HW10 Patrick Neyland

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## Question 1

### 1

Ceteris paribus, if the number of cigarettes per day increases by 10, the birth weight will decrease by 4% on average.

### 2

A white child is expected to weigh 5.5% more than a nonwhite child, on average holding all else constant. With a t-value of 4.23, yes—it is statistically significant.

### 3

I don’t think that the education of parents would be a great indicator of child birthweight. This feeling holds because is not statistically significant.

### 4

The f statistic cannot be computed because the regressions use different samples. The regressions would have to be built using the same data to calculate the mentions F statistic

## Question 2

### 1

Yes, these is plenty of evidence to include in the model–it is statistically significant. From the equation, the optimal school size is one that has a graduating class of 4.41 hundred students.

### 2

Holding hsize fixed, the difference between nonblack females and nonblack males is 45.09 points. With a t-stat close to 10, the difference is highly statistically significant.

### 3

The estimated difference in SAT score between nonblack males and black males is 169.81 points. We reject the null hypothesis.

### 4

The estimated difference in SAT score black females and nonblack females is 107.5 points. I would need to linearHypothesis test from R to test statistical significance.

## Question 3

### 1

model6\_1 <- lm(log(wage)~educ + exper + tenure + married +  
 black + south + urban, data = wage2)  
stargazer(model6\_1, type = "text")

##   
## ===============================================  
## Dependent variable:   
## ---------------------------  
## log(wage)   
## -----------------------------------------------  
## educ 0.065\*\*\*   
## (0.006)   
##   
## exper 0.014\*\*\*   
## (0.003)   
##   
## tenure 0.012\*\*\*   
## (0.002)   
##   
## married 0.199\*\*\*   
## (0.039)   
##   
## black -0.188\*\*\*   
## (0.038)   
##   
## south -0.091\*\*\*   
## (0.026)   
##   
## urban 0.184\*\*\*   
## (0.027)   
##   
## Constant 5.395\*\*\*   
## (0.113)   
##   
## -----------------------------------------------  
## Observations 935   
## R2 0.253   
## Adjusted R2 0.247   
## Residual Std. Error 0.365 (df = 927)   
## F Statistic 44.747\*\*\* (df = 7; 927)   
## ===============================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Holding other factors fixed, on average, the approximate difference in monthly salary between blacks and nonblacks is 18.8%–with nonblacks being on the upper side of that difference. This difference is statistically significant.

### 2

model6\_2 <- lm(log(wage)~educ + exper + I(exper^2) + tenure + I(tenure^2) +   
 + married + black + south + urban, data = wage2)  
stargazer(model6\_2, type = "text")

##   
## ===============================================  
## Dependent variable:   
## ---------------------------  
## log(wage)   
## -----------------------------------------------  
## educ 0.064\*\*\*   
## (0.006)   
##   
## exper 0.017   
## (0.013)   
##   
## I(exper2) -0.0001   
## (0.001)   
##   
## tenure 0.025\*\*\*   
## (0.008)   
##   
## I(tenure2) -0.001\*   
## (0.0005)   
##   
## married 0.199\*\*\*   
## (0.039)   
##   
## black -0.191\*\*\*   
## (0.038)   
##   
## south -0.091\*\*\*   
## (0.026)   
##   
## urban 0.185\*\*\*   
## (0.027)   
##   
## Constant 5.359\*\*\*   
## (0.126)   
##   
## -----------------------------------------------  
## Observations 935   
## R2 0.255   
## Adjusted R2 0.248   
## Residual Std. Error 0.365 (df = 925)   
## F Statistic 35.171\*\*\* (df = 9; 925)   
## ===============================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

linearHypothesis(model6\_2, c("I(exper^2)", "I(tenure^2)"))

## Linear hypothesis test  
##   
## Hypothesis:  
## I(exper^2) = 0  
## I(tenure^2) = 0  
##   
## Model 1: restricted model  
## Model 2: log(wage) ~ educ + exper + I(exper^2) + tenure + I(tenure^2) +   
## +married + black + south + urban  
##   
## Res.Df RSS Df Sum of Sq F Pr(>F)  
## 1 927 123.82   
## 2 925 123.42 2 0.39756 1.4898 0.226

They are not jointly significant even at 20%

### Part 3

model6\_3 <- lm(log(wage)~educ + exper + tenure + married +  
 black + south + urban + educ:black, data = wage2)  
stargazer(model6\_3, type = "text")

##   
## ===============================================  
## Dependent variable:   
## ---------------------------  
## log(wage)   
## -----------------------------------------------  
## educ 0.067\*\*\*   
## (0.006)   
##   
## exper 0.014\*\*\*   
## (0.003)   
##   
## tenure 0.012\*\*\*   
## (0.002)   
##   
## married 0.199\*\*\*   
## (0.039)   
##   
## black 0.095   
## (0.255)   
##   
## south -0.089\*\*\*   
## (0.026)   
##   
## urban 0.184\*\*\*   
## (0.027)   
##   
## educ:black -0.023   
## (0.020)   
##   
## Constant 5.375\*\*\*   
## (0.115)   
##   
## -----------------------------------------------  
## Observations 935   
## R2 0.254   
## Adjusted R2 0.247   
## Residual Std. Error 0.365 (df = 926)   
## F Statistic 39.322\*\*\* (df = 8; 926)   
## ===============================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Because the coefficient of is not significant, we can see that the return to education does not depend on race.

model6\_4 <- lm(log(wage)~educ+exper+tenure+south+urban+I(married\*(1-black))  
 +I((1-married)\*black)+I((1-married)\*(1-black)), wage2)  
stargazer(model6\_4, type = "text")

##   
## ==========================================================  
## Dependent variable:   
## ---------------------------  
## log(wage)   
## ----------------------------------------------------------  
## educ 0.065\*\*\*   
## (0.006)   
##   
## exper 0.014\*\*\*   
## (0.003)   
##   
## tenure 0.012\*\*\*   
## (0.002)   
##   
## south -0.092\*\*\*   
## (0.026)   
##   
## urban 0.184\*\*\*   
## (0.027)   
##   
## I(married \* (1 - black)) 0.179\*\*\*   
## (0.041)   
##   
## I((1 - married) \* black) -0.250\*\*\*   
## (0.094)   
##   
## I((1 - married) \* (1 - black)) -0.009   
## (0.056)   
##   
## Constant 5.413\*\*\*   
## (0.110)   
##   
## ----------------------------------------------------------  
## Observations 935   
## R2 0.253   
## Adjusted R2 0.246   
## Residual Std. Error 0.366 (df = 926)   
## F Statistic 39.170\*\*\* (df = 8; 926)   
## ==========================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

The estimated wage differential between married blacks and married nonblacks is 17.9%