Inter-firm Employment Differences By Gender: A Case Study of the U.S. Major Orchestras

Samuel Schwarz*

INTRODUCTION

Economists have spent a great deal of effort analyzing differences in wages and employment. The advent of human capital theory (see Becker, 1964) has reinforced the analysis to show that not all such differences are due to discrimination. For example, Landes (1977, p. 523) estimated that "at least two-thirds of the relative wage differential between men and women within occupations is accounted for by sex-differences in turnover and training. In addition, the relative number of women employed in an occupation varies inversely with the amount of on-the-job training..." But what about the differences among different firms within the same occupation?

In this paper, we analyze male-female employment differences amongst the U.S. orchestras and show that they appear to be attributable largely to different requirements amongst the different firms for the same occupation: orchestra musician. Our approach of identifying industry subgroups can serve as a model for other industries. Since this paper began as part of a larger study on the major orchestras (Schwarz and Greenfield, 1977), we will retrace the steps tried to arrive at our conclusions.

In fiscal year 1977, women represented only about one-quarter of all the regularly employed players in the 31 U.S. major orchestras, compared to a female percentage of 31% for all artists and 43% for all professional workers. 1 (A major orchestra for that year was defined as one with an annual budget of at least $1.5 million.) In addition, since the women's playing time was concentrated in the lower-paying of these orchestras, it implied that the average salary of women players was less than that for men.

This immediately posed the natural question: were these gender differences due mainly to economic discrimination or to other human-capital differences? In order to answer this question, we must first understand the nature of the player labor market in the orchestra industry.

A MODEL OF THE ORCHESTRA LABOR MARKET

To simplify the exposition, we begin with a somewhat simplified version. Suppose we have a competitive market consisting of m orchestras, 0, and n players,\ j. Furthermore, the labor force is not homogeneous, but rather is composed of three grades of players -- 1, 2, and 3 -- of sizes n0, n1, and n2, respectively, in order of decreasing level of skill. Since the more qualified players are more limited in supply, the equilibrium salaries for these three groups are also in descending order.

* The College of Staten Island, CUNY, 1000 Staten Street, Staten Island, New York 10301

I am grateful to the American Symphony Orchestra League (ASOL) and to its then-Director of Research and Reference, Bob Olisaroff, for allowing me use of the selected data presented in this article. The helpful comments of Robin Carey, Richard Thaler and the Editor, are gratefully appreciated.
In hiring players for next year, each orchestra sets aside a budget, based upon its expected revenue, consisting of both earned income and contributions. With this budget, it decides on the number and quality-mix of its players. However, there are two classes of orchestra: high-budget and low-budget orchestras, designated O' and O. The O' can afford a greater number of players and higher-paid players, hence, these orchestras choose only amongst 1' and 1 players. On the other hand, the O' can only afford to choose from the pool of 1 and 1' players.

![Diagram](Image)

Figure 1 depicts a typical orchestra's choice for players, each isoquant representing a different level of output. It should be noted that "output" in the arts has a very special meaning, for it consists not only of the number of performances, but also has a "quality" dimension as well, however defined; for a Beethoven symphony performed by the Chicago Symphony Orchestra is not the same as when performed by a high-school band. Hence, a performance with only 1 players is superior to one with only 1' players, for example, leading to a trade-off between grades of players.

The nature of that trade-off is determined by each individual orchestra -- perhaps by its music director or conductor -- and forms the shape of its particular isoquant map. Some prefer more players -- albeit of somewhat lesser skill -- while others prefer quality to quantity. Furthermore, there exists a maximum limit to the total number of players (the heavy line in Fig. 1), sometimes determined by the physical capacity of the orchestra hall. Within this limit, the orchestras can choose amongst the different grades of players, given its budget constraint.

It is obvious that the typical O' will have a different mix of players than the typical O; indeed, one of greater skill. At the same time, not all O' have the same number and type of players; for, as we have seen, that depends on the individual orchestra's preferences. In fact, we sometimes find two orchestras with similar budget conditions, yet with different player equilibria: one has opted for a large number of players, while the other has chosen a smaller, more select group.

This simplified discussion can be generalized to more than two groups of orchestras and three grades of players; indeed, an unlimited classification scheme, without any change in the conclusions derived, is possible. But this raises the question of why a given orchestra prefers one grade of players to another.

Though they may bear the same title, the positions in different orchestras are different in nature. Some orchestras not only require more accumulated skill at initial hiring but also more on-the-job investment in those skills than other orchestras. Indeed, the positions occupied by the highest-grade players often require twice the hours in a full-time work week (only part of which is directly compensated): practicing, rehearsing and performing. At the other end of the spectrum, the positions occupied by the lowest-grade players usually require little more than a limited number of actual rehearsals and play hours each week, all after the player's regular work hours; in fact, a part-time job. This is analogous to the difference between the research effort required of, say, a research-oriented Harvard faculty position and that required of a strictly teaching position in some local college, even though both carry the same title of assistant professor. But this basic difference in the nature of the positions in different orchestras leads to an important implication with regard to the male-female composition of the orchestra's player corps.

It is well known that women tend to have a different lifetime pattern of labor force participation than men; namely, lower and more intermittent market participation. But more importantly, given that persons with the major responsibility for home production tend to be women, it is rare for such a person to have the full "commitment" to the orchestra required of the higher-grade players. Thus, the pool of women players is gradually diminished with a rise in the player grade.

The previous analysis has two verifiable implications. First, it implies that the orchestras hiring higher-grade players should have a lower percentage of female players. Second, as the nature of women's labor force participation has changed over time, one would expect a corresponding change in female percentages for the orchestras. These two implications are the subject of our empirical analysis in the next section.

**EMPIRICAL ANALYSIS**

We use the average salary per week of regularly employed players as a measure of an orchestra's ability to seek and obtain higher-grade players. Our previous analysis, then, implies that orchestras with higher salaries should have lower percentages of women players.

We begin with a cross-sectional analysis of the orchestras in FY77. The 30 major orchestras, for which we have data on the number of women players, 1 had 34.6% women players, as a whole, but their average weekly salaries ranged from $302 to $490. If we divide the group into the 11 orchestras with salaries of $390 or more and the 19 with salaries less than $390, we find a dichotomy between the two subsets: 13.6% for the higher-salary orchestras and 32.9% for those with the lower salaries. Since the higher salaries of the 11 did not follow a uniform distribution, but were rather bunched at the two ends of the salary range, 1 we obtained two subsets of this group: five (5) orchestras with salaries from $460 to $490 and five (5) with salaries from $390 to $408. This yielded a female percentage of 10.4% for the former and 16.6% for the latter. Thus, the evidence seems to indicate that the percentage of female players is inversely related to player salaries, our first implication.
In order to further substantiate the weight of evidence, we turned to the smaller-budget regional and metropolitan orchestras the former had annual budgets of at least $500,000 up to $1.5 million, and the latter, $100,000 up to $500,000. The salary scale for the regionals is considerably lower than that of the major and is even lower for the metropolitan. We should, therefore, expect a higher percentage of women players in these orchestras.

Calculating the female percentage for all the 23 regional orchestras and the 54 metropolitan which reported this information, we obtain about 42% for the regionals and about 46% for the metropolitan. These smaller-budget metropolitan orchestras had a percentage almost twice that of the major and even higher than that for all professional workers (43%). Indeed, some individual orchestras had as high as 69% women players.

Let us now turn to the growth in the percentage of women players over time. As the labor force participation rate of adult women has increased from 30% in 1950 to more than 50% in 1980, one would expect the female percentage in the orchestras to also increase substantially.

Here we make use of a set of 17 major orchestras which have provided continuous data since 1940, except for the 1959-60 season for which there are no known existing data. These seventeen either reported all years or missed a year or two, which we estimated so as not to bias the total amounts. The first two years were omitted because the data for these years were sparse and somewhat unreliable, leaving us with data for a 28-year period: 1951-52 through 1978-79.

Figure 2 shows not only the number of women players has more than doubled over this period, but it also reveals an even more interesting occurrence. For two decades, the number of men players remained virtually constant, and the entire increase in the total number of players was comprised of women. More recently, women have even begun to displace men, thereby decreasing the number of male players. The net result was the about doubling of the percentage of female players over this period. This evidence is consistent with our second inference.

CONCLUDING REMARKS

We have developed a model of the orchestra labor market based on the underlying fact that not all orchestra positions are identical. As a result, these orchestras that can afford more demanding positions, seek only those players that can meet their demands. But because more demanding positions require a higher level of "commitment," there are fewer women in the pool of players available for these positions.

The presented evidence, both in the cross-section and over time, is consistent with our analysis and its implications. The evidence, as a whole, seems to indicate that even if discrimination were a contributing factor, it alone could not be solely responsible for the low percentage of female players in the major orchestras. With the smaller-budget orchestras approaching 50% women players, it is difficult to conclude that, in the absence of discrimination, it would be much higher. On the other hand, the time-series data showed that women's role in society changes vis-a-vis men, so does their participation in the orchestra labor market.

But there is a wider implication here for the study of labor market discrimination. Markets are generally not homogeneous, and before we compare firms, or groups of firms, within one market, we must first standardize for different requirements of the positions in the different firms. The employment of a lower percentage of women in a particular firm is not necessarily indicative of discrimination which can only be ascertained on a case by case basis.

NOTES

1. See Table 13, Report #12, Research Division, National Endowment for the Arts.
2. Of all the major orchestras, not one surpassed 110 players.
3. See Sills (1986, p. 268) on the need for women to have the "same commitment to career" as men in order to earn as much as men in competitive markets. Also see Polachek (1981, p. 68).
4. This is similar to a finding by the Small Business Administration that women are more likely to find jobs with small businesses than with large ones. As Frank S. Swain, the chief counsel of advocacy for the agency, stated: "Small businesses can schedule people in part-time employment, which allows them to raise a family and work at the same time." (The New York Times, Feb. 26, 1986).
5. Only one of the major did not report this information.
6. Only one of the 11 had an average weekly salary between the two ends, $37.
7. Baltimore, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Houston, Indianapolis, Los Angeles, Minneapolis, National, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, and San Francisco.
Global Pollution: A Heckscher-Ohlin-Samuelson Model of Pigouvian Taxation

Robert E. Kohn*

INTRODUCTION

When emissions from one country adversely affect the environment of other countries, it would be
first-best from a "cosmopolitan point of view," write Baumol and Oates [1988, p.266], for the polluting
country to impose "an internationally optimal Pigovian tax on its emissions—a tax equal to
marginal damage in all countries together." In the specific case in which "many nations pollute a common
resource which they all use equally, such as a border lake," Ruff [1976, p.9] favors a solution in which the
nations "... agree on a common effluent charge imposed on all their individual polluters, the revenues
to go into a common fund which is then distributed back to the member governments on the basis
of some predetermined formula." The fund is a "useful device," Ruff [1976, p.9] explains, "for buying
the agreement of reluctant nations." Such reluctance is likely, according to Baumol and Oates [1988,
p.278-9], because "... we can hardly export a polluting nation to place a tax on its own polluting
industries in order to reduce the damages accruing outside its borders." For that reason Segerson [1985,
p.63] concludes that the Pigovian approach "... requires the existence of an international overseeing
body with the authority to tax the polluting country for the benefit of society as a whole."

It is not clear in the above literature which particular countries, those that pollute more or those
that pollute less, are the "reluctant nations" likely to be made worse off by the uniform Pigovian tax on
emissions and whose agreement would have to be purchased. However, it could be inferred that the less
polluting countries would be the net beneficiaries of a program that reduces their exposure to an
international level of pollution of which their own emissions are a relatively small portion. This paper
uses the well known Heckscher-Ohlin-Samuelson model of international trade to illustrate the case in
which the reverse could be true; the pollution intensive countries are beneficiaries of uniform Pigovian
taxation whereas the less polluting countries are made worse off.

In the Heckscher-Ohlin-Samuelson setting there are two countries (which may also be interpreted
as one country and the rest of the world), each of which uses the same constant-return-to-scale
technology to produce the same two goods. In the present application of this model, it is assumed that
one of these two industries emits pollution that contributes to a common global pollutant level to which
all inhabitants of the planet are equally vulnerable. It is also assumed that the global pollution level
adversely affects utility levels, as in the models of Perloff [1976], Berglas [1977] and Asal [1979].

In the Heckscher-Ohlin-Samuelson model, countries differ in their relative factor endowments so
that each produces a larger proportion of the good that is intensive in the input in which it has relative
abundance. In this paper the marginal conditions are determined for optimal production and distribu-
tion; these conditions can be achieved by perfectly competitive markets in the two countries, augmented
by a uniform Pigovian tax and efficient terms of trade. Some numerical simulations are made to
compare the utility levels of the two countries in the case in which pollution damage is not internalized

*Southern Illinois University at Edwardsville, Edwardsville, Illinois 62026-1102

I am grateful to the anonymous referees for their suggestions for improving this paper and to David E. Ault for sharing
with me his insights on international trade and pollution. Any errors that remain are entirely my own.