

## **Foreword**

This paper is written on completion of my bachelor's degree in economics and management from NTNU business school. The thesis is written on the basis of labour marked.

To study the wage gap is crucial both for developing and developed countries, it gives us information how the economic actors shape the labour marked and it provides direct insight to reshape our thinking.

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## **Abstract**

The aim of this study is to estimate the wage gap between public and private sector in the US in 2015 and finding the factors which influenced such wage differentials. The analysis identifies the wage gap across education and health sector. The cross-sectional data is obtained from international public use microdata series(IPUMS). The result show high return for education in private sector and wage gap due to gender, age and geography is point of interest. Sub sample analyses by gender, race and sector allow me to identify the wage variation among individual in these two sectors. Controlling av statistical properties are robust to analyse cohort in 2015, the reward on education for private health sector is higher than public sector. Low educated individuals have lower return.

**Keywords:** Income inequalities, public -private sector, School, Hospital, Gender, Education.

## Introduction

The labour market has huge impact on an individual's wellbeing, it also structures our socioeconomic status, and it has an important role to form an even-handed society with sustainable economies. In many countries the return on labour has not increased as compared to the labour productivity, an unskilled worker in EU earns more than the skilled worker in India, and it is important to comprehend that such an externality may harm the aggregate labour market, where the top earnings are increased tremendously but the worker with low wages still struggle to survive. The wage structure is an important and crucial topic both for the profit maximizing companies and policymakers with different political objectives and as result the worker enter into the market with personal intention, like finding high paid job on the other side the employer is in search of competitive skill with low cost. Such a diversity and unjust in some country make me eager to understand and find out the determinant of wage gap between public and private sectors. Also, the aim of this paper is to estimate the disparities of wage between these two sectors in the US and also try to find out what are the main factors determining the wage gap between the public and private sectors.

In general, what decide a wage gap in a labour market, is supply and demand which shape the structure of wages in a labour market. In a market where the return for skilled worker is higher the more there is wage gap between the skilled and unskilled worker. In competitive market the demand of worker with greater productivity increase and employer will pay good return.<sup>1</sup>

One of the causes of wage gap from the public sector is the political motives, for instance constraint of budget to minimizing the expenditure for total economy, which may not be achievable by markets model.<sup>2</sup> Such political objective could be decentralization of wage and little attention on productivity of characteristic and more bureaucracy. In public sector there is always preference for high education. There is also some political motivation, that the government are willing to pay high return to its lower skilled worker. One of the political economic models is the wage differentiation on the basis of geographic role in Norway.<sup>3</sup> which clearly identify the excess burden due to the variation in payroll tax. Beside a such issue there are many other factors that involves in the convergence of wage gap

among the public and private sectors. There are some other factors such as single characteristic of employee, choice of occupation, education and experience, these factors could affect the wage gap among sectors, and it can empirically find out with the help of Mincer equation. During the 1970s in US, wage for labour in public sector was about 15% higher than in private sector and female was paid higher than male in public sector.<sup>4</sup>

There is a large variation in wage gap, both sector wise across the country, on the basis of education and skill, and better return for high education and experience. Besides this there is geographical pay differentials.<sup>5</sup> My contribution is to find out how the different return to education determines wage gap in health and education industry both in private and public sectors. The first stage of estimation was looking for the wage gap in different sectors overall in US, then analyse the heterogeneity for control variables, for example education, age, gender, region, and occupation.

This paper is organized as follows. Section 2 describes the detail about the data, methodology and analysis. The third section discusses the results and 4 draw a conclusion on results and at last I consider the robustness and limitations of my paper.

## 2. DATA

The cross-sectional data for this analysis were obtained from the harmonized Integrated Public Use Microdata Series (IPUMS) International, the IPUMS US 2015 sample is collected for United States from the population of 50 states and samples are extracted randomly one in hundred. The original sample size is 3147005. Since the aim of the study is to compare wage gap between two sectors some data are excluded for compatibility reasons. After excluding some data (the detail for each variable is mentioned separately) the size of observation is 183452. I exclude the worker below 16 and older than 65 (Table 1) unpaid worker and self-employed. In my work the dependent variable is wage and the other all variables are independent variables, among independent variables sector of work and Gender is a dummy variable. Sector of work is coded, public sector = 0 and private sector = 1. The Gender male = 1 and female = 0. The measurement for wage gap in public-private sector is also used by Louis N Christofides, Maria Michael, (2013). The predictor variables are explained as follows.

**HRSWORK1:** Describe the number of hours per week.

**Gender:** In the population 46.18% is male and 53.82% is female.

**EMPSECT:** variable is used for sector of employment, where the age of worker is greater than 16 years and working from last five years. 14.61% of the population is public employment and 70.41 % work in private sector.14.98 % is self-employment. 8.5% of male workers and 11.5% of female workers are employed in the public sector, 48.69% of male workers and 49.54% of female worker are employed in the private sector. The data which was not in universe and foreign combined sectors are excluded from data analysis because it was not separate public form private employees in these sectors.

**EDATTAIN:** Describe the person's educational level. It is categorized by 1 for less than primary completed , 2 for primary completed, 3 for secondary and 4 for university level. 40% of population has university degree, 51% has completed secondary school, 6.8% has primary school and nearly 2.1 has less than primary education. The age of workers is ranged from 16 to 65. Out of the total observation the public employee is 246277 and in private sector 1090988.

**Incwage:** reports the annual salary in us dollar in 2015. The total average wage is 48455\$. The data shows the average wage in public sector 52712\$ which is higher than private sectors, 46480\$

**IND:** is five-digit numerical data which refer to sector where the person worked.

**REGNUS:** The variable is geographic identifier in the census region of United States with for major region northeast, Midwest, South and West.

**RACE:** It indicates the race of each individual by describing him and herself to particular group.

**HRSWORK1:** Indicate the number of hours per week. According to the U.S Department of labour standard number of hours per week is 40 hours, there for data above 40 hours is excluded.

**Table. 1**

Summary table for income, region wise, 2015

| United States region     | Mean         | Std. Dev     | Freq.         |
|--------------------------|--------------|--------------|---------------|
| New England              | 40109        | 48471        | 49359         |
| Middle Atlantic division | 39691        | 46110        | 132406        |
| East North               | 32668        | 37241        | 149333        |
| West North               | 31679        | 35087        | 68530         |
| South Atlantic           | 36779        | 42933        | 188084        |
| East South               | 31362        | 35679        | 56160         |
| West South               | 35332        | 42800        | 104368        |
| Mountain division        | 34829        | 39558        | 68422         |
| Pacific division         | 42146        | 48306        | 144703        |
| <b>Totalt</b>            | <b>36544</b> | <b>42729</b> | <b>961362</b> |

Table1 show the income distribution on region wise, the country (US) is divided in 9 regions. Overall mean income is 36544\$, among them pacific has highest average wage and East South has the lowest income.

**Table. 2**

Educational attainment, 2015

| Gender | University | Public | Private |
|--------|------------|--------|---------|
| Male   | 117892     | 37111  | 66610   |
| Female | 170108     | 429331 | 94308   |

## Table 2.

This descriptive table show the number of Gender with different level of education in private and public sector. The total number of females completed university is 523639 out of total simple, and of those 429331 are employee in public sector.

## 3. Result

In the first model I examine the wage gap in public and private sector overall , I used a cross-sectional data on a sample of 961362 individuals. The Ordinary Least Squares method is used to estimate the model:

$$\text{Wage} = \beta_0 + \beta \text{ empsect} + u$$

The model above is estimated in column 1 in table 3. The result shows that the wage decrease with amount of 119 hundred dollars sector wise and all other things being equal. The expected wage for every individual is 39169 thousand dollars annually, when alle other regressors are equal to zero. Which does not make any sense to keep the other variables equal to zero. The  $u$ , error term contains all the other unobserved variables that determine explained variable. The estimation yields with R-squared of 0.001 which leads towards incorrect inferences. To get a fair result I add some other statistical properties which is important to determine independent variable more correctly. The population regression model is as fellows.

$$\text{Wage} = \beta_0 + \beta_1 \text{ empsect} + \beta_2 \text{ edattain} + \beta_3 \text{ race} + \beta_4 \text{ Gender} + \beta_5 \text{ age} + \beta_6 \text{ regnus} + \beta_7 \text{ ind} + \beta_8 \text{ race} + u$$

In the second model I controlled the other independent variable, I used the Multi linear regression to model the relationship between regressand and regressors. I found the effect of regressor on wage. The expected wage is negative 56611 thousand dollars when all other variables are equal to zero, *ceteris paribus*, which does not give sense. The result shows that model 1 yields under estimation and on predictor variable the error term conditional was not zero. My estimation yields that there is a positive return on education but expected wage premium for primary education is 5675 dollars , for secondary it is 9979\$ and those who hold university degree earn 36461\$ more. There is huge difference between the wag of

a person with primary education and high education ( 36461 – 5675 = 30786). Hours per week indicate the employee with extra hour per week (mean hours per week of 33.812 in descriptive table) earn 1145 dollars more. Considering region, the wage gap increases with 7.3 dollars per hours, the summary table provide more details on different regions where the mean wage, region wise is 36544 thousand dollars annually and it is highest in west region pacific division and lowest in East South. Public indicates that the wage decreases for employee working in public sector with an amount of 22234\$ annually. The return on wage for male is higher than female which is 9993 thousand dollars and native white Americans earn 8151\$ more than the other racial group. This indicates a racial discrimination in different sector. there is a limitation in this model to study the wage gap due to discrimination and it need further analysis to this part of the model. Employee in public sector receive 1655\$ more than the private sector. This composition is because of high education and Gender. The number of female employees with high education in public sector is relatively high than private sector. Table 2 show this composition.

### Table. 3

Model (1) estimate relationship between wage and independent variable. In the second model added other statistical properties in MRL.

|                             | Model (1)<br>Wage  | Model (2)<br>Wage  |
|-----------------------------|--------------------|--------------------|
| <b>Intercept</b>            | 39169.6<br>(105.5) | -56611<br>(493.18) |
| <b>Sector of employment</b> | -119<br>(4.376)    | -26.49<br>(3.790)  |
| <b>Hours per week</b>       |                    | 1145.6<br>(4.114)  |
| <b>Primary education</b>    |                    | 5675.8<br>(381.1)  |
| <b>Secondary education</b>  |                    | 9979.9             |



|                             |        |                     |
|-----------------------------|--------|---------------------|
|                             |        | (355.0)             |
| <b>University completed</b> |        | 36431<br>(358.7)    |
| <b>Gender</b>               |        | -10059.6<br>(78.71) |
| <b>Age</b>                  |        | 568.1<br>(82.792)   |
| <b>Region</b>               |        | 23.9<br>(3.7)       |
| <b>Public</b>               |        | 1655.35<br>(133)    |
| <b>Male</b>                 |        | 9993.71<br>(78.61)  |
| <b>White</b>                |        | 8025<br>(169)       |
| <b>Observation</b>          | 961326 | 961326              |
| <b>R-squared</b>            | 0.001  | 0.264               |

Further I exclude some variable and focused on effect of age which I assumed with the passage of time for sure the employer get more experience and how does this effect on wage in public and private wage. The result show that the wage increase from the early period in career up to age of 46 and decreased after that with an amount of 1610\$ in private sector and 1444\$ in public sector.

In 3<sup>rd</sup> and 4<sup>th</sup> model I estimate a sub set of a sample to find out the effect of industry in health and education sector. The sub sample for school has 5095 observation, and the sub sample consist of 52095 individual, with focused on worker in hospital, though the return on education is positive with different level of education but the annual return both for private sector and female decrease respectively with 4600\$ and 7928 thousand dollars, and it is

positive for government employee which is 2219\$. Those who are employed in government sector get paid 4600\$ annually less than worker in private sector. The return for education in health sector are high for those who completed university. Wage for female worker in health sector decrease 11685 thousand dollars annually, female employed in education sector earn 3757 thousand dollars(11685-7928) less than female employed in health sector.

**Table. 4**

Estimation of private-public wage gap: Education and health sector, 2015

|                      | Education sector | Health sector   |
|----------------------|------------------|-----------------|
| Private              | -4600<br>(1514)  | -2527<br>(588)  |
| Self-employed        | -6873<br>(1801)  | 54920<br>(4234) |
| Primary completed    | 9378<br>(7373)   | -140<br>(3288)  |
| Secondary completed  | 13757<br>(7220)  | 11047<br>(2880) |
| University completed | 25034<br>(7212)  | 40374<br>(2884) |
| Female               | -7928<br>(830)   | 11685<br>(452)  |
| Age                  | 620<br>(30)      | 727<br>(14)     |

|                 |        |        |
|-----------------|--------|--------|
| Intercept       | -8959  | 6061   |
|                 | (7440) | (3015) |
| Nr. Observation | 5095   | 52095  |
| R-squared       | 0.186  | 0.158  |

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Standard errors in parentheses

#### 4. Robustness and limitations

The robustness of the result is finding the effect of different features in different model and concentrating on narrowing the estimation by specific industry of education and health. Focusing only on these two industries make me able to compare the wage gap in private and public sector because there are only few industries which is govern by both private and public sector.

The limitation of this analysis is not having data on shifter which can direct the reader to find out the wage gap in this to sector , and possibility of another approach for finding wag gap not only by market discrimination. By this way policy maker could apply different measure on the behaviour of individuals. I leave this opportunity for further future research. The only focus on distinct industry gives a good information only for the subject of interested but it cannot be generalizing the wage gap for overall labour market in US. There are some other variables which effect the result in more correct direction like Tenure, return on experience in different cities and capture the effect of wag gap by region- wise.

## 5. Conclusion

The aim of this paper is to concentrate on wage gap between private and public sector in US. I carry out research on wage gap to understand what are the feature that increases the gap relatively more than characteristic of job and individual discrimination. The starting point is simple linear regress which is extended to include statistical properties by adding more regressors. The result shows that wage for male is higher than for female comprehensively. There is good return for worker with high qualification, but it is higher in private sector than public sector, but the wage pattern decreases for female in public sector more than private sector. considering gender, education and geography lead the result towards large variations. The static gap shows that gender, race and geography matters.

Considering the result, to understand the wage inequality it is important to study the wage gap between private and public sector. Estimation on wag gap in these two sectors recommends, providing equal chance to each individual which can minimize the cost of employing and stimulate economy effectively in a country overall.

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## Data extracted:

**Minnesota Population Center. Integrated Public Use Microdata Series, International: Version 7.3 [dataset]. Minneapolis, MN: IPUMS, 2020.**

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