1-1-1990

The income gap and symphony orchestras

Joseph Anthony Volpi
University of Nevada, Las Vegas

Order Number 1344897

The income gap and symphony orchestras

Volpi, Joseph Anthony, M.A.

University of Nevada, Las Vegas, 1991

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

The Income Gap and Symphony Orchestras

by

Joseph A. Volpi

A thesis submitted in partial fulfillment
of the requirements for the degree of

Master of Arts

in

Economics

Department of Economics
University of Nevada, Las Vegas
May 1991

Approval Page

The thesis of Joseph A. Volpi for the degree of Master of Arts in Economics is approved.

Chairperson, Thomas M. Carroll, Ph.D.

Examining Committee Member, Lewis Karstensson, Ph.D.

Examining Committee Member, Bernard Malamud, Ph.D.

Graduate Faculty Representative, Jeffrey Koep, Ph.D.

Graduate Dean, Ronald W. Smith, Ph.D.

University of Nevada, Las Vegas
April, 1991

ABSTRACT

Symphony orchestras are the supposed victims of a malignant disease entitled "Baumol's Disease." This disease occurs as costs rise at a faster rate than earned income. The gap between earned income and costs is called the "Income Gap." The remedy is injections of cash to stop the disease from expanding.

This thesis takes actual data from the American Symphony Orchestra League and tests Baumol's diagnosis. The data are first analyzed historically to measure if the income gap does exit and if it is growing over time. The results show that this is the case. Symphony orchestras experienced a significant growth in the income gap between 1979 and 1986.

To determine if the income gap is an incurable disease, a more comprehensive model is developed. A deficit model is designed including output composition variables, demographic variables, and the lagged value of the income gap. This model shows that, in the majority of cases, symphony orchestras are not the victims of Baumol's Disease. The symphonies can control their destiny, at least in the long run.

Included within the paper is a review of selected literature including empirical studies similar to this one.

This provides a theoretical framework for analyzing the empirical results. The results point out that the perseverance and durability of symphony orchestras may be underestimated. The injections of cash to alleviate the disease may only be a placebo for the majority of symphonies. It is in their power to stay healthy.

CONTENTS

TABLES

ACKNOWLEDGEMENTS

I would like to thank Dr. William Luksetich, visiting professor to UNLV, who graciously offered me the use of the data set to test Baumol's Income Gap in symphony orchestras. Beside providing it, he spent many hours adapting it to the computer facilities at UNLV and teaching me how to use Shazam, an econometrics computer program.

I would like to thank Dr. Thomas Carroll and Dr. Bernard Malamud for their help in spotting problems with both the models and the data. Without their keen insight the measurement error would have been more telling than the coefficients. Thanks to Dr. Lewis Karstensson for his editorial suggestions as well as his support during rather stressful time. And thanks to Dr. Jeffrey Koep, the only non-economist, who has a wonderful eye for what makes sense and what doesn't.

I would also like to thank William Baumol. The idea of the paper came directly from reading his books and articles on this subject.

INTRODUCTION

Symphony orchestras in the United States rely on earned income, contributions and grants in order to operate. It is believed that costs rise at a faster rate than earned income, signaling a growing need for tertiary support, in the form of private contributions or government grants, for orchestras to stay performing. The "income gap", as originally defined by Baumol and Bowen, is the difference between earned income of a performing arts organization and total costs.[1]

The performing arts are a labor intensive industry. They rely greatly on labor (performers), in order to perform a concert. Because the performing arts are predominantly labor intensive, they cannot achieve the productivity gains which more capital intensive industries experience through innovation. They are unable to lessen substantially their dependency on labor. For this reason, revenue lags costs. Baumol and Bowen argue the need for an ever increasing public support of the performing arts. This unbalanced productivity growth is called "Baumol's disease."

Baumol's disease is malignant, in the sense that the

---

[1]William J. Baumol and William G. Bowen, Performing Arts - The Economic Dilemma (New York: Twentieth Century Fund, 1966), 147.

gap between earned income and costs is ever expanding.[2] If the performing arts are to continue, they will require injections of cash to combat the disease they face. Baumol and Bowen make it clear that the responsibility must be taken by society:

> The size of the total income gap is a crucial figure. This is the amount which, at the present time, society must be prepared to contribute, by some means, if the nation's existing performing arts organizations are to be kept solvent.[3]

Society must bridge the gap between earned income and expenditures, either through private contributions or government subsidy.

The purpose of this thesis is to test Baumol's diagnosis with particular reference to symphony orchestras in the United States. This report has five principal parts. First, I will review selected literature concerning the economics of the performing arts and symphony orchestras. Second, I will identify the data set used in this investigation. Third, the models employed in this analysis will be specified. Fourth, I will examine the results obtained in this study. Finally, the report will end with a concluding comment.

---

[2]Ibid., 161. The growing income gap assumes that other industries are experiencing productivity gains.

[3]Ibid., 150.

THE LITERATURE REVIEW

Baumol's diagnosis can be broken down into two testable assertions. The first is that the income gap exists. The second is that the income gap is inevitable.

The empirical tests of the first assertion are not extensive, because the data are difficult to obtain. Using data from Australia, Throsby and Withers empirically tested the income gap in symphony orchestras, and found the gap between earned income and aggregate costs to exist, and to be growing over time.[4] Baumol and Bowen themselves have found the gap to exist and to be expanding.[5] Yet both studies have the deficiency of few observations in their samples (11 orchestras for Baumol-Bowen, and 2 for Throsby-Withers). Conclusions concerning all symphony orchestras in the United States are difficult to make from such limited samples.

The second assertion concerns the inevitability of the income gap. To deal with this question, we must look at the specific characteristics of the performing arts. All symphony orchestras in the American Symphony Orchestra League are organized as nonprofit firms. Why is this the

---

[4]David Throsby and Glenn Withers, The Economics of the Performing Arts (New York: St Martin's Press, 1979), 137.

[5]Baumol and Bowen, 423.

case?

Symphony orchestras organize as nonprofit firms and depend on donations for a substantial fraction of their income.[6] Firms which rely on donations normally organize as nonprofit firms for two reasons. First, any donations made to them are tax deductible. Second, people who make donations to nonprofit firms take less risk that the money they donate will go to purposes which they find undesirable. Donations made for specific purposes go toward those same purposes. Furthermore, nonprofit firms in the United States receive their charter from the government. They are considered "stamped and approved" as worthwhile philanthropic organizations, helping to facilitate donations from private sources. Orchestras rely on these donations in order to perform.

Hansmann provides a theoretical framework as to why performing arts organizations are organized as nonprofit firms. He argues that the demand curve faced by most performing arts organizations is below their average total cost curve at all quantities of output. There is not one price which they can charge to cover their average total costs. By organizing as nonprofit firms, symphonies facilitate their ability to solicit donations and establish

---

[6]Henry Hansmann, "Nonprofit Enterprise in the Performing Arts," Bell Journal of Economics 12, (1981): 341-361. Hansmann estimates between one-third and one-half of their income.

an average price which covers average total costs.[7]

The typical audience attending symphony orchestra performances is characterized as financially well to do. According to Hansmann, a large proportion of the donations received come from those who attend the performing arts organizations' functions (e.g., symphony orchestra concerts). In other words, those who donate money also buy tickets. Hansmann terms this activity, "voluntary price discrimination."

The performing arts are generally characterized by high fixed costs.[8] Symphony orchestras are housed in areas with a large number of seats, and a staging area from which to perform. Fixed costs, by their nature, are constant regardless of the number of performances. Orchestras may expand the number of performances to lower their average costs, or they may allow other activities to take place in the concert hall and receive rent income. The marginal cost of one more performance is comparatively low. Since fixed costs are a large fraction of total cost, it is logical to expand the number of performances to bring down the average costs. If symphonies set the ticket price to match the low marginal cost of an additional performance (or an additional attender if not sold out), they will fail to cover their

---

[7]Where average price includes all donations.

[8]Hansmann, "Nonprofit Enterprise in the Performing Arts," 341-361.

total costs. Hansmann concludes that if performing arts organizations practice price discrimination, they can capture enough consumer surplus to cover their total costs. Some price discrimination actually exists (eg., more is charged for the better seats), but is limited and insufficient to cover total costs. Hansmann and Baumol and Bowen contend that performing arts organizations hope that their patrons voluntarily pay an additional amount, in the form of donations, if the value they place on attendance exceeds the price charged for admission.

Most performing arts organizations find themselves in a predicament. With nonprofit firms, ticket price increases tend to decrease donations.[9] As costs rise, nonprofit performing arts organizations will not try to immediately raise ticket prices, but rather attempt to increase the contributions they receive from patrons, or turn to the government for grants.

Both Baumol and Bowen and Hansmann agree that performing arts industries do not experience the same gains in productivity as other industries. Thus, the income gap exists and inevitably widens over time. Society must

---

[9]William Luksetich and Mark Lange. "Modelling and Estimating Nonprofit Behavior: Symphony Orchestras, 1991" TMs [photocopy], 18-21, St. Cloud State University, Saint Cloud, Minnesota. Luksetich and Lange have found that price increases will significantly decrease attendance for all symphony orchestras. They have also found that gifts will significantly decrease for Major Orchestras. Price increases were found to significantly increase gifts in Small Budget Orchestras.

contribute financial support to prevent the demise of the performing arts. This contribution can be made either through private donations, or through government subsidy.

If productivity growth was assumed constant across all industries, symphony orchestras will find it difficult to match the productivity increases through wage increases. The rising costs which wage increases represent, would not pass to consumers through higher prices. These organizations will search out more donations and pursue grants, or idly watch their labor migrate toward higher wage industries.

If productivity growth was assumed to be higher in more capital intensive industries, (e.g., manufacturing) then symphony orchestras would be in even more of a dilemma. There will be less gains from productivity to offset increasing costs (specifically the increasing wage bill). The pressure on symphony orchestras will increase, forcing them to lessen their dependency on the labor market by changing output composition toward less labor intensive performances. In the extreme case, symphony orchestras will be forced to cut variable costs to zero and have no performances. This will occur, unless the income gap is met by society through donations and government grants.

The present study has as its focus the analysis of a data set on American symphony orchestras. The purpose of the analysis is to determine the credibility of the Baumol

assertions of (1) the existence of the income gap and (2) its inevitability.

THE DATA

The data set employed in this study is one obtained from the American Symphony Orchestra League.[10] The full data set is comprised of some 136 variables across the eight years from 1979 to 1986 for 53 orchestras.

The variables examined in this study are those given in Table 1. All orchestral variables (X, Y, and Z variables in Table 1) have the raw values provided in the data set or are generated therefrom. The demographic variables (I, M, N, and O variables in Table 1) were taken from Sales and Marketing Management.[11] The variables expressed in money terms were converted from nominal to real values using the GNP Implicit Price Deflator and are thus expressed in 1982 dollars.[12] The means and standard deviations for the examined variables are then given in Table 2.[13]

---

[10]The American Symphony Orchestra League is an orchestra trade association headquartered in Washington DC.

[11]Sales and Marketing Management, 28 July 1978, c1-c228 and subsequent eight July issues.

[12]Council of Economic Advisors, Economic Report of the President ([Washington, D.C.]: U.S. Government Printing Office, 1990), 298.

[13]The output composition variables (X_1 through X_{10} in Table 2) sum to more than one. This occurs because of double counting. For example, some regular subscription concerts are performed by a full orchestra.

Table 1
Variables: Names and Definitions

Deficit (Y_t)	Earned income minus costs.
Lagged (Y_{t-1}) Deficit	The deficit lagged by one period.
Average (Y_t) Revenue	Earned income excluding private and public subsidies, divided by total concerts.
Average (Y_t) Costs	Total costs of the orchestra divided by total concerts.
Regular (X_1) Subscription	The number of regular subscriptions concerts divided by total concerts.
Nonsummer (X_2) Subscription	The number of non summer subscription concerts divided by total concerts.
Other (X_3) Home Concerts	The number of other home concerts divided by total concerts.
C/Y/S (X_4) Concerts	The number of child, youth, student concerts divided by total concerts.
Summer (X_5) Subscription	The number of summer subscription concerts divided by total concerts.
Other (X_6) Sum Concerts	The number of other summer concerts divided by total concerts.
Full (X_7) Orchestra	The number of concerts performed with a full orchestra divided by total concerts.
Chamber (X_8) Concerts	The number of chamber orchestra performances divided by total concerts.
Free (X_9) Home Concerts	The number of free concerts in the home area divided by total concerts.
Special (X_{10}) Constituents	The number of concerts for special constituents divided by total concerts.
Pop (N_1) 18 - 24	Percent of the home metropolitan area or county population between ages 18 and 24.
Pop (N_2) 25 - 34	Percent of the home metropolitan area or county population between ages 25 and 34.
Pop (N_3) 35 - 49	Percent of the home metropolitan area or county population between ages 35 and 49.
Pop (N_4) 50 +	Percent of the home metropolitan area or county population 50 years old or older.

Inc > 25 (I)	The percent of households with nominal income greater than twenty-five thousand dollars.
Median HH Income (M)	The median household income in the home metropolitan area or county.
Population (O)	The population in the home metropolitan area or county.
No. of players (Z_1)	The average number of players in the orchestra who are paid under a weekly contract.
Average Salary (Z_2)	The average salary of a player per week.
α (alpha)	The constant term.
ϵ (epsilon)	The error term.

Table 2
Means and Standard Deviations () of Variables

Variables	Premier	Major	Metropol	Sml Budg
Deficit	-4173000 (1154300)	-3022000 (1252400)	-881000 (483270)	-299110 (187970)
Average Revenue	19200 (4448)	7003 (4868)	2958 (1889)	1795 (1207)
Average Costs	26048 (5582)	13203 (6479)	5789 (3601)	3700 (2598)
Regular Subscription	.4125 (.1480)	.2837 (.1274)	.1790 (.1320)	.2780 (.2700)
Nonsummer Subscription	.0053 (.0354)	.0700 (.0521)	.0610 (.0680)	.0220 (.0557)
Other Home Concerts	.0678 (.0777)	.0980 (.0825)	.0870 (.0780)	.0460 (.0471)
C/Y/S Concerts	.0710 (.0419)	.1130 (.0864)	.1150 (.1070)	.0670 (.0636)
Summer Subscription	.0690 (.0800)	.0320 (.0479)	.0032 (.0110)	.0070 (.0261)
Other Summer Concerts	.0780 (.0758)	.0580 (.0690)	.0067 (.0140)	.0300 (.0600)
Full Orchestra	.8578 (.1640)	.7870 (.2170)	.5260 (.2940)	.4987 (.3520)
Chamber Concerts	.0295 (.0419)	.1000 (.1140)	.1332 (.1630)	.0810 (.1310)
Free Home Concerts	.0250 (.0535)	.0720 (.1160)	.1090 (.1900)	.1770 (.2630)
Special Constituents	.0010 (.0021)	.0120 (.0290)	.0240 (.0490)	.0200 (.0547)
Pop 18-24	12.23 (.93)	12.90 (1.43)	12.86 (1.07)	13.14 (2.50)
Pop 25-24	17.14 (.81)	18.43 (1.77)	17.94 (1.09)	17.09 (1.40)
Pop 35-49	18.16 (1.08)	18.21 (1.50)	17.87 (1.16)	17.45 (1.40)
Pop 50 +	26.78 (2.26)	23.20 (3.47)	24.40 (1.22)	25.66 (4.84)

Inc > 25	31.08 (12.81)	29.71 (13.53)	25.29 (11.59)	22.24 (10.65)
Median HH Income	25739 (1454)	25372 (2593)	22989 (2027)	21740 (2087)
Population	8254000 (5122100)	2171000 (1241200)	925380 (343590)	534390 (288430)
No. of players	104.90 (1.43)	85.35 (18.69)	41.00 (29.34)	7.70 (17.00)
Average Salary	615 (338)	503 (207)	292 (185)	82 (210)

To afford a measure of detail in the analysis, the data are arranged into four cross-section subset classifications by size of the budget from large to small. These four classifications are (1) Premier Orchestras, (2) Major Orchestras, (3) Metropolitan Orchestras, and (4) Small Budget Orchestras. The Premier Orchestra class is that suggested by Hale.[14] The remaining three classes are those used for reporting purposes by the Statistical Abstract of the United States.[15] This classification scheme results in 6, 21, 11, and 15 orchestras in each of the above classes, respectively.[16]

The data set thus permits the examination of the orchestral deficits for four classes of orchestras over the period from 1979 to 1986. It is of interest to note that these years were potentially difficult years for symphony orchestras. The double digit inflation of the late 1970s was followed by the recession of 1981-1982. The 1983-1986

---

[14]Rosemary Hale, "Economics and the Symphony Orchestra," TMs, photocopied. A paper presented at the 1983 Midwest Economic Association Meeting. Six "Class A" orchestras are identified: the Boston Symphony, Chicago Symphony, Cleveland Orchestra, Los Angeles Philharmonic, New York Philharmonic, the Philadelphia Orchestra.

[15]Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, ([Washington, D.C.]: U.S. Bureau of the Census, 1980).

[16]This classification scheme not only differentiates the orchestras by budget, but by performance activity. The mean number of annual performances for Premier Orchestras is 231, for Major Orchestras it is 201, for Metropolitan Orchestras it is 163, and for Small Budget Orchestras it is 136.

years were characterized by low inflation and economic expansion. However, this was also the time of the Reagan administration, which opposed federal support for the arts. Thus, the time period examined was not one in which incentives were particularly favorable to the arts in general and symphonies in particular.

THE MODELS

The Baumol assertions are tested in the context of two models. The first, the growth model, is constructed to test the initial assertion of the existence of the income gap. The second, the deficit model, is presented for the purpose of testing the assertion of the inevitability of the income gap.

The Growth Model.

The growth model is given in the following expression:

$$(1) \qquad Y_t = \beta Y_{(t-1)} + e_t,$$

where Y_t is the current year deficit, $Y_{(t-1)}$ is the deficit lagged by one year, and ϵ_t is the error term.

Equation 1 provides two pieces of information concerning the deficit. The first is whether the deficit persists from one period to the next period. This is determined by calculating a $\pm$-statistic to test if the coefficient on the lagged deficit is significantly different from zero. An insignificant coefficient is the basis for acceptance of the null hypothesis that the deficit is not exhibiting growth; conversely, a significant result will lead to an acceptance of the alternative hypothesis that the deficit is growing from one year to the next. The second

piece of information that Equation 1 presents is determined through a different t-test. If the coefficient on the lagged deficit is significantly greater than one, the average growth rate of the deficit from 1979 to 1986 is determined. By subtracting one from the coefficient, the average growth rate in the income gap over the 1979 to 1986 period is calculated. This will lead us to accept the alternative hypothesis that the income gap exists and is growing.

Similar specifications are used to determine the growth in earned income and in costs. The same two t-tests are conducted to determine whether significant growth rates exist in income and costs. This will shed light on whether the deficit is a cost or a revenue side phenomenon.

The Deficit Model.

The deficit model is used to test the assertion of the inevitability of the income gap or deficit. The deficit is calculated by taking the earned income from performances and subtracting costs. Those variables which affect revenue and those which influence cost must both be included. Thus, to build a deficit model, revenue and cost specifications are preliminarily developed.

The revenue specification is built to test the effect of output composition on the revenues of symphonies, holding demographic characteristics constant. The model follows:

$$(2) \quad Y_t = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} N_1 + \beta_{12} N_2 + \beta_{13} N_3 + \beta_{14} N_4 + \beta_{15} I + \beta_{16} M + \beta_{17} O + \epsilon_t,$$

where Y_t is earned income per concert; X_1 through X_{10} are output composition variables defined in Table 1; N, through O are demographic characteristics also defined in Table 1; and ϵ_t is the error term.

Symphony orchestras perform different types of concerts. The output composition variables represent the different types of concerts as a proportion of total concerts. Significant coefficients on these variables suggest income sensitive types of output. In other words, orchestras can change their output composition in order to increase income. The N, M, I, and O variables represent demographic characteristics. These are held constant through each cross section, as we look at the impact of output composition on revenues.

The cost side specification relates orchestral costs to selected output and input variables. The cost model is as follows:

$$(3) \quad Y_t = \alpha + \beta_1 X_7 + \beta_2 X_8 + \beta_3 Z_1 + \beta_4 Z_2 + \epsilon_t,$$

where Y_t is the cost per concert; X_7 and X_8 are output

composition variables; Z_1 and Z_2 are input variables; and ϵ_t is the error term.

The output composition variables are included in the cost specification as they are expected to significantly influence costs. These are full orchestra concerts and chamber concerts as a percentage of total concerts, respectively. The cost of putting the full orchestra on the stage is larger than putting a chamber group on stage.[17] The Z variables represent the wages and the number of workers, respectively.

The deficit model then combines the revenue and cost specifications:

$$(4) \quad Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 X_5 + \beta_7 X_6 + \beta_8 X_7 + \beta_9 X_8 + \beta_{10} X_9 + \beta_{11} X_{10} + \beta_{12} N_1 + \beta_{13} N_2 + \beta_{14} N_3 + \beta_{15} N_4 + \beta_{16} I + \beta_{17} M + \beta_{18} O + \beta_{19} Z_1 + \beta_{20} Z_2 + \epsilon_t,$$

where Y_t is the current year deficit.

This model is not developed to empirically define the deficit. Rather, it is developed to test if the orchestras have some control over their deficits -- to test whether output composition decisions can be made to lower the deficit. It will suggest which variables are under the

---

[17]The percent of total concerts performed by ensembles are not included. Doing this would create a singular matrix.

orchestra's control, thus demonstrating their ability to reduce and perhaps eliminate the income gap.

The coefficient on the lagged deficit (Y_{t-1}) gives us direct information concerning the inevitability of the income gap. The t-statistic for this variable will show if the coefficient is significantly different from zero. A different t test is conducted to determine if the coefficient is significantly different from one. A computed t-statistic larger than the critical value of 1.96 will suggest a decreasing deficit over the period from 1979 to 1986, other things equal. This result would cast some doubt on Baumol's assertion that the deficit is inevitable.

THE RESULTS

With the models constructed, we may now turn to examine the results obtained in this study.

The Growth Model Results.

The growth model results are given in Tables 3, 4, and 5. Provided here are the findings for the deficit, revenue and cost growth models, respectively.

Table 3 shows the results of the deficit growth model. Two different t-statistics are given in the Table. The first demonstrates whether the coefficient on the lagged deficit is significantly different from zero. For all four cross sections this is the case. This suggests that a larger deficit in the current period leads to a larger deficit in the next period, from 1979 to 1986.

The second t-statistic is computed by subtracting one from the coefficient on the lagged deficit and dividing by the standard error. For each of the four classifications, the coefficients on the lagged deficit are significantly different from one. By subtracting one from the coefficient and multiplying by 100, the growth rate of the deficit is computed. The deficit of Premier Orchestras are observed to be growing by 5.33 percent over the 1979 to 1986 period. The growth in the deficit of Major Orchestras is 3.69

percent. For Metropolitan Orchestras the deficit is growing at a 9.69 percent rate over the period, while the Small Budget Orchestra deficit is growing at a 9.42 percent rate.

Table 3
Deficit Growth Model

Orchestra	Coefficient on Lagged Deficit	t-statistic from zero	t-statistic from one
Premier	1.0533	100.900	3.500
Major	1.0369	135.640	4.830
Metropol.	1.0969	63.194	5.580
Small Budget	1.0942	80.408	6.920

Table 4
Revenue Growth Model

Orchestra	Coefficient on Lagged Revenue	t-statistic from zero	t-statistic from one
Premier	1.065	127.320	7.790
Major	1.068	130.760	8.330
Metropol.	1.034	95.015	3.160
Small Budget	1.061	81.488	4.660

Table 5
Cost Growth Model

Orchestras	Coefficients on Lagged Cost	t-statistic from zero	t-statistic from one
Premier	1.066	127.320	7.790
Major	1.062	176.510	10.060
Metropol.	1.045	87.728	3.810
Small Budget	1.072	88.630	5.980

This leads us to accept the alternative hypothesis that the income gap exists. It can be said with 95 percent confidence that the Baumol assertion that the income gap exists and is growing is correct.

The results in Table 4 and 5 use a specification similar to that in equation 1. The difference is that Y is earned income and costs respectively. The same two t-tests are conducted. This suggests that revenues and costs have significant growth rates over the 1979 to 1986 period.

This is of interest as it shows both costs and revenues, in real dollars, growing from 1979 to 1986. From these observed results it is not possible to conclude that the income gap is either a cost or a revenue side phenomenon.

The Deficit Model Results.

The deficit model was constructed from separate revenue and cost models. The results for the revenue, or earned income, specification appear in Table 6 while those for the cost specification are given in Table 7.

The revenue specification shows that output composition has a significant effect on the earned income for each classification. For example, revenue per concert significantly increases as the percent of regular subscription concerts increases for all but Premier Orchestras. This model also shows the effects of exogenous, demographic variables on earned income per concert. The population variable has a significant positive influence on Metropolitan and Major Orchestras, a significant negative effect on Premier Orchestras, and no significant relationship with Small Budget Orchestras.[18]

The results for the cost specification suggest that output composition has a significant impact on costs for all but Premier Orchestras. The number of players under weekly contract and the average salary per week variables are included because of an a priori belief that they have a positive impact on cost per concert. For Premier Orchestras, the number of players variable has a significant

[18]A. Buse, "Goodness-of-Fit in the Generalized Least Squares Estimation," The American Statistician 27 (1979): 106-108. This R-square is corrected for pooled, cross section data.

negative impact on costs per concert.[19]

The results for the deficit model, which combines the foregoing revenue and cost specifications, are given in Table 8.

It is apparent from these results that certain of the output composition variables are significantly related to the deficits for each of the orchestral cross sections with the exception of Small Budget Orchestras. In the case of Premier Orchestras, other summer concerts increase the deficit; here a one percent increase in other summer concerts, other things equal, increases the deficit by about $52,000.[20] In the case of Major Orchestras, increases in summer subscriptions and other summer concerts significantly increase the deficit. The deficit among Metropolitan Orchestras is increased by greater numbers of regular subscription, non-summer subscription, and other home concerts. On the whole, these results suggest that the larger orchestras can influence to some degree their deficits by altering their output mix of concerts.

---

[19]The marginal cost of hiring an additional worker is apparently less than the resulting increase in the average costs for these orchestras.

[20]The dependent variable, earned income deficit, has a negative sign in all of its observation values. Negative signs on the coefficients of the independent variables signals a direct relationship between the independent variable and the deficit since the deficit is a negative number in the data set.

Table 6
Revenue Model -- All Orchestras

Independent Variables	Premier Orchestra	Major Orchestra	Metropol Orchestra	Small Budget
Regular Subscriptions	80.11 (1.2)	107.42 * (7.1)	77.95 * (8.13)	19.18 * (2.85)
Non Summer Subscriptions	172.87 * (3.03)	90.44 * (4.02)	19.788 (1.6)	16.8 (1.82)
Other Home Concerts	63.451 (1.39)	39.61 * (2.25)	-16.63 (-1.44)	-6.96 (-.73)
C/Y/S Concerts	-13.56 (-.097)	-22.1 (-1.42)	-21.32 * (-2.79)	-16.30 (-1.4)
Summer Subscriptions	85.91 (1.07)	78.38 * (2.76)	105.23 * (2.49)	-33.95 * (-2.45)
Other Summer Concerts	-66.68 (-1.24)	15.22 (.752)	12.58 (.396)	-21.73 * (-2.51)
Full Orchestra	70.88 (1.27)	6.94 (.596)	18.48 * (2.67)	21.70 * (4.04)
Chamber Concerts	-233.92 * (-3.85)	22.328 (1.84)	3.4 (.83)	12.69 * (3.27)
Free Home Concerts	17.07 (.312)	7.64 (-1.22)	-5.36 * (-2.09)	-2.93 * (-2.39)
Special Constituents	558.72 (.764)	-21.13 (-.84)	6.92 (.601)	1.08 (.293)
Pop 18-24	-.0311 (-.0034)	.148 (.119)	-2.34 * (-1.96)	1.31 * (3.42)
Pop 25-34	32.35 * (5.7)	-.733 (-.469)	2.76 * (3.35)	1.12 * (2.4)
Pop 35-49	17.9 * (2.84)	5.7 * (4.26)	.979 (1.07)	1.98 * (3.85)
Pop 50+	.822 (.815)	2.59 * (2.5)	1.2 (1.92)	.195 (1.4)
Income > 25	-.143 (-1.31)	.0798 (1.38)	.0513 (1.19)	.0186 (.877)
Median HH Income	-.768 * (-6.09)	-.0656 (-1.33)	-.0701 (-1.87)	.0178 (.922)

Population	-.0031 * (-2.6)	.0076 * (3.7)	.0039 * (2.19)	.0037 (1.4)
Constant	-572.68 * (-2.78)	-138.3 * (-2.45)	-47.00 (-1.01)	-78.93 * (-4.83)
Buse R-square	.9589	.9075	.9604	.8459
F Statistic	41.206	86.535	99.879	32.93
t-statistics are in parentheses (). *Coefficient significantly different from zero.				

Table 7
Cost Model -- All Orchestras

Independent Variables	Premier Orchestra	Major Orchestra	Metropol Orchestra	Small Budget
Full Orchestra	69.1 (1.01)	142.49 * (9.41)	84.66 * (11.4)	60.43 * (17.1)
Chamber Concerts	-169.92 (-1.06)	101.48 * (4.61)	19.31 (1.64)	38.95 * (5.1)
No. of players week contract	-7.88 * (-2.21)	.404 * (2.13)	.0564 (.899)	.0275 (.782)
Avg. Salary per week	.00303 (.193)	.0118 (1.33)	.0429 * (4.09)	.0012 (.656)
Constant	1027.6 * (2.7)	-30.1 (-1.8)	-4.058 (-.86)	5.74 * (3.85)
Buse R-square	.1670	.4217	.9641	.7655
F Statistic	2.156	29.717	47.1	93.856
t-statistics are in parentheses (). *Coefficient is significantly different from zero.				

Table 8
Deficit Model - All Orchestras

Independent Variables	Premier Orchestra	Major Orchestra	Metropol. Orchestra	Small Budget
Lagged Deficit	.701 * (3.64)	.6996 * (14.46)	.8015 * (9.36)	.89 * (15.9)
Regular Subscriptions	7770 (.25)	7420.2 (1.42)	-6667.2 * (-2.2)	330.3 (.7)
Non Summer Subscriptions	-28037 (-.7)	8177.6 (1.31)	-8892.6 * (-2.2)	928.2 (.8)
Other Home Concerts	-30541 (-1.2)	3282.1 (.61)	-12297 * (-2.8)	1261 (1.4)
C/Y/S Concerts	-45898 (-.9)	4934 (1.14)	-573.8 (-.23)	357.1 (.37)
Summer Subscriptions	-42010 (-1.1)	-18062 * (-2.8)	2570.5 (.18)	13.1 (.01)
Other Summer Concerts	-52001 * (-1.98)	-15384 * (-2.8)	-17281 (-1.7)	147.8 (.23)
Full Orchestra	15306 (.65)	-6365.7 (-1.8)	4064.4 (1.75)	-367 (-.8)
Chamber Concerts	-6275.9 (-.23)	3289.8 (1.13)	1669.7 (1.3)	448.2 (1.3)
Free Home Concerts	-6297.4 (-.45)	1681.3 (.68)	1360.3 (1.51)	-311 (-1.5)
Special Constituents	318130 (1.1)	2124.9 (.22)	-1657 (-.5)	-409 (-.5)
Pop 18-24	122.49 (.04)	-678.67 (-1.80)	-89.61 (-.26)	60.1 (1.21)
Pop 25-34	932.45 (.426)	303.92 (.69)	-247.08 (-1.09)	-217 * (-3.7)
Pop 35-49	-3433.6 (-1.65)	-745.27 (-1.87)	-104.96 (-.3)	55.48 (.85)
Pop 50 +	270.78 (.58)	-24.96 (-.14)	67.333 (.338)	4.88 (.19)
Income > 25	147.16 * (2.68)	-56.17 * (-2.78)	-10.82 (-.79)	-7.87 * (-2.1)

Median HH Income	-129.8 * (-2.04)	-.1005 (-.007)	11.29 (1.07)	1.71 (.886)
Population	-.388 (-.802)	-2.74 * (-5.64)	-.356 (-.414)	-.726 * (-2.8)
# of players week contract	-101.97 (-.18)	-12.4 (-.55)	-13.39 * (-2.1)	-1.36 (-.42)
Avg. Salary per week	4.51 (1.88)	-.24 (-.16)	-1.118 (-.797)	-.063 (-.3)
Constant	59627 (.55)	18964 (1.5)	2734.7 (.2)	1486 (.72)
Buse R-square	.9644	.9094	.9527	.9637
F Statistic	36.612	73.734	67.45	131.55

t-statistics are in parentheses.
*Coefficient significantly different from zero.

It was noted among these results that in the case of Metropolitan Orchestras, increased regular subscription concerts add to the deficit of such orchestras. This result suggests the possibility that Metropolitan Orchestras are not maximizing just earned income, but rather both earned income and contributions. In other words, perhaps these orchestras are practicing Hansmann's voluntary price discrimination.

Important, as well, for our purpose, are the coefficients on the lagged deficit. In each case, this coefficient is significantly greater than zero. In the cases of the Major, Metropolitan and Small Budget Orchestras each coefficient was also found to be significantly less than one.[21] Apparently the income gap for these three types of orchestras declined significantly over the examined period. Since the coefficient for Premier Orchestras was not found to be significantly less than one, it appears that the income gap among these orchestras did not decline significantly over the examined period.

In sum, the results for the deficit model contain mixed findings. On the one hand, in the cases of Major and Metropolitan Orchestras, the deficit was found to be sensitive to the orchestras' output composition. Moreover, these deficits were found to have declined over the period

---

[21]The t-statistic for Major, Premier, Metropolitan and Small Budget orchestras are -6.21, -1.55, -2.32, and -2.02, respectively.

analyzed. On the other hand, Premier and Small Budget Orchestras each had a unique situation. For Premier Orchestras the deficit was found to be sensitive to output composition, yet it was found not to be significantly declining. For Small Budget Orchestras, the deficit significantly declined over the period, yet none of the output composition variables was significant. The weight of the evidence with respect to Major and Metropolitan Orchestras is that the income gap is not inevitable while the evidence with respect to Premier and Small Budget Orchestras is mixed.

THE CONCLUSIONS

This paper empirically tests Baumol's diagnosis of the income gap for symphony orchestras. The research problem centered on an examination of two testable assertions. The first was that the income gap exists, and the second was that it is inevitable.

These assertions were tested using a data set for 53 orchestras covering the period from 1979 to 1986. The orchestras were examined in the following four classes determined by the size of budget: Premier Orchestras, Major Orchestras, Metropolitan Orchestras, and Small Budget Orchestras.

A growth model was constructed to test the first assertion. It was found here that there was a significant growth in the deficit for all orchestras over the period. Thus, the deficit was found to be present and growing.

A deficit model containing output composition and demographic control variables was constructed to test the second assertion. Here we found the income gap to be decreasing, other things equal, in the Major, Metropolitan, and Small Budget Orchestras. This casts some doubt on the inevitability of the income gap. Furthermore, it was found that the deficits in the Premier, Major, and Metropolitan Orchestras were sensitive to the mix of concerts offered by

the orchestras. The weight of this evidence suggests that orchestras are to some extent able to exert control over their deficits.

BIBLIOGRAPHY

American Symphony Orchestra League. Compiled Annual Reports. Washington, D.C., 1978 - 1986.

Baumol, H. and W. Baumol. "The Future of the Theater and the Cost Disease of the Arts" in M.A. Hendon, J.F. Richardson and W.S. Hendon (eds.). Bach and the Box: The Impact of Television on the Live Arts. Akron: Association for Cultural Economics, 1985. 7-31.

Baumol, H. and W. Baumol, ed. Inflation and the Performing Arts. New York: New York University Press, 1984.

Baumol, W. "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis." American Economic Review (June 1967): 415-27.

Baumol, W. and W. Bowen. Performing Arts - The Economic Dilemma. New York: The Twentieth Century Fund, 1986.

Brennan, M. and T. Carroll. Quantitative Economics & Econometrics. Cincinnati: South-Western Publishing Co., 1987.

Cameron, Samuel. "The Demand for Cinema in the United Kingdom." The Journal of Cultural Economics 14 (June 1990): 35-47.

Danielson, R.L. "An Analysis of Grants: A Case Study of the National Endowment for the Arts." Normal: Illinois State University. Unpublished research paper.

Davidson, G. and P. Davidson. Economics for a Civilized Society. New York: W. M. Norton & Company, 1988.

DeBoer, Larry. "Is Rock 'N' Roll a Symptom of Baumol's Disease?" Journal of Cultural Economics 9 (December 1985): 48-59.

Dupuis, Xavier. "The Microeconomics of the Performing Arts" in M.A. Hendon, J.F. Richardson and W.S. Hendon (eds.). Bach and the Box: The Impact of Television on the Live Arts. Akron: Association for Cultural Economics, 1985. 33-50.

Gambling, T. and G., Andrews, "Does Baumol's Disease Exist? Some Findings from the Royal Shakespeare Company." Journal of Cultural Economics 8 (December 1984): 73-92.

Gapinsky, James. "The Production of Culture." The Review of Economics and Statistics. 62 (November 1980): 578-587.

Goudriaan, R. and Pommer, E. "Productivity Trends in the Subsidized Performing Arts" in N.K. Grant, W.S. Hendon and V.L. Owen (eds.). Economic Efficiency and the Performing Arts. Akron: Association for Cultural Economics, 1987. 16-30.

Grimberg, William. "Arts - A Foundation for Economic Revival." Fund Raising Management, (May 1988): 34-38.

Grist, E.T. "The Economic Efficiency of Arts Centres" in W.S. Hendon, H. Hillman-Chartrand and H. Horowitz (eds.). Paying for the Arts. Akron: Association for Cultural Economics, 1987. 199-214.

Hale, Rosemary. "Economics and the Symphony Orchestra." TMs, photocopied. A paper presented at the 1983 Midwest Economic Association Meeting, 1983.

Hansmann, Henry. "Nonprofit Enterprise in the Performing Arts." Bell Journal of Economics 12 (2)(1981): 341-361.

_____. "Economic Theories of Organized Nonprofit Organization" in W. Powell (ed.). The Nonprofit Sector. New Haven: Yale University Press, 1987.

Heilbrum, James. "Keynes and the Economics of the Arts." Journal of Cultural Economics. 8 (December 1984): 37-50.

Hendon, William. "Economic Incentives: Theater and Cultural Programming." Journal of Cultural Economics 11 (June 1987): 76-93.

Ito, Takatoshi, and D. Domian. "An Economic Note on American Symphony Orchestras." Discussion Paper Series. University of Minnesota, Center for Economic Research, Department of Economics. August, 1983.

Judge, G., W.E. Griffiths, R. Carter Hill, H. Lutkepohl, and T.C. Lee. The Theory and Practice of Econometrics. New York: John Wiley and Sons, 1980.

Lange, Mark, J. Bullard, W. Luksetich, P. Jacobs. "Cost Functions for Symphony Orchestras." Journal of Cultural Economics. 9 (December 1985): 71-85.

Lange, Mark and William Luksetich. "Demand Elasticities for Symphony Orchestras." Journal of Cultural Economics. 8 (June 1984): 29-48.

Luksetich, William, and Mark Lange. "Modelling and Estimating Nonprofit Behavior: Symphony Orchestras, 1991." Normal: St. Cloud State University, St. Cloud, Minnesota. Unpublished research paper.

Moore, Thomas G. The Economics of the American Theater. Durham-Raleigh: Duke University Press, 1968.

National Endowment for the Arts. Audience Development: An examination of selected analysis and prediction techniques applied to symphony and theatre attendance in four southern cities. January 1981.

Newman, Danny. Subscribe Now!. New York: Theater Communications Group Inc., 1977.

Reiss, Alvin H. "Dance Group meets its Goal." Fund Raising Management, July 1989, 29-31.

_____. "Local Arts Agencies throughout the country help spur funding for cultural programs." Fund Raising Management, December 1989, 57-59.

_____. "Funding of chamber music ensembles spurred by new programs and services." Fund Raising Management, May 1990, 80-81.

_____. "Arts presenters find ways to increase funding." Fund Raising Management, March 1989, 84-86.

Sales and Marketing Management. July issues, 1978-1986.

Schwarz, Samuel. "A New Look at the Earnings Gap in the Arts." Journal of Cultural Economics 6 (December 1982): 1-10.

_____. "Differential Economies and a Decreasing Share of Artistic Personnel Costs." Journal of Cultural Economics 7 (June 1983): 27-32.

_____. "Long-Term Adjustments in Performing Arts Expenditures." Journal of Cultural Economics 10 (December 1986): 57-66.

Throsby, C.D. and G.A. Withers. The Economics of the Performing Arts. New York: St. Martins Press, 1979.

U.S. Department of Commerce, Bureau of the Census. Statistical Abstract of the United States. [Washington, D.C.]: U.S. Department of Commerce, Bureau of the Census, 1980.

Vogel, Harold. Entertainment Industry Economies. Cambridge: Cambridge University Press, 1986.

Weisbrod, Burton. The Nonprofit Economy. Cambridge: Harvard University Press, 1988.