

AN ECONOMIC NOTE ON AMERICAN

SYMPHONY ORCHESTRAS

by

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We acknowledge helpful comments from music lovers in our department.

ABSTRACT

In this note, we have examined the financial structure of major orchestras and characteristics of their programming. Although findings in the note are subject to some qualifications, they have interesting implications. First, an orchestra seems to operate with an increasing labor productivity with respect to the size of the budget. Second, the frequencies of popular symphonies or contemporary works have no correlation with an orchestra's financial size or strength. Third, the concerto ratio is negatively correlated with the size of an orchestra, measured either in budget or in earned income. If we choose the ratio of earned income to the budget as an explanatory variable, then the concerto ratio is smaller for an orchestra with a higher earned income ratio. We cannot reject a hypothesis that an orchestra schedules more concertos when it is financially pressed. One explanation may be that an orchestra uses concertos to attract a larger audience.

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1. Introduction

American symphony orchestras have long experienced a steady increase in demand for their performances. In the past few years, the Boston Symphony Orchestra celebrated its 100th season while the New York Philharmonic marked its 10,000th concert. New concert halls have recently been built in cities such as San Francisco and Baltimore. Although orchestras, as non-profit organizations, may not consciously maximize profits, they do strive for financial security. Many engage in financially lucrative summer pops concerts, and all have annual fund-raising campaigns. No modern orchestra is singlehandedly financed by a wealthy patron. Moreover, relationships among management, the music director, and musicians have changed dramatically over the years. It is no longer true that a dictatorial maestro can select players and programs at will. Musicians belong to local unions which negotiate wages and fringe benefits. In every respect, symphony orchestras are modern economic organizations which produce musical output in the form of concerts and recordings by hiring players, music directors, and guest soloists.

It is appropriate to apply standard economic theory to analyze cost structures of major American orchestras and to investigate financial influences on the selection of music. First, we examine a conjecture that there are differences in the orchestra labor productivities due to large fixed costs. In other words, payments to musicians are a decreasing proportion of earned income as the annual budget size increases. We will show that this conjecture is confirmed by the data. Second, we investigate whether there are

marked differences in repertoires of major orchestras. An orchestra with financial difficulties might attract a larger audience by programming well-known symphonies instead of contemporary works, or by bringing in famous soloists to play concertos. Examining concert schedules over a three-year period, we find no relationship between financial strength and the selection of either well-known symphonies or contemporary works. However, there is a negative correlation between the frequency of concertos and the size of the annual budget, which suggests that smaller orchestras with less financial strength program concertos in hopes of boosting attendance. This result can be used to predict the consequences of a decrease in government grants to orchestras. We find that a one million dollar cut would increase an orchestra's concerto ratio by 2.76 percentage points. In other words, the cut would result in an increase of about two concerto programs over three years, given that an orchestra plays twenty-five different programs each season.

Baumol and Bowen (1966) studied the cost and revenue structures of performing arts organizations including major orchestras. Our study differs from their section on major orchestras in the following ways. First, we put an emphasis on analyzing programmings of major orchestras. Second, the cost and revenue structure has very much changed since 1966, so that we do not completely agree with their analysis of financial problems. Third, we look at a cross-sectional variation among major orchestras instead of their aggregate characteristics.

2. Data

We select large orchestras for our analysis, using a criterion based solely on the annual budget size. We study the twelve orchestras with the largest average annual budgets during the two-year period 1980-1982. These orchestras had average budgets of around eight million dollars or more, while

all other American orchestras had average budgets of less than six million dollars. The twelve orchestras were also the highest in annual guaranteed wages for their union members. Each union contract in these orchestras covers 52 weeks, while most of the other orchestras have contracts for fewer than 52 weeks.

We use two financial measures to estimate a short-run production function for a major American orchestra. Since all the orchestras have deficits, with operating revenues less than operating expenditures, it is hard to measure "input" and "output." We define output to be the earned income of an orchestra, and the input in the short run is the wages paid to orchestra musicians.

Our analysis of orchestral programming covers the regular season subscription concerts given by the twelve orchestras during 1980-81, 1981-82, and 1982-83. We take an average over three years because there are year-to-year fluctuations in programs; for example, some orchestras have a series of concerts which feature only one or two composers in a single year. It is also true that an orchestra typically does not repeat the same music for at least a few years. We consider three kinds of music: concertos, "popular" symphonies, and contemporary works. The concerto category is in general defined as works featuring one or more soloists accompanied by orchestra. We do not include symphonic works with vocal soloists, since pieces such as masses and Mahler symphonies are clearly not concertos, but we do include arias in the concerto category. We define "popular" symphonies to be those of the best-known classical and romantic composers.¹ The contemporary category includes all 20th century music other than works generally classified as impressionistic or post-romantic. For each orchestra, we determine the total number of concerts

1. These composers are Beethoven, Berlioz, Brahms, Bruckner, Dvorak, Haydn, Mahler, Mendelssohn, Mozart, Schubert, Schumann, Sibelius, and Tchaikovsky.

which include at least one concerto, the number including at least one "popular" symphony, and the number with at least one contemporary work. These figures are then divided by the total number of concerts to obtain three ratios, each showing the percentage of programs with works from the given category.

We obtained the annual budgets, earned income, and musicians' pay from the American Federation of Musicians (1981) (1982), with some adjustments listed in Appendix 1. We calculated the concerto, "popular" symphony, and contemporary ratios from season schedules provided by the orchestras.

3. Labor Productivity

The production function of an orchestra is difficult to estimate. Since most of input and output are in the form of services, they have to be measured in dollars rather than physical units. Moreover, an orchestra is almost always in a deficit, which makes it hard to interpret the estimated relationship between input and output. The relevant statistics are summarized in Table 1.

TABLE 1

NAME	BUDGET	EARN #	WAGE #
BOSTON	17.60	13.38 (.76)	6.07 (.34)
CHICAGO	13.50	8.37 (.62)	4.73 (.35)
LOS ANGELES	13.14	10.51 (.79)	5.06 (.38)
CLEVELAND	12.78	7.65 (.60)	3.59 (.28)
NEW YORK	12.55	7.20 (.57)	6.02 (.48)
SAN FRANCISCO	11.15	7.41 (.66)	5.35 (.48)
PHILADELPHIA	9.65	6.23 (.64)	5.02 (.52)
NATIONAL	9.30	3.72 (.40)	4.56 (.49)
MINNESOTA	8.95	5.30 (.59)	4.05 (.45)
PITTSBURGH	8.05	4.90 (.61)	4.40 (.55)
DETROIT	7.91	2.25 (.28)	3.76 (.48)
ST. LOUIS	7.83	3.27 (.41)	4.39 (.56)

Sources: American Federation of Musicians (1981) (1982) with exceptions explained in Appendix 1.

Brackets indicate the ratio of respective items to budget.

First, we attempt to capture the relationship between the wage bills paid to musicians (WAGE) and the earned income of orchestras (EARN). The wage bills are a major variable cost in producing performances, while earned income represents the direct income from those performances. Regressing EARN on WAGE, we obtain a significantly positive coefficient on WAGE:

$$EARN = -5.29 + 2.52 \text{ WAGE}$$

(4.64) (.96)

$R^2 = .41$
Standard errors in brackets

Since the coefficient on WAGE is larger than one, this relationship suggests that earned income increases faster than wages. Knowing that the earned income is positively correlated with the total budget, this suggests a production function with increasing average labor productivity. In order to verify this conjecture directly, we may regress the average cost, i.e. the ratio of the wage bill to earned income, on the total budget (BUDGET):

$$\text{WAGE/EARN} = 1.92 - .10 \text{ BUDGET}$$

(.30) (.03)

$R^2 = .58$
Standard errors in brackets

The negative coefficient on BUDGET implies decreasing average cost of musicians and thus there is increasing labor productivity. However, we must not jump to the conclusion that musicians in larger orchestras have skills superior to those in smaller orchestras. Since the budgets include expenditures for summer seasons and tours, variations in labor productivity may reflect differences in running lucrative summer seasons or in planning tours. Since all major orchestras have fifty-two week wage contracts with their musicians, the labor productivity measured above may well be a reflection of how productively the management uses musicians.² Thus, it is inappropriate to discuss any political overtones of our result.

2. As Baumol and Bowen (1966; ch. 7) point out, there is little room for productivity increases through the accumulation of capital in the live performing arts. However, labor productivity may increase as marketing of performances becomes better. One example is the recent surge of summer festivals.

4. Selection of Music

One may conjecture that an orchestra might bend its artistic goal to meet financial needs. This belief was stated in a recent magazine article as well as in a serious work in the field:

The separation of arts and state has had one beneficial side effect, though: because American orchestras are rarely very far from the brink, they are forced to make their product appeal to as wide an audience as possible. On the other hand, fiscal constraints often force conservatism in choice of repertory, with unfamiliar or contemporary music slighted so as not to offend those concertgoers principally attracted by the Beethoven symphonies. [Time, April 25, 1983]

[W]e conclude that audience size can sometimes be stimulated by means requiring sacrifices of principle, such as the avoidance of contemporary works, sacrifices which some organizations may be unwilling to accept. [Baumol and Bowen (1966; p.257)]

Aside from the normative question of whether making up programs to please the audience is indeed "beneficial," there are two factual questions pertaining to the above statements. First, it has not been determined whether a majority of concertgoers today are still after only "Beethoven symphonies." Sophisticated patrons may want to listen to a wide range of music. Estimating a demand function of an audience with respect to different types of music is difficult unless some kind of surveys are taken. It still seems true that a majority of the audience enjoys the classical and romantic symphonies.³ Second, even if a majority wants to listen to a certain type of music, it may not be the case that orchestras will comply with these desires. The artistic goal of a major orchestra can include expanding repertoires and even "educating" the audience.

3. For Japanese audiences, there is such a survey (cited in Kurabayashi (1979)). A survey of the NHK symphony subscribers reveals that about 64 percent of their favorite pieces belong to either the classical or romantic school. The details are reproduced in Appendix 2. Baumol and Bowen (1966; pp.255 and Appendix X-G) used a report of attendance for "adventurous" and "popular" programs. This report showed that among the British orchestras, adventurous programs result in a decrease in attendance by at least 20% compared to popular programs.

Let us examine how programmings of major orchestras are different. The concerto, symphony, and contemporary ratios are summarized in Table 2.

TABLE 2

NAME	BUDGET (\$MIL.)	CONCERTO RATIO	SYMPHONY RATIO	CONTEMPORARY RATIO
BOSTON	17.60	51.5	53.0	66.7
CHICAGO	13.50	63.0	50.0	68.1
LOS ANGELES	13.14	79.7	60.9	65.2
CLEVELAND	12.78	67.6	57.7	46.5
NEW YORK	12.55	71.0	51.0	69.0
SAN FRANCISCO	11.15	67.5	53.2	68.4
PHILADELPHIA	9.65	73.8	51.3	57.3
NATIONAL	9.30	71.2	54.2	52.1
MINNESOTA	8.95	84.7	55.6	56.9
PITTSBURGH	8.05	80.6	50.0	63.9
DETROIT	7.91	83.8	60.8	55.4
ST. LOUIS	7.83	77.8	50.0	68.1

We immediately observe that the symphony ratios are very uniform for these orchestras. All of the orchestras schedule popular symphonies at least every other concert on average, but not much more. The contemporary works which financially-motivated orchestras are supposed to avoid also appear in more than half of the programs. The variation in the contemporary ratios has a larger amplitude than that of the symphony ratios, but this does not seem to have any relation to orchestra standings.

The most notable finding in this table is a strong negative correlation between the concerto ratio (CONCERTO) and the budget size. A simple regression shows a significant negative coefficient:⁴

$$\text{CONCERTO} = 102.09 - 2.66 \text{ BUDGET}$$

$$(6.51) \quad (.57)$$

$$R^2 = .68$$

Standard errors in brackets

4. We assume here that the programming of concertos and non-concertos is dependent and the financial variables are independent variables. Of course, this is not quite true if programming has repercussions on the financial situation. However, we could not find an appropriate "instrument" to remove the bias.

This negative correlation is plotted in Figure 1 with a regression line. It implies that a one million dollar cut would increase an orchestra's concerto ratio by 2.66 percentage points, or two concerto programs over three years for an orchestra which offers twenty-five programs each season. There are several possible reasons for this negative correlation. First, the variations in the concerto ratio reflect different tastes of the music directors. However, this does not explain the correlation with the budget size. Second, the negative correlation may reflect the difference in demand of audiences for programings of their "home" orchestras. Since large cultural centers such as New York have many visiting soloists playing recitals and chamber concerts, there may be little demand for concertos as a means to see famous soloists. But again, this does not explain the observed relationship.

Third, the negative relationship can be interpreted as a result of some economic decision making. Let us make a hypothesis that the concerto ratio which maximizes an orchestra's revenue is higher than the one called for as an artistic goal of the orchestra. Then an orchestra with a strong financial foundation can afford to program fewer concertos. The negative correlation between the budget size and the concerto ratio is in accord with this hypothesis, given that the budget size somehow represents financial strength. In order to investigate further this conjecture, let us regress the concerto ratio on the total earned income, and also regress it on the ratio of earned income to the budget.

$$\text{CONCERTO} = 87.00 - 2.14 \text{ EARN}$$

(4.98) (.68)

$R^2 = .50$
Standard errors in brackets

$$\text{CONCERTO} = 88.52 - 27.29 \text{ EARN/BUDGET}$$

(11.06) (18.52)

$R^2 = .18$
Standard errors in brackets

Although the values of R^2 become smaller, the negative correlation is still significant between the concerto ratio and alternative variables for financial strength.⁵

The symphony and contemporary ratios are similarly regressed on BUDGET, but in each case the coefficient is insignificant. Therefore, the view expressed in the articles quoted at the beginning of this section is not in harmony with the data we collected. Major orchestras are very similar in their programming of symphonies and contemporary works.

5. Coda

In this note, we have examined the financial structure of major orchestras and characteristics of their programming. Although findings in the note are subject to some qualifications, they have interesting implications. First, an orchestra seems to operate with an increasing labor productivity with respect to the size of the budget. Second, the frequencies of popular symphonies or contemporary works have no correlation with an orchestra's financial size or strength. Third, the concerto ratio is negatively correlated with the size of an orchestra, measured either in budget or in earned income. If we choose the ratio of earned income to the budget as an explanatory variable, then the concerto ratio is smaller for an orchestra with a higher earned income ratio. We cannot reject a hypothesis that an orchestra schedules more concertos when it is financially pressed. One explanation may be that an orchestra uses concertos to attract a larger audience.

5. We would test the amount of assets as an alternative measure of financial strength, but the orchestras use different criteria for determining their assets.

Appendices:

Appendix 1: Exceptions in obtaining data for WAGE:

Cleveland: Union data does not provide numbers. In response to our inquiries, the orchestra provided us with the numbers.

Philadelphia: The data for 80-81 is missing in the union data. The number available for 81-82 in the union data is more than "expenditures for musicians, conductors, and soloists," in the annual report. This is a contradiction, since the union data are supposedly excluding conductors and soloists. We used the numbers reported in the annual report.

Minnesota: The union data report only 79-80 and 80-81, a year behind the other orchestras. We take "Expenses: orchestra salaries and benefits" from annual reports.

St. Louis: The union data prints the budget size for the 81-82 season as \$100 mil. This is an error; we obtained the correct figure of 8.22 from the annual report.

Appendix 2: Japanese survey on favorite pieces

Approximately 5,000 copies of a questionnaire were handed out to attendants at the NHK symphony regular subscription concerts in 1978; about 30 % responded. One of the questions asked in which period their favorite pieces belong. Their responses were Baroque 17.4%, Classical 33.1%, Romantic 30.8%, Modern 11.4%, Contemporary 5.7%, and Avant-garde 1.6%.

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FIGURE 1

