Association between gender and salary setting at the Houston College of Medicine

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# Introduction

Title VII of the Civil Rights Act of 1964 is a federal law that prohibits employers from discriminating against employees on the basis of sex, race, color, national origin and religion (1). Also, the equal pay act of 1963 requires that men and women in the same workplace be given equal pay for equal work. Income inequality between men and women have been a point of debate over the years and efforts have been made to ensure women receive the same remuneration as men. The U.S education system is one area that is not immune to this income gap problem. Several factors determine one’s compensation in the education system. Despite these legitimate factors that determine compensation, there are many cases that have been published claiming that female professors are getting paid less compared to their male colleagues while bearing the same, if not superior, titles or accolades.

The aim of this study is to examine the association between gender discrimination in setting salary within the Houston college of medicine where a female professor claimed, through a district court lawsuit, that there was evidence of discrimination against women in giving promotions and setting salaries. To support this, we built multiple regression models using six predictor variables such as the subject's department, their area of expertise, whether or not they are board-certified, years of experience, and their position title. We tested for interactions and confounders that might be present between all the stated predictors and our main predictor of interest: the subject’s gender. Our response variables were the baseline salary in year 1994 and the change in salary between year 1994 and year 1995.

# Methods

**Data Description**

The dataset for analysis has 261 observations of 8 variables.

The departments of Physiology, Genetics and Pediatrics had a significantly higher proportion of female faculties compared to the male, and the department of Surgery had a significantly lower proportion of female faculties. There was no significant difference in both clinical or research emphasis as well as certification between both genders. The results also presented that years after obtaining MD for females were shorter than that of males. By comparing the rank, which was also a proxy for productivity, the proportion of full professors among female faculties was much lesser than males (female: 15.1%, male: 44.5%, p <0.001).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Male (N=155) | Female (N=106) | Total (N=261) | p value |
| Department |  |  |  | <0.001 |
| - Biochemistry/Molecular Biology | 30 (19.4%) | 20 (18.9%) | 50 (19.2%) |  |
| - Physiology | 20 (12.9%) | 20 (18.9%) | 40 (15.3%) |  |
| - Genetics | 10 (6.5%) | 11 (10.4%) | 21 (8.0%) |  |
| - Pediatrics | 10 (6.5%) | 20 (18.9%) | 30 (11.5%) |  |
| - Medicine | 50 (32.3%) | 30 (28.3%) | 80 (30.7%) |  |
| - Surgery | 35 (22.6%) | 5 (4.7%) | 40 (15.3%) |  |
| Emphasis |  |  |  | 0.197 |
| - Clinical Emphasis | 100 (64.5%) | 60 (56.6%) | 160 (61.3%) |  |
| - Research Emphasis | 55 (35.5%) | 46 (43.4%) | 101 (38.7%) |  |
| Certification |  |  |  | 0.074 |
| - Board certified | 118 (76.1%) | 70 (66.0%) | 188 (72.0%) |  |
| - Not certified | 37 (23.9%) | 36 (34.0%) | 73 (28.0%) |  |
| Publication |  |  |  | 0.004 |
| - Mean (SD) | 4.65 (1.94) | 5.35 (1.89) | 4.93 (1.94) |  |
| - Median (Q1, Q3) | 4.00 (3.10, 6.70) | 5.25 (3.73, 7.27) | 4.40 (3.20, 6.90) |  |
| - Min - Max | 1.30 - 8.60 | 2.40 - 8.70 | 1.30 - 8.70 |  |
| Experience |  |  |  | <0.001 |
| - Mean (SD) | 12.10 (6.70) | 7.49 (4.17) | 10.23 (6.23) |  |
| - Median (Q1, Q3) | 10.00 (7.00, 15.00) | 7.00 (5.00, 10.00) | 9.00 (6.00, 14.00) |  |
| - Min - Max | 2.00 - 37.00 | 1.00 - 23.00 | 1.00 - 37.00 |  |
| Title |  |  |  | <0.001 |
| - Assistant Professor | 43 (27.7%) | 69 (65.1%) | 112 (42.9%) |  |
| - Associate Professor | 43 (27.7%) | 21 (19.8%) | 64 (24.5%) |  |
| - Full Professor | 69 (44.5%) | 16 (15.1%) | 85 (32.6%) |  |
| Salary (1994) |  |  |  | <0.001 |
| - Mean (SD) | 177338.76 (85930.54) | 118871.27 (56168.01) | 153593.34 (80469.67) |  |
| - Median (Q1, Q3) | 155006.00 (109687.00, 231501.50) | 108457.00 (75774.50, 143096.00) | 133284.00 (90771.00, 200543.00) |  |
| - Min - Max | 52582.00 - 428876.00 | 34514.00 - 308081.00 | 34514.00 - 428876.00 |  |
| Salary (1995) |  |  |  | <0.001 |
| - Mean (SD) | 194914.09 (94902.73) | 130876.92 (62034.51) | 168906.66 (88778.43) |  |
| - Median (Q1, Q3) | 170967.00 (119952.50, 257163.00) | 119135.00 (82345.25, 154170.50) | 148117.00 (99972.00, 218955.00) |  |
| - Min - Max | 58923.00 - 472589.00 | 38675.00 - 339664.00 | 38675.00 - 472589.00 |  |

**Modeling**

We built two models for the analysis of the association between gender and salary. For Model 1, the goal was to check whether there was gender discrimination in the baseline salary in 1994. Since the main outcome was the salary amount and the main variable of interest was gender, we first regressed the salary in 1994 with only `gender` to test the direct association, and then added the potential confounders to the model one by one to see if these potential confounders would actually be confounding. The variable `rank` was kept in model 1 **though it should be excluded in the initial steps for checking confounders.** If the coefficient of `gender` changes directionality and/or there was an appreciable difference in magnitude after adding a new variable to the model, that variable would be regarded as a confounder. After checking all the potential confounders, interaction terms were added to the model for analyzing any interaction between gender and other factors. The second model generally followed a pathway similar to the first model. However, the main outcome in the second model was slightly different since it focused more on the difference in salary increment rather than the baseline salary between male and female. The main outcomes for the two models were all log-transformed. There was one influential point in the dataset. We fitted the final model without that point after comparing the models fitted with and without the influential point.

**Results**

**Potential Confounders**

In Model 1, factors that were associated with gender and might explain the differential association between genders and baseline salary in 1994 were examined as potential confounders (Table  2.2). These variables were identified based on the results of the previous regression analysis. After testing for confounding in the regression model, we included the department, work emphasis, certification and the number of years since obtaining MD as the confounders, considering that adding each of these variables to the model caused an appreciable change in the magnitude or directionality of the coefficient of `gender` (table\*).  Specifically, we hypothesized that rank might still be a confounder and kept it in the model although it was excluded in the initial steps for checking confounders. Identification of the confounders in Model 2 followed a similar pathway as in Model 1. In Model 2 where the outcome was the salary increment, we included the department, work emphasis, certification, number of years since obtaining MD and rank as the confounders (table 2).

**Model information**

We built two models for analyzing the difference of salary between both genders. Model 1 accounted for the association between gender and baseline salary in 1994, adjusting for the department, work emphasis, certification, years since obtaining MD and rank. Model 2 accounted for the association between gender and income growth in 1995, adjusting for the same variables. While there was no interaction effect in Model 2, Model 1 considered the interaction between gender and the number of years since obtaining MD (see table 2). Model diagnostics showed that both of the models met the assumptions of multilinear regression and there was one influential point in the data (figure \*). We fitted two models both with and without the point and eventually selected the model fitted without the influential point for analysis. For  collinearity, since most of the variables were categorical, it was acceptable that the Variance Inflation Factor of those variables became higher.

However, considering the salary increment between 1994 and 1995 based on Model 2, gender only had a slight influence on the difference in the increment. Surprisingly, even though gender had an effect on the baseline salary, the salary growth level leaned a little more towards the female in this case. According to Model 2, there was a relatively small negative association between males and the salary increment, which implied that gender equality in the income growth was almost achieved in 1995, though the inequality still existed at the baseline level of salary.

For further analysis, Model 1 was stratified by each of the included confounders. While being stratified by the departments, the results showed that males were more likely to receive higher baseline salaries than females in the Department of Physiology and Medicine. The gender difference still existed after adjusting for other confounders (Table 3.2 ~ 3.3).

**Conclusion**

In this cross-sectional study that involved 261 college medical professors, we found that gender was significantly associated with salary at the baseline level (1994) but that a professor’s salary increase from 1994 to 1995 was not dependent on gender. Therefore, the claim made by the Houston college of medicine professor that there exist gender discrimination in setting salary was in part supported by our first model and refuted by the second model when it comes to salary increase between both genders.

**Discussion**

There is a popular belief that there is a significant pay gap between male and female, and this study partially supports this theory. Our data indicate that gender has a relatively strong association with the baseline payment of salary. In addition, its interaction with the number of years of experience also contributes to different wage payments. However, our final model of the increment in salary reveals that, except for gender, all the other variables are independently and strongly associated with the increment in salary between 1994 and 1995. This finding suggests that there is no gender pay gap in wage increase. Prior studies show that women tend not to self-promote or negotiate salary.  Moreover, both our data and AAMC specialty data suggest that women often find more career opportunities in lower-paying specialties. These might explain why there is a general pay gap in gender but no discrepancies in the increment of the salary.

Unlike gender itself, the reason behind the interaction between gender and the number of years of experience is less intuitive. Our data shows that women who work in the college of Medicine compared to men tend to have fewer years of experience in the field. According to a study of 776 subjects that compared women and men medical doctors concluded that women tended to be younger on average. In addition, men listed substantial pay as their number two priority, whereas women ranked optimal collegiality and control of personal time above pay since the study found women were less likely to pursue leadership positions. Moreover, according to a JAMA Internal Medicine Study, many women cut down on work hours once they had children. Even though our sample data failed to record the ages of subjects, these discoveries explain that women do not prioritize salary, and prefer a more flexible schedule due to family reasons, and therefore results in fewer years of experience and therefore lesser wages.

**STUDY STRENGTHS.** The major strengths of this study came mostly from the use of multiple regression models to explain the association between gender and salary. Both model 1 and 2 yielded high adjusted R-squared, 94% and 81% respectively, meaning a high percentage of variations in the response salary variable can be explained by the variation in the predictor variables. Additionally, the simplicity of multiple linear regression allows us to easily interpret the relationship between predictor and outcome variables.

**STUDY LIMITATIONS.** First, our study was restricted to faculties in the Houston college of medicine. The dynamics of employees of other institutions or organizations may be quite different. Second, our research data did not include the age and race of subjects. Therefore, our results may not be generalizable to schools with a different distribution of age and race. Finally, we cannot exclude the possibility that the association we observed is due to a certain sociological environment that the school is embedded in. If, for example, the school is in a community where sexism is common and embedded in their subconsciousness and the environment they grew up in, our result, therefore, cannot be generalized to other communities.

**References**

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A close up of a map

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Figure. \* model diagnostics for model 1

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Figure. \* model diagnostics for model 2