To what extent does age, sex and ethnicity influence income levels given prior degree attainment?

Group 149

2005594, 2007017, 2062589, 2054100, 2038075

Introduction

Having a university degree undoubtedly influences one's lifelong income expectations, which is one of the main motivators for students pursuing higher education. We wanted to achieve a better understanding beyond this usual conclusion, therefore we decided to look at multiple other factors concerning degree attainment, metrics such as age or ethnicity that also play an important role in determining future income.

The UK Data service's Annual Population Survey from 2020 was a great dataset to look at for this goal, as it includes hundreds of variables and a large sample size. This topic was also interesting for us personally, as in many ways it allowed us to glimpse into our future, seeing how our existing background may influence our potential income levels.

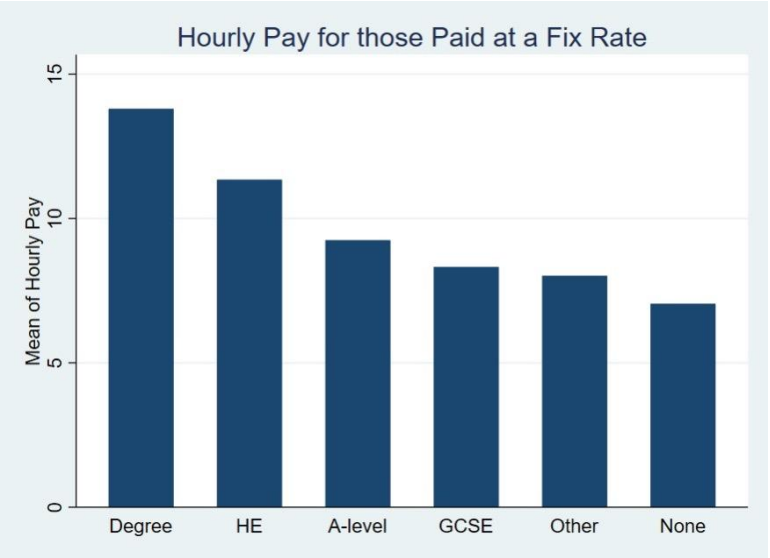
Variables used

- Highest qualification (detailed grouping) (**HIQUL15D**)
- Gross hourly pay (**HOURPAY**)
- Whether paid fixed hourly rate (**HOURLY**)
- Age bands (**AAGE**)
- Ethnicity (9 categories) UK level (**ETHUKEUL**)
- Sex (**SEX**)
- Whether degree level qualification (**QUAL_1**)

Data Analysis

Contextualising Qualifications

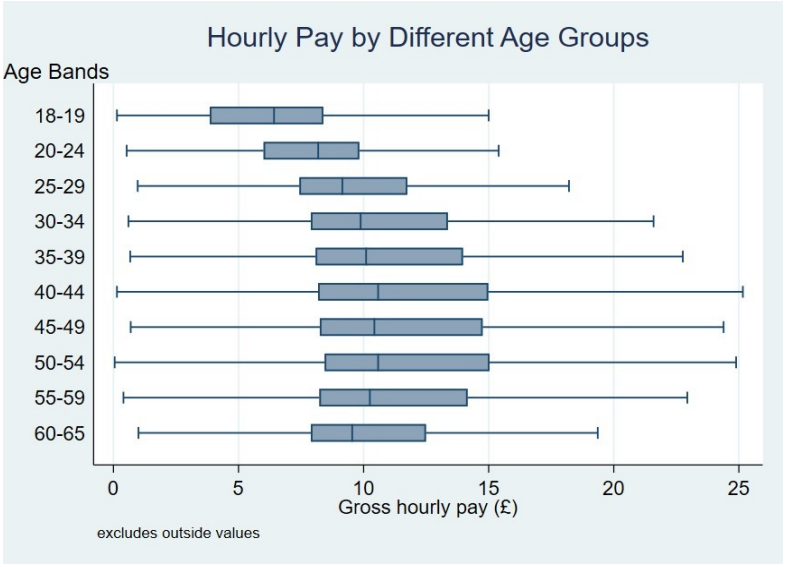
Figure 1



As seen in Figure 1 which charts prior educational attainment against mean hourly pay, there is a linear positive relationship between prior educational attainment and mean hourly pay. A Degree yields the highest mean hourly pay of approximately £14 per hour, which continues to fall as the level of education decreases, with education levels of none reporting a mean hourly pay of approx. £6.50. This implies that individuals with a degree will enjoy a mean hourly pay 2.15(2dp) times larger than that of their 'none' education counterparts. Figure 1 here highlights that the relationship between educational levels and hourly wages are purely positivity related.

Impact of Age

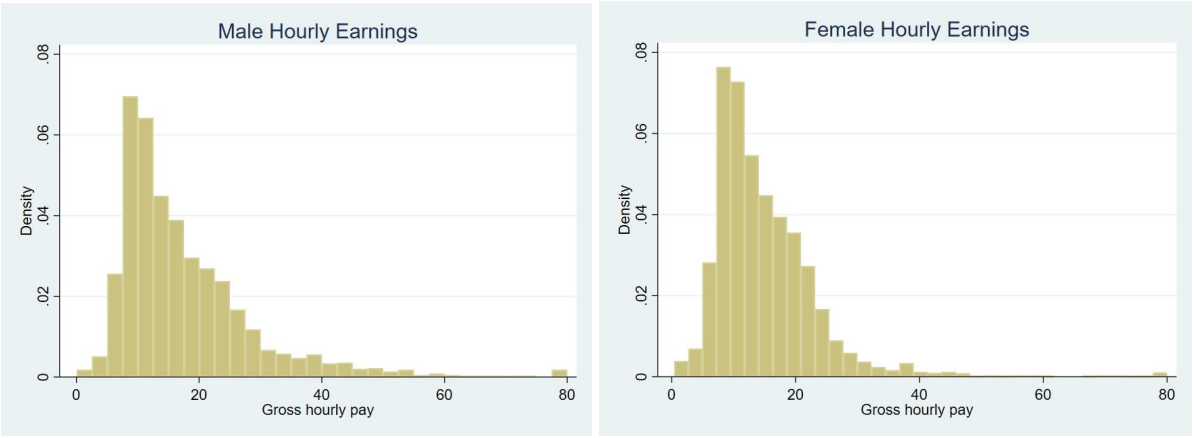
Figure 2



In figure 2, we undertake a box plot of gross hourly pay against age. We have excluded ages below 18 and above 65 as the vast majority of these individuals do not work or are retired. We have also filtered out those individuals who do not have prior degree attainment to address our question and excluded outside values. From the box plot, there is ample evidence to suggest that the mean of gross hourly pay increases as the age band increases from 18-19 to 40-44 age band before decreasing as the age band increases to 60-65. The dispersion of points (indicated by the blue box width) also tends to follow a similar pattern increasing until the age band 40-44 before falling as age approaches the 60-65 age band.

Impact of Gender

Figure 3 and Figure 4



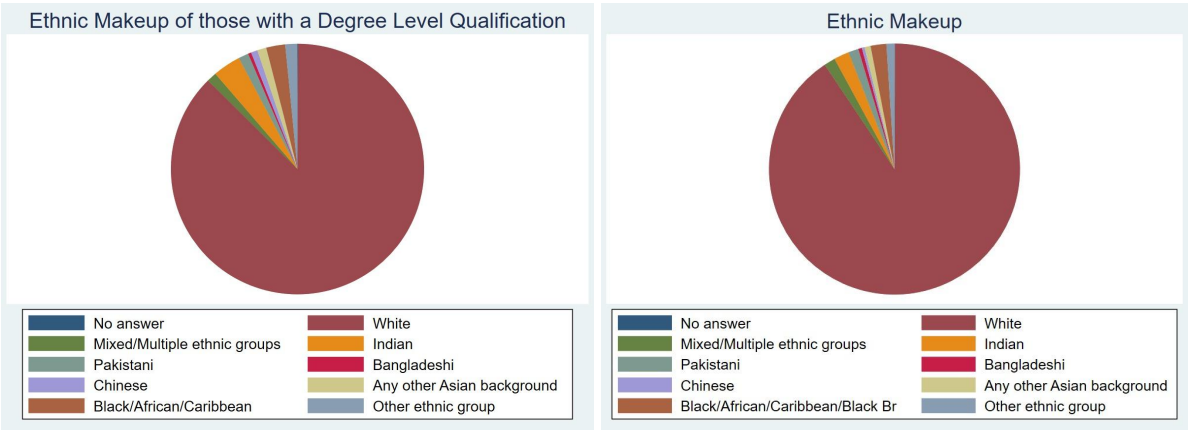
While the mean of hourly pay for those with a degree qualification (or higher) is higher than those without it, we still believe that the distribution of income is still gender-biased. Of the total 44,308 individuals who have a degree where the mean is 7.02, it is reported that the mean hourly pay for males is roughly 8.21 and 6.05 for females. The standard deviation of men (19.04) is also higher than the standard deviation for the entire group (17.39) and females (15.86) alike. Using the means of the Central Limit Theorem, we have undertaken a hypothesis test with the null hypothesis that the average earnings of men and women are the same against a one-sided alternative that men earn more. With the calculated test statistic of 12.80 and at 1% significance level, we can reject the null hypothesis. The findings of our hypothesis test is also synonymous with the growing literature on the gender pay gap, albeit being restricted to only those with a degree.

Impact of Ethnicity

To analyse the extent to which ethnicity influences income levels, we must look at the ethnic makeup of those with a degree-level qualification in the UK in 2020 in Figure 6. From a sample of 44,308 people with a degree level qualification, 38,772 were ethnically white (87.5%), compared to 174 Bangladeshi (0.39%), 367 Chinese (0.83%) and 566 Pakistani (1.28%). Those who are ethnically white make up the majority of British citizens with a degree-level qualification. Although this data may seem alarming, if we look at the ethnic

makeup of the whole UK sample, we see that the proportions are very similar. In the sample of 217,194 people, 90.5% are ethnically white, 0.46% Bangladeshi, 0.35% Chinese and 1.32% Pakistani. There is a marginal difference in the ethnic makeup of the whole sample (Figure 7) and those with a degree-level qualification. However we can also notice that for some ethnicities, the ratio of degree attainment to sample size is greater, for example, the ratio for Indians is 1:0.55 and for Black/African/Caribbean is 1:0.84, whereas for Pakistanis it is 1:1.03. These ratios indicate that the proportion of people with a degree-level qualification varies for different ethnicities and there is no significant trend in the data to imply a correlation.

Figure 5 and Figure 6



Conclusion

We use the Annual Population Survey to examine the impact of age, sex and ethnicity based on hourly pay in 2020 given prior degree attainment. We looked at many different factors and the analysis indicates that those with higher hourly pay tend to be male (as opposed to female) and tend to be in their middle ages (40-54). We also saw no significant relationship between ethnicity and degree level qualification attainment.