provided to donors regarding the consistency of the donor objectives with those of the recipient organizations.

The data set employed in the statistical estimation procedure documents amounts and sources of all income (earned and unearned) and data describing activities and attendance of all 28 Major and 59 Metropolitan orchestras and 41 of the

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Urban/Community orchestras in the United States for the year 1970.[2] Orchestras are classified as Major, Metropolitan or Urban/Community by size of budget, Majors having budgets in excess of $500 000, Metropolitan budgets being between $100 000 and $500 000 (with a few having somewhat larger budgets), while Urban/Community budgets were between $50 000 and $99 999 and upto $50 000, respectively (*Statistical Abstract*, 1970). The data were compiled by the American Symphony Orchestra League and are collected largely from forms prepared by the League. Consequently, they are closely comparable between and among orchestras.

The next section of this paper presents a brief description of a simultaneous decision variable model of non-profit symphony orchestras and a discussion of the data used to measure the variables and estimate the model. The estimation of the reduced-form equations allows evaluation of the comparative statics as developed by Hansmann for non-profit performing-arts firms.

The estimated reduced-form equations are reported separately for each of the three general types of symphony orchestras in the subsequent section. This explicitly allows for the possibility that firms in the same industry facing different budget constraints may exhibit different behavior and/or pursue different objectives. The possibility of differing objectives by budget size across non-profit firms has not been explicitly treated in the literature.

The discussion of the statistical estimates is followed by a comparison of the results with conditions derived from the model developed by Hansmann to determine the relative importance of attendance and quality in the objective functions of the orchestras. This provides information regarding the various goals of different orchestra classes, and reveals the impact on various orchestra decision variables associated with the receipt of non-ticket revenues or grants. A summary concludes the paper.

EMPIRICAL MODEL

The model of symphony orchestras portrays the orchestras an non-profit institutions maximizing attendance, quality or some combination of the two goals subject to a budget constraint that is at lest partially determined by the ticket price, the orchestra quality, the number of concerts and the total season attendance of the performances. The constraint is also affected by the size and nature of the subsidies received in the form of grants (i.e. the dollar amount, the purpose of the grant and/or whether there is a matching or other sort of requirement).

A list of symphony orchestra performance measures and other exogenous variables afffecting the performance of symphony orchestras is shown in Table 1. The availability of the data listed in Table 1 allows the estimation of the model of symphony orchestras shown below, where:

$$Q_i = F(P, X_1) \quad \text{(supply)}$$
$$Q_i = F(P, X_2) \quad \text{(demand)}$$

therefore,

$$Q_i = F(X_1, X_2)$$
$$P = F(X_1, X_2)$$

Table 1. Definitions, Mean Values and Standard Derivations ( ) by Orchestra Group

		Major
	Endogenous variables	
ATIN	Total season attendance (excluding out-of-town attendance)	344 830 (163 600)
PRICE	A weighted average of price from all non-out-of-town programs. Computed by dividing gross income from ticket sales by *ATTN*	$2.13 ($1.07)
TOTCON	Total number of concerts performed (excluding out-of-town concerts)	143 (41)
QUAL	Total expenses for artistic personnel divided by the total number of players in the symphony orchestra	$15 426 ($6 127)
	Exogenous variables	
INC	Median family income of the SMSA or city in which the orchestra is located	$10 947 ($883)
EDSP	Percentage of the SMSA or city retail sales for eating and drinking purposes. A measure of an area's development and/or the availability of substitute	8.5 (1.4)
POP	Population of the SMSA or city in which the orchestra is located	3 112 500 (2 996 800)
TAXES	One minus the highest marginal personal income tax rate for the state in which the orchestra is located	0.945 (0.05)
GRT-YES	Grants from non-profit institutions or public agencies which require services	$207 802 ($142 600)
GRT-NO	Grants from non-profit institutions or public agencies which do not require services	$512 960 ($495 490)

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Here output, Q_i, is alternatively measured by equations for attendance (*ATTN*), quality of performance (*QUAL*) or number of concerts (*TOTCON*). Exogenous variables in the vectors X_1 and X_2 include income (*INC*), other goods (*EDSP*), population (*POP*), seating capacity of the auditorium (*SEATS*), grants which require no services (*GRT-NO*), grants which require services (*GRT-YES*) and one minus the highest marginal personal income tax rate of the orchestra's state (*TAXES*).[3,4] As hypothesized by Hansmann, ticket prices may be below average cost or, as evidence indicates, in the inelastic range of the demand function.[5] However, many patrons are willing to forego a portion of the resulting increased consumer surplus in orchestra service consumption in the form of a tax-deductible contribution. The variable, *TAXES*, is therefore included as a proxy for the cost of any self-imposed or voluntary ticket price discrimination on the part of patrons. The estimated reduced-forms of the model provide the data for application of the conditions specified by Hansmann to determine quality- or attendance-maximizing preferences of symphony orchestras.

The model developed by Hansmann uses a general specification of a net revenue function of the non-profit symphony orchestra as:

$$NR = nP(n, q) + D(n, q) + L - C(n, q) = 0$$

This equation expresses ticket revenue as a product of attendance, n, and the inverse demand function $P(n, q)$, where P is ticket price and q is quality. Donations are a function of the same arguments as the inverse demand function (n, q) as costs, C, are as well. The lump-sum grants or subsidies are L.

With this general specification of net revenue Hansmann is able to generate qualitative first-order conditions with regard to a quality- or attendance-maximizing symphony orchestra. The conditions reveal the sign of expected changes that occur in attendance and quality due to changes in non-ticket revenues. These conditions are provided in a subsequent section of this paper. In order to use the conditions established by Hansmann to attempt to identify the objective function of orchestra groups attendance, ticket price, concert numbers and orchestra quality would necessarily be modeled as or similar to the above equations.

STATISTICAL RESULTS

The reduced-form equations of the model shown above were estimated by ordinary least squares and the results are reported in Tables 2–4. Composite tests were performed to establish the appropriate symphony groupings among the three types. Test results indicated it was necessary to reject the hypothesis of parameter equalities across orchestra subgroups. The application of Hansmann's developments does not require estimating or reporting the reduced-form equations for ticket price and concert numbers. However, these equations are also reported in Tables 2–4.

The differences across orchestras by size in response to the receipt of lump-sum subsidies are readily seen by examining the estimated coefficients for *GRT-NO* in the reduced-form equations reported in Tables 2–4. The exogenous variables in the reduced-form equations are naturally the same for all equations and the same specification was used for all three subgroups.

The results in Tables 2–4 indicate that increases in lump-sum grants are associated with increased quality across all orchestras. The impact of these funds on attendance is significant for both Major and Urban-Community orchestras. The estimated coefficient in

Table 2. Estimated Reduced-Form Equations of Symphony Orchestra Behavior: Major Orchestras.

	ATTN	PRICE	TOTCON	QUAL
CONSTANT	−1554400	3.54	−525.98	−2046.1
	(951750)	(6.21)	(233.2)	(28125)
GRT-NO	0.14	0.000001	0.00002	0.009
	(0.06)	(.0000004)	(.00001)	(0.002)
GRT-YES	0.56	−0.0000028	0.00022	0.014
	(0.204)	(.000001)	(.00005)	(0.006)
INC	47.52	0.00002	0.016	1.12
	(29.8)	(0.0002)	(0.007)	(0.88)
TAXES	1119100	−2.36	441.56	−3792
	(675170)	(4.41)	(165.4)	(19951)
EDSP	8417.2	0.108	5.62	−669.7
	(28854)	(0.188)	(7.07)	(852.7)
POP	0.008	0.000001	0.000005	0.0004
	(0.012)	(0.00000008)	(0.000002)	(0.0004)
SEATS	12.1	−0.0002	−0.0033	0.54
	(36.4)	(0.0002)	(0.009)	(1.06)
R^2	.61	.61	.62	.75
F-statistic	*3.87*	*3.87*	*4.17*	*7.77*

Standard errors are in parentheses.

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Table 3. Estimated Reduced-Form Equations of Symphony Orchestra Behavior: Metropolitan Orchestras.

	ATTN	PRICE	TOTCON	QUAL
CONSTANT	−1211.1	.211	81.38	−221.6
	(21920)	(2.76)	(88.32)	(5794)
GRT-NO	0.007	0.00000009	0.000005	0.0006
	(0.01)	(.0000002)	(.000004)	(0.0002)
GRT-YES	0.40	0.0000004	0.003	0.03
	(0.27)	(0.000003)	(0.0001)	(0.007)
INC	−15.3	0.0003	−0.004	−0.003
	(9.46)	(0.12)	(0.003)	(0.25)
TAXES	139990	−0.423	−33.29	1797.2
	(196910)	(2.48)	(79.3)	(5205)
EDSP	6606	−0.088	0.38	21.2
	(7032)	(0.09)	(2.83)	(185.8)
POP	−0.006	0.00000007	−0.000005	−0.003
	(0.005)	(.00000007)	(.000002)	(0.0001)
SEATS	11.5	−0.0001	0.033	0.17
	(9.32)	(0.0001)	(0.004)	(0.25)
R^2	.15	.18	.25	.34
F-statistic	*1.02*	*1.25*	*1.95*	*2.89*

Standard errors are in parentheses.

Table 4. Estimated Reduced-Form Equations of Symphony Orchestra Behavior: Urban/Community Orchestras.

	ATTN	PRICE	TOTCON	QUAL
CONSTANT	−10715	1.56	14.15	−503.4
	(13781)	(5.30)	(15.48)	(858.2)
GRT-NO	0.52	−0.00003	0.0003	0.025
	(0.14)	(0.00005)	(0.00015)	(0.009)
GRT-YES	0.82	0.00004	0.0008	0.04
	(0.28)	(0.0001)	(0.0003)	(0.017)
INC	0.31	−0.0002	0.0003	0.0031
	(0.50)	(0.0002)	(0.0006)	(0.031)
TAXES	7538	1.355	−11.64	501.74
	(14042)	(5.37)	(15.7)	(86.9)
EDSP	−233.4	0.129	0.07	−0.89
	(221.6)	(0.085)	(0.25)	(13.7)
POP	0.004	0.0000009	−0.0000001	0.00011
	(0.008)	(0.000003)	(0.000008)	(0.0005)
SEATS	3.92	−0.0003	−0.001	0.07
	(0.66)	(0.0003)	(0.0007)	(0.041)
R^2	.91	.22	.63	.77
F-statistic	23.99	1.65	3.91	7.57

Standard errors are in parentheses.

the attendance equation for the Metropolitan orchestras is positive but not statistically significant. Clearly, increased attendance is likely to be associated with quality increases, *ceteris paribus*. It is also interesting to note the impact of lump-sum subsidies on prices and the number of concerts because they also have obvious effects on attendance.

The estimated coefficients in the price equations for *GRT-NO* are positive for both Major and Metropolitan orchestras, but statistically significant for only the Major orchestra group. The estimated coefficient in the price equation in the price equation for *GRT-NO* is negative and insignificant in the Urban/Community group. In the total concert numbers equations the coefficients of *GRT-NO* are positive in all orchestra groups, but significant only in the Urban/Community Group.

The signs of the estimated coefficients for *GRT-YES*, those subsidies requiring services, are also positive and significant in the attendance equations for the Major and Urban/Community orchestra groups. The coefficients for *GRT-YES* in the estimated quality equations are all positive and significant. This is the same pattern of signs and significance as in the case of lump-sum (*GRT-NO*) grants.

The impact of the receipt of grants requiring services

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on ticket prices and concert numbers varies across the subgroups. For the Major orchestra group the estimated coefficient is negative and significant in the ticket price equation and positive and significant in the concert numbers equation. For the Metropolitan and Urban/Community orchestras the signs of the coefficients on *GRT-YES* are positive in both the price and concert equations but significant in only the concert number equations.

These results indicate that quality adjustments are forthcoming regardless of the nature of the subsidy or the orchestra group. Moreover, grants of both types have influence on the attendance of Major and Urban/Community types of orchestras. The relationship between the receipt of these grants and changes in attendance appears to differ significantly between these two groups and the Metropolitan orchestras.

For Major orchestras, grants for which services are not required result in both quality- and price-increases, the former tending to have positive and the latter tending to have negative effects on attendance. The effects of grants for which services are required on the decision measures of price, quality and numbers of concerts appear to be attendance-enhancing. These types of grants have negative effects on price and positive effects on both quality and the total number of concerts performed. The effects of grants of both types on Urban/Community orchestras differs from the Majors in only one respect; grants received by Urban/Community orchestras have no effect on price.

Metropolitan orchestra behavior differs substantially from the behavior of the other two orchestra groups. Grants for which services are not required are estimated to have effects only on orchestra quality, while those for which services are required affect positively only orchestra quality and the number of concerts. The coefficients on *GRT-YES* and *GRT-NO* are both positively related to attendance but are insignificant.

The results reported thus far suggest that different types of orchestras have, given the nature of the orchestras and the constraints they face, different objectives, Major and Urban/Community orchestras opting for attendance-increasing activities and Metropolitan orchestras emphasizing quality-enhancing activities. In the next section the comparative statics of the Hansmann model are compared with the estimates from the reduced-form equations for possible determination of arguments of the objective functions of orchestra groups.

HANSMANN'S CONDITIONS

The qualitative results of the first-order conditions derived from Hansmann's model may be briefly stated. Comparison with statistical estimates reported in this study are provided in the following analysis. Lump-sum grants are those grants or subsidies with no conditions or characteristics with which they are to be associated. The lump-sum grant is distinguished from what Hansmann calls the donation subsidy due to the matching characteristic of the donation subsidy. Thus, donations or contributions by private individuals or businesses are not lump-sum grants in the sense of Hansmann due to the donation subsidy associated with the deductibility for income-tax purposes. Donations from private individuals and businesses are also distinguished from the lump-sum grant in the previously noted net revenue equation and are represented as a function of the same arguments as the inverse demand function. The funds included in the grants for this analysis conform to the Hansmann definition. The receipt of these grants may stipulate that some services are to be performed. In this analysis the funds are separated on that basis. The sources of the grants are either public agencies or non-profit institutions. For the lump-sum subsidy, where L = lump-sum, n = attendance and q = quality, the first-order conditions imply:

$$dn/dL \gtrless 0 \text{ and } dq/dL > 0 \text{ for quality-maximizing, and}$$

$$dn/dL > 0 \text{ and } dq/dL \gtrless 0 \text{ for attendance-maximizers}$$

Thus, if dn/dL and dq/dL are both greater than zero the relative importance of attendance and quality in the symphony orchestra's objective function are indeterminant with respect to lump-sum grants. For the Major and Urban/Community orchestras the estimated coefficients on *GRT-NO* are positive and significantly different from zero in both the quality and attendance equations. This seems to indicate that the objective functions for Major and Urban/Community orchestras are indeterminant

The Metropolitan orchestras appear to have quality-maximization as a dominant goal. While the estimated coefficients on *GRT-NO* are positive in both the quality and attendance equations, the coefficient is only significant in the quality equation. On the basis of the Hansmann conditions, therefore, it can be concluded that Metropolitan orchestras are dominated by quality-maximizing goals.

SUMMARY

The purpose of this paper has been to apply a theoretical development associated with non-profit performing arts firms to data on non-profit orchestras in the United States in an attempt to determine if the arguments of their objective function could be empirically revealed. Estimation was allowed because of the availability of a comprehensive data set compiled by the American Symphony Orchestra League.

Statistical estimation of the model revealed that behavior objectives among types of orchestras varied. Orchestras classified as Metropolitan had quality as the dominant goal, while those in the other orchestra classifications appeared to have no single dominant goal. The results provided here are the first estimates of non-profit symphony orchestra behavior.[6] They are

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consistent, however, with speculations concerning orchestras' goals which were inferred from estimates of price elasticities of demand for symphony orchestra services reported in an earlier study (Lange and Luksetich, 1984). These estimates are useful in aiding in the understanding of the behavior of non-profits in general and in helping decision-makers to allocate resources in a manner consistent with their goals as well as providing information to donors with respect to the consistency of the institution's goals with the donor's preferences.

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NOTES

1. Hicks (1935), for example, suggests that salaried managers pursue objectives such as the quiet life', while Alchian and Kessell (1962) and Baumol (1967) argue, respectively, that the goals of managers are job benefits and sales-maximization. Tullock (1978) presents arguments suggesting that if, indeed, firms are sales-rather than profit-maximizers, the welfare effects of a market economy are even greater than under conditions in which firms are profit-maximizers.
2. Data for later years were not available because of American Symphony Orchestra League policies.
3. The definition here for grants which require services are those funds from non-profit institutions or public agencies whose uses are restricted. Such restrictions are commonly associated with support for certain types of concerts or performances. Many orchestras apply for funds from these sources under various programs to support summer concerts, youth concerts or special public concerts on holidays or at local festivals. Grants referred to here as requiring no services or lump-sum grants are funds from these same sources with no restrictions on the use of the funds. Orchestras commonly receive support from state and local public agencies and a variety of non-profit institutions with no restrictions on the use of the funds.
4. Economic theory and other empirical work (for example, see Lange and Luksetich, 1984, and Withers, 1980) suggests that other measures of population characteristics and market-area characteristics will be important arguments in the estimated equations. Initially included, therefore, in the estimations of the demand equations were unemployment rates, median education, percentage of the population with income above $25 000, percentage of the population over 25 years of age with a college education and percentage of the population in various job classifications. The data were for each SMSA or city, if the symphony was located. Many of these measures exhibited high multicollinearity and, as a result, were consistently found to be not statistically significant and were dropped from further consideration.
5. Hansmann argues (p. 343) that many performing-arts groups face demand curves which lie everywhere below average cost. Estimates of average and marginal costs of symphony orchestra performances by Lange *et al.* (1985) indicate over one half of all orchestras in the United States in 1970–71 were operating in the production range where average costs were declining. Estimates of price elasticities of demand for symphony orchestra services by Lange and Luksetich (1984) indicate that the Major orchestras operate in the inelastic range of the demand curve.
6. The unavailability of additional data preclude construction of a behavioral model of non-profits. Without such data, as Gapinski has noted, research on non-profits must proceed on the basis of relatively small samples (Gapinski, 1984).

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