Gender Based Wage Disparity in City of Philadelphia Employees

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Over the past several decades, the rate of labor market participation among women has been on the rise. With advancements in household technology and changing societal opinions, women are stepping away from the traditional norm of serving as homemakers and are transitioning into more market production oriented roles. This trend has the implication that women are spending more time getting the skills necessary for a labor market job, "Women have been increasing their relative labor market qualifications and commitment to work" (Blau & Kahn, 2016). As this movement continues, it begs the question as to whether women are being compensated for their work at rates competitive to those of their male counterparts. Much of the existing research on the gender wage differential suggests otherwise, "By 2014, women full-time workers earned about 79% of what men did on an annual basis and about 83% on a weekly basis" (Blau & Kahn, 2016).

Gender wage gap differential research has been furthered by specifically looking at certain fields and occupations such as science, technology, and math (STEM) and CEO's. However, there has been very little research examining gender based pay differences in government jobs. Perhaps this lack of research is due to the commonly held notion that government jobs have helped increase women's labor market participation rates. Gornick & Jacobs (1998) make exactly this point in their paper: "Some scholars argue that public employment not only has increased female participation rates, but that it also has constituted a crucial source of especially 'good jobs' for women." On the contrary, the little bit of research that does exist on the topic highlights that the government sector is not free from the wage discrimination we see in other fields. Miller's (2009) paper notes, "The government sector is, however, characterized by a distinct sticky floor effect in female-male pay differential" (Miller,

2009). In other words, these findings suggest that women are systematically placed and kept in positions that pay less than positions that are traditionally more male dominated.

This paper hopes to expand the existing body of literature on gender based pay differentials in government with a case study looking at the salaries of City of Philadelphia employees to understand whether the same gender-based wage disparities that exist in many industries are also present in the governing body of a major city. As the sixth largest city in the United States, Philadelphia offers a robust dataset of city employee wages to analyze. Having an understanding of a potential wage differential in a large city allows us to make predictions about issues with wage disparity that we may see in other cities and at the state and federal level.

Significance

The reasons for studying gender based wage disparities in government are numerous. For one, unequal employee compensation has a substantial effect on policy, whether it be at the city level, state level, or federal level. Men and women have different and "different gender-based roles and responsibilities in their own lives, families, households, and communities" (Population Reference Bureau, 2002). By paying two equally qualified individuals in our government different salaries because one gender identity is preferred over another, we as a society are conveying that we value a certain perspective more than another. Not only is this morally wrong, but it also has tangible implications. Take for example the current state of health care in the United States. At the moment, we have a predominantly male legislative body trying to make decisions about women's reproductive rights. Men lack a female reproductive system and hence they also lack the perspective that is necessary to make an informed decision on the subject. The same principle is true for a city government policy and decision making. By understanding the difference in men and women's pay, we can take proactive measures to reduce the potential

disparity between men and women's wages. This is the first step in shifting a long held societal values that place more importance on men's perspectives than women's.

Furthermore, the government today sets the stage for future generations of government. If young girls do not see women in positions of power being compensated similarly to men in the same field, that has an effect on their aspirations to go into the field. In the case of government, that makes a huge difference in adding varied perspectives on topics. In other words, our wage practices today have a direct impact on our societal future.

By studying gender based wage disparities, we can better understand the extent of the issue and possible causes. It is only after better understanding this issues that we can come up with fruitful policy suggestions that will ultimately mitigate the problem.

Theory

There are several explanations for why a gender based pay differential between workers at the same employer may exist. The employer, in this case the City of Philadelphia, could be operating with animus based discrimination towards female applicants. This would mean that people making hiring decisions in the City of Philadelphia have a personal distaste towards women. Such animus may be due to beliefs that women are less capable of completing a job or employers do not want to work with women. Animus based discrimination may also prevent women from receiving promotions, despite positive job performance in their current position. This sort of discrimination may keep women in lower paying positions, or keep them from being hired at all. Animus based discrimination would have to be addressed by targeting and ameliorating the personal biases that people hold towards women.

Another possible explanation for gender discrimination is statistical discrimination. In practice, this could be an employer making assumptions about a woman's future life decisions.

An employer may assume that because their potential employee is a woman that they will leave the work place in a few years to have children and may decide that it does not make sense to invest time and money in this hire. Alternatively, an employer could assume that a woman may not be able to perform her job as well as a man because she has familial obligations such as taking care of children or housework. In short, statistical discrimination towards women involves making stereotype-based assumptions about what a worker will be like based on, solely having information about their gender.

When looking at a model of discrimination, both statistical and animus based discrimination would be result in a lower a demand for a female worker compared to a male worker for the same job (see Figure 1 in appendix). Assuming an equal supply of male and female workers, lower demand for female workers means that equilibrium pay for women (W_w) would be lower than the equilibrium pay for a man (W_m). This differential would be represented as $W_m - W_w > 0$. If the differential does exist then we would also see a lower number of women being employed than men, in Figure 1 this would be represented as $L_m > L_w$.

If no discrimination on the employer's end exists and the supply of male and female workers is the same, then the employer's demand for men and women to fill a given position would be the same (see figure 2 in appendix). This would also mean that men and women would be hired at equal rates and paid the same amount for the same position.

Lastly, it is important to acknowledge that if a pay differential between men and women does exist, it is not necessarily because of discrimination on the employer's part. A differential may be due to the fact that women are genuinely less qualified than men to be hold certain positions. This may attributable to a lack of investment in skills that translate into market education and more expertise in non-market labor. As Blau and Kahn (2000) explain, this may

be because of "The traditional divisions of labor by gender in the family, women tend to accumulate less labor market experiences than men. Further, because women anticipate shorter and more discontinuous work lives, they have lower incentives to invest in market-oriented formal education and on-the-job training, and their resulting smaller human capital investments will lower their earnings." Even though women are now transitioning into market-oriented positions at a higher rate than ever, it is possible that they lack the necessary skills for occupying these positions and for this reason are getting paid less than their male counterparts. Such an issue could only be remedied by providing these individuals with the appropriate market training.

Evidence

This section looks at individual level data from the City of Philadelphia to determine if gender based wage differential does actually exist. Data for this project was obtained through Open Data Philly, an open data initiative that aims to create a more transparent city government. Data on all city employees, including: name, position, and annual salary for 2016 is available on this website. This particular analysis looks at the first fiscal quarter of 2016 in order to control for any change in salary levels that may occur from quarter to quarter. There was a total of 30,253 entries in this data set.

The data obtained from the City did not include gender as a variable in the data set. Gender is a protected identifier; this prohibits an employer from sharing this information. Instead, data was matched against the 10,000 most common male and female names (Kantrowitz, 1991), to determine the most likely gender for an individual. Limitations of this approach are discussed later on.

After the matching and cleaning process, the total sample size was 20,081 individuals belonging to 54 unique departments. The mean salary for all employees was $57,312.61. Men

and women had an average salary of $59,113.71 and $53,964.52 respectively (see Figure 3 in appendix for other summary statistics).

For the most part, the distribution of wages (see figure 4) appears to be relatively similar among men and women. Both graphs are skewed right. There is a higher frequency of male jobs in this data set. It is difficult to determine whether this finding is indicative of hiring practices in the City of Philadelphia or if it is a side effect of the data cleaning process.

A difference between means t-test was performed to determine whether there is a statistically significant difference between the salaries of male employees and those of female employees (see figure 5). The results show a significance level below $p < 0.01$. This means that we can reject the null hypothesis that there is no difference in wages between men and women with 99% confidence. In other words, the City of Philadelphia, on average pays individuals who were identified as male more than employees who were identified as female.

The Bureau of Labor Statistics (2016) provides a breakdown of a women's earning as a percentage of men's. Construction is indicated to be the occupation with the least wage inequality despite being a field that is more labor intensive and male dominated. Women's earnings in this field are indicated to be 91.3% of their male equivalent's. With this in mind, I was interested to see how departmental gender break down fared in comparison to this national statistic and also exploring whether gender wage disparity in these departments in particular was also statistically significant.

Figure 6 in the appendix shows the ten departments with the lowest percentage of employees that were identified as female. Perhaps not surprisingly, the majority of these departments are labor intensive positions, which are typically occupied by men. Further analysis was done on the top three departments on this list: Fleet, Fire, and Streets (see figure 7). The

average salary for an identified woman in the Streets Department exceeded that of a man's by over $1,000. Another between means t-test found that the Fire Department was the only department amongst these three that had a statistically significant difference between male and female salaries. In other words, the wage disparity between men and women in other two departments is likely due to chance. This finding is in accordance with the Bureau of Labor Statistics' report that a woman earns a higher percentage of a man's income in more labor-intensive positions.

Limitations

Given the data cleaning process in this project, there are several limitations to these findings. Roughly 10,000 names were dropped in the name-gender matching procedure due to fact that they did not match with the database of names or they were identified as gender-neutral names. It is possible, and quite likely, that the names that were dropped had some sort of unifying factor to them. The power to make statements about the population as a whole is lost because these observations had to be dropped.

Non-Caucasian names are less likely to show up on a list of the 10,000 most common names in the United States. By losing people of color in this population, we are probably getting a less than accurate understanding of the extent of the gender disparity that exists amongst men and women. In addition, by using this method, we are assuming people's gender identity which can be problematic from a research perspective because people do not often identify with the gender most commonly associated with their name.

Even with the limitations associated with this approach, the results of this research still do have value. In order to convince policy makers that there is a wage disparity problem, we need to work with the data and information that we currently have. Only after using this this

information and identifying a problem can we work to get better data and information that is needed to further understand the problem.

Future Research

This exercise provides numerous ideas for possible future research topics. Perhaps most the most obvious idea for future research would be to obtain this same data set again but with people's genders attached. This would likely be more possible if names were excluded from the data itself. By having gender as a variable endogenous to the data set, one would be able to get an accurate picture on the extent to which wage discrimination is a problem. It would also be interesting to expand the scope of this research to include race and ethnicity as variables as well.

Furthermore, it would be interesting to see if similar trends of wage discrimination are also present at the level of the state government and the federal government. This would be particularly impactful for national policies that have an effect on the whole country.

City of Philadelphia government is so expansive that there is no clear hierarchy that can be determined simply based off an employee's title. Many departments determine interdepartmental on their own. Developing a clear classification of roles in the department would make it easier to identify whether the reason that women are getting paid less is due to the fact that they are occupying lower paying positions. If this is the case, this may indicate a sticky floor effect where women are systematically kept in lower positions.

Policy Recommendations

There are several steps that both the City of Philadelphia can take as a policy maker and as an employer that could help remedy the problem of a wage gap. As was noted earlier, the period during which the wage gap is lowest is during the early years of a woman's time in the labor market. The gap widens as women get older and start to take more time outside of the labor

market. Many women have children during this time. In the meantime, men who used to be compensated equally have progressed in their career. Sociologists refer to this phenomenon as the motherhood penalty. The motherhood penalty also affects how employees think of their female coworkers. Correll, Benard, and Paik (2007) found in their study on the motherhood penalty that "Mothers were considered to be 12.1 percentage points less committed to their jobs than non-mothers while fathers were perceived as being 5 percentage points more committed than non-fathers. Compared to childless men, mothers were rated 6.4 percentages points lower with regard to commitment than childless men."

While the data set for this project did not include age or parental status, it is undeniable that the motherhood penalty is one of the many culprits for the unequal wage distribution in the City of Philadelphia. One substantial step that can be taken at the employer level is to offer more competitive and flexible maternity leave that would allow women to keep working while raising children. By instituting such a policy, women could continue working while raising children.

Philadelphia's current maternal leave policy is far from flexible. As it stands, permanent employees are entitled to a total of six months of unpaid maternity leave (City of Philadelphia Office of Human Resources, 2017). This puts women at a disadvantage because taking time away from work to have children is accompanied with a financial burden. Instead, Philadelphia could model their maternal leave policy after the Paid Family Leave program that exists in the State of California. Employers in California are required by state law to provide their employees with an option to take family leave to take care of a new child or family member (State of California Employment Development Department, 2017). A new mother can claim up to 12 weeks of disability insurance through this program. For someone making $48,000 per year the weekly benefit rate that a new mother can collect is 60% of her weekly earnings or $564 per

week. This program also offers flexibility in that all time off does not to be taken off at once and can instead be broken up into numerous segments. Philadelphia implementing a policy modeled off California's Paid Family Leave program would provide new mothers with additional income that would help ease the financial burden that often contributes to the wage gap.

Conclusion

This exploration of City of Philadelphia employee salaries suggests that there is a significant difference between the salaries of employees that registered as male and those who registered as female in the data cleaning process. While the data cleaning process in this project presents several limitations, this is a good first step in understanding existing disparities. By getting more data about employees and variables of interest, we would be able to further identify, and hence understand, the root of any disparities that may exist between different groups of individuals.

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Appendix

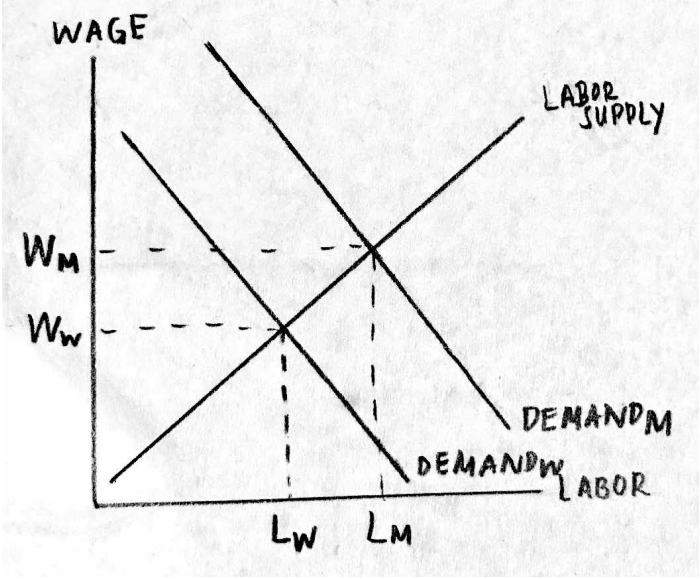

Figure 1: Lower demand for female workers due to forms of discrimination

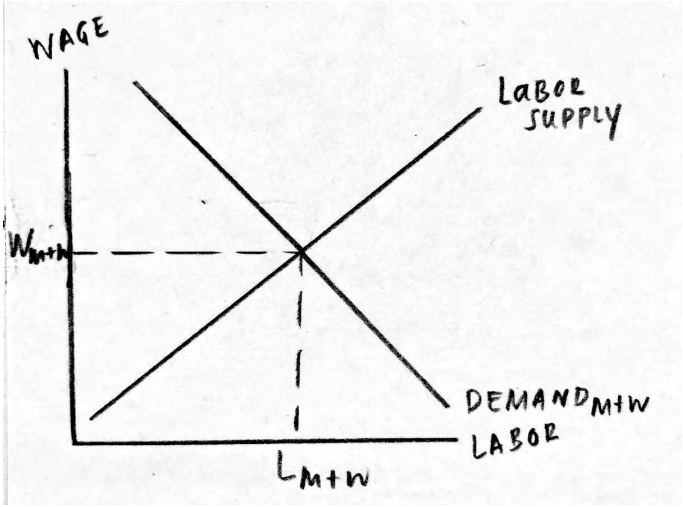

Figure 2: Equal demand for male and female workers

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Women	7,024	$53,964.52	$20,050.68	$23,681.00	$215,000.00
Men	13,057	$59,113.71	$19,757.17	$120.00	$240,000.00
All Employees	20,081.00	$57,312.61	$20,011.08	$120.00	$240,000.00

Figure 3: Summary statistics for salaries based on gender, City of Philadelphia 2016, Quarter 1

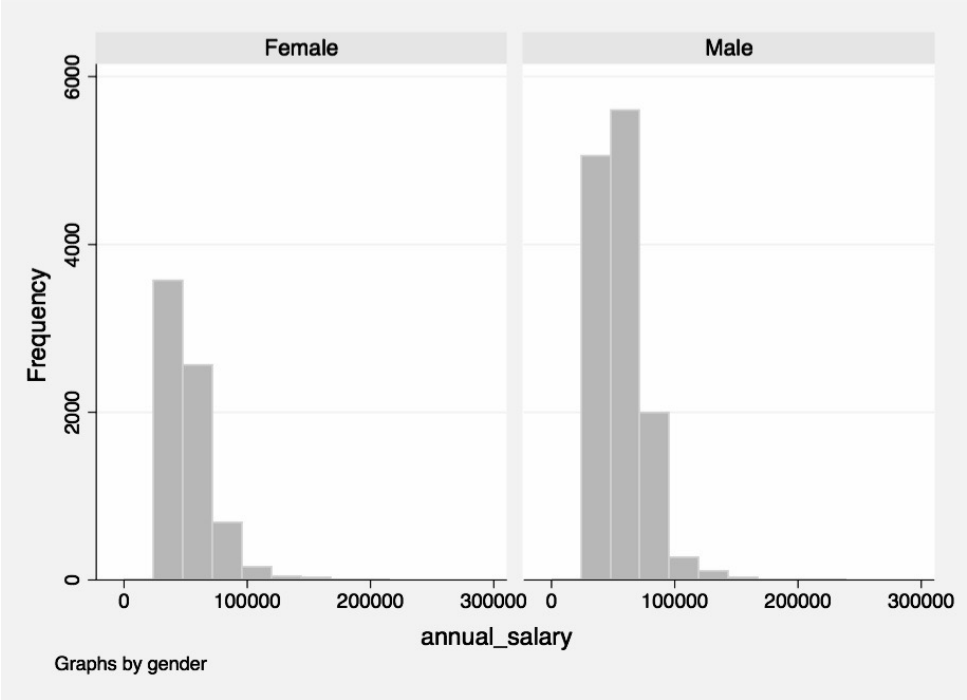

Figure 4: Histogram showing distribution of wages based on gender

Group	Observations	Mean	Standard Error	Standard Deviation	95% Confidence Interval
Female	7024	53964.52	239.2416	20050.68	[53495.5, 54433.51]
Male	13057	59113.71	172.9032	19757.17	[58774.79, 59452.62]
Combined	20081	57312.61	141.214	20011.08	[57035.82, 57589.4]
Difference		-5149.185	293.8766	-5725.207	-4573.163

H_0: diff = 0

diff = mean(female) = mean (male)

H_a: diff < 0	H_a: diff ≠ 0	H_a: diff > 0
Pr(T < t) = 0.0000	Pr(|T| > |t|) = 0.0000	Pr(T > t) = 1.0000

Figure 5: Results of difference between means t-test

Department	Total Number of Employees	Percentage of Female Employees
Fleet Management	262	5.725%
Fire Department	1,948	9.805%
Streets Department	1,162	11.704%
Mural Arts Program	7	14.286%
Public Property	145	16.552%
Water Department	1,452	17.287%
City Sheriff's Department	225	24.000%
Police Department	5,401	24.551%
Board of Revision of Taxes	15	26.667%
Recreation Department	536	26.679%

Figure 6: Top 10 departments with lowest percentage of female employees. Note that this figure excludes departments that showed up as entirely male.

Department	Mean Salary	Mean Salary Women	Mean Salary Men	Between Means T-Test Results
Fleet Department	$48,251.01	$46,507.67	$48,386.81	Not Significant
Fire Department	$67.802.48	$60,061.11	$68,523.64	P <.01
Streets Department	$40,533.11	$41,390.15	$40,416.23	Not Significant

Figure 7: Average salaries for top 3 departments with lowest percentage of female employees

Figures not discussed in paper:

Figure 8: Scatter plot and regression line showing relationship between the proportion of department that is female employees and the average department salary

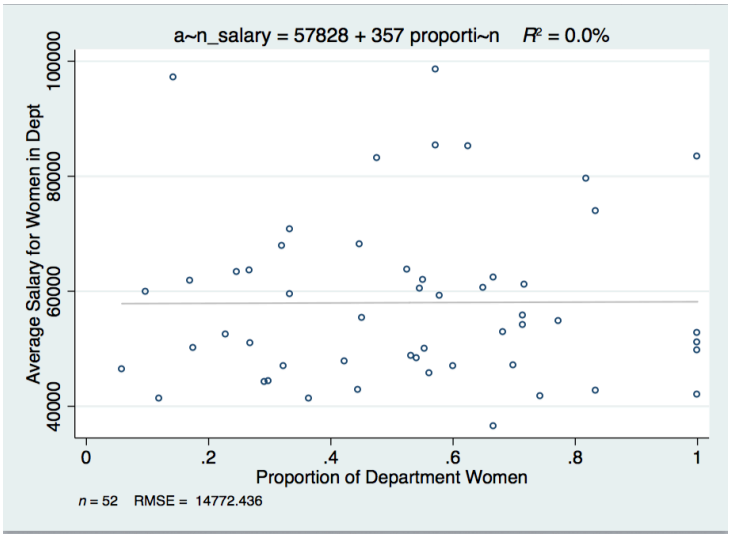

Figure 9: Scatter plot and regression line showing relationship between the proportion of department that is female employees and the average salary for women in the department