HW3

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A

For men only, run a regression of the wage rate regressed on years of education and age.

i. Interpret the coefficients on years of education and on age.

```
. regress wage educatn age if sex == 1

      Source |       SS           df       MS      Number of obs   =       290
-------------+----------------------------------   F(2, 287)       =     57.47
       Model |  1023.99108         2   511.99554   Prob > F        =    0.0000
    Residual |  2556.94015       287  8.90919911   R-squared       =    0.2860
-------------+----------------------------------   Adj R-squared   =    0.2810
       Total |  3580.93122       289  12.3907655   Root MSE        =    2.9848

------------------------------------------------------------------------------
        wage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     educatn |   .4510391   .0644782     7.00   0.000     .3241289    .5779492
         age |   .1204381   .0136298     8.84   0.000     .0936111    .1472652
       _cons |  -3.109822   1.028949    -3.02   0.003    -5.135066   -1.084578
------------------------------------------------------------------------------
```

This implies that a unit change in educational years results in 0.451 change in average hourly earnings and a unit change in age results in .12 change in average hourly earnings.

ii. What is the expected wage rate for a 25---year old man with a high school diploma? What is the expected wage rate for a 25---year old man with one more year of education? What is the percent difference of the second man relative to the first?

```
. display _b[ educatn ] * 12 + _b[ age ] * 25 + _b[ _cons ]
5.3136004

. display _b[ educatn ] * 13 + _b[ age ] * 25 + _b[ _cons ]
5.7646395
```

The increase is about 8.4%.

B

b. For men only, run a regression of the logarithm of the wage rate on years of education and age.

i. Interpret the coefficients on years of education and on age.

```
. regress log_wage educatn age if sex == 1

      Source |       SS           df       MS      Number of obs   =       290
-------------+----------------------------------   F(2, 287)       =     66.76
       Model |   18.450228         2  9.22511402   Prob > F        =    0.0000
    Residual |  39.6567266       287  .138176748   R-squared       =    0.3175
-------------+----------------------------------   Adj R-squared   =    0.3128
       Total |  58.1069546       289  .201062127   Root MSE        =    .37172

------------------------------------------------------------------------------
    log_wage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     educatn |   .0595785   .0080299     7.42   0.000     .0437735    .0753835
         age |   .0163166   .0016974     9.61   0.000     .0129756    .0196575
       _cons |   .4941712   .1281422     3.86   0.000     .2419535    .7463889
------------------------------------------------------------------------------
```

This implies that a unit change in educational years results in 5.9% change in average hourly earnings and a unit change in age results in 1.6% change in average hourly earnings.

ii. Comparing the two men from part a, and using this regression, what is the percent difference in expected wages of the second man relative to the first? (Approximately, using the rules of thumb.)

The two men according to this model, using rule of thumb would differ by 5.9%. This is different from 8.4% calculated above, but likely more accurate as the r-squared here is better.

C

For men only, run a regression of the logarithm of the wage rate on years of education, age, and age squared.

```
. regress log_wage age age_squared educatn

      Source |       SS           df       MS      Number of obs   =       457
-------------+----------------------------------   F(3, 453)       =     55.49
       Model |  29.6014289         3  9.86714297   Prob > F        =    0.0000
    Residual |  80.5481177       453  .177810414   R-squared       =    0.2687
-------------+----------------------------------   Adj R-squared   =    0.2639
       Total |  110.149547       456  .241556023   Root MSE        =    .42168

------------------------------------------------------------------------------
    log_wage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |   .0508079   .0109947     4.62   0.000     .0292008    .0724149
 age_squared |  -.0004409   .0001396    -3.16   0.002    -.0007152   -.0001666
     educatn |   .0563233   .0081119     6.94   0.000     .0403817    .0722649
       _cons |  -.1915081   .2080805    -0.92   0.358     -.600431    .2174148
------------------------------------------------------------------------------
```

i. What is the expected difference in wages, in percent, for a 26---year old man versus a 25- --year old man? For a 65---year old man versus a 64---year old man?

```
. display _b[ educatn ] * 12 + _b[ age ]*24 + _b[ age_squared ]*596 + _b[ _cons ]
1.4409864


. display _b[ educatn ] * 12 + _b[ age ] * 25 + _b[ age_squared ] * 625 + _b[ _cons ]
1.4790083
```

Taking the antilog, the values are 4.22 and 4.38 respectively. There is a 3.7% increase between a 25 year old man and a 26 year old man, assuming 12 years of education.

```
.  display _b[ educatn ] * 12 + _b[ age ]*64 + _b[ age_squared ]*4096 + _b[ _cons ]
1.9301687


. display _b[ educatn ] * 12 + _b[ age ]*65 + _b[ age_squared ]*4225 + _b[ _cons]
1.9241011
```

Taking the antilog, the values are 6.89 and 6.84 respectively. There is a 0.7% decrease between a 64 year old man and a 65 year old man, assuming 12 years of education.

ii. For what age does the regression predict that wage rates are expected to peak?

```
. display -_b[age] / (2*_b[age_squared])
57.619018
```

It appears as if wages peak at 57.6 years, assuming our model is correct.

D

For men with a 4-year college degree, graph their expected wage rate age profile. The wage rate age profile has the logarithm of the wage rate on the vertical axis, and age on the horizontal axis.