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1

1.a $H_0 ; \hat{\beta}_2 = 0$
$H_a ; \hat{\beta}_2 \neq 0$

$t_{cal} = \dfrac{\hat{\beta}_2 - \beta_2}{se(\hat{\beta}_2)}$

$= \dfrac{0.0709 - 0}{0.0052} = 13.6346$

$t_{cri} = \pm 1.96$

$\therefore$ reject H_0
we cannot conclude that 95% $\hat{\beta}_2 = 0$, therefore $\hat{\beta}_2$ is significantly different from 0

1.b We need to use f-test to find the overall significant.

$H_0 ; \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$
$H_a ;$ otherwise

$f_{cal} = \dfrac{ESS/df}{RSS/df} = \dfrac{168.6972/7}{276.2828/1252} = 109.2095$

$f_{cri(0.05; 7, 1,252)} = 2.01$

$\therefore f_{cal} > f_{cri} \Rightarrow$ reject H_0
we can say that all of the slope paramiter are not simultaneously $= 0$

1.C we use f-test

$H_0 = \beta_6 = \beta_7 = 0$
$H_a =$ otherwise

$f_{cal} = \dfrac{0.3791 - 0.3737 / 2}{1 - 0.3791 / 1,252}$

$= 0.0003$

$f_{cri(0.05: 2, 1,252)} = 3$

$\therefore f_{cal} < f_{cri} \rightarrow$ cannot reject H_0
we cannot make sure that 95% of the time physical attractiveness has an impact on logarithm of hourly wage.

1.d there is no convincing evidence that woman with above average looks will earn more. we can see from 1.c that physical attractiveness has no impact on ln wage. Therefore being more beautiful doesn't mean that you will get higher wage.

②

2.a I think yes, because living with more children means that the family has more expense than those who don't. Moreover, we want to find then whether living in municiple area will cause more or less. we collect these two variables to find that are they really effect to each household expense, which is the consumption in the goods market. When Consumption rise will also raise the output demand ($AE = Y^d$) in the market.

2.b $H_0 ; \beta_k = 0$

$H_0 ; \beta_K \neq 0$; for every coefficient

$t_{cri} = 2.576$

$t_{cal} = \frac{\hat{\beta} - \beta}{se_\beta}$

$\hat{\beta}_0 = \frac{9{,}736 - 0}{43.83} = 222.0296$ ∴ reject H_0

$\hat{\beta}_1 = \frac{-2{,}835}{-15.8} = 179.4304$ ∴ reject H_0

$\hat{\beta}_2 = \frac{881}{6.81} = 129.3686$ ∴ reject H_0

∴ all variables (constant, $area_i$, and $child_i$) are statistically different from 0.

2.c not living in municipal area = 1

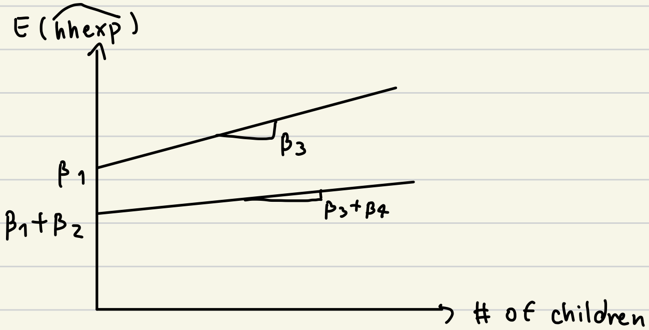
number of children = 3

$E(\widehat{hhexp_i} \mid area_i = 1, child_i = 3) = 9{,}736 - 2{,}835(1) + 881(3)$

$= 9{,}544$

2.d $area_i = 0$; $E(\widehat{hhexp_i} \mid area_i = 0, child_i = 0) = 9{,}693$

$area_i = 1$; $E(\widehat{hhexp_i} \mid area_i = 1, child_i = 0) = 6858$



③

3.a the pair of variables that I suspect that they might be linearly correlated are age_i and $agesq_i$. From the table the values of VIF are very high, it should not exceed 10, also $\frac{1}{VIF}$ should be close to 1. While other values are close to 1 age_i and $agesq_i$ are only about 0.01 which is very low. If we put all values to a scatter plot, we will see that these 2 will be linearly correlated.

3.b No, I will not remove one of the variables because we need both age and agesq in the model, since age can also refer to your experience. Therefore as you get older the more wage you should receive, and when agesq reach the peek it will start to fall.

3.c Yes, because there is no correlation between $\hat{u}_i^2$ and weekot. Some of the plot spread out, and most of the data is nearly zero so it is hard for us to find the slope of the line.

3.d H_0; homoscedasticity
H_a; Heteroscedasticity

$$F_{cal} = \frac{R^2_{\hat{u}_i^2}/K}{1-R^2_{\hat{u}_i^2}/n-K-1}$$

$$= \frac{0.0184/5}{\frac{1-0.0184}{2026}} = 7.5954$$

$$F_{cri\,0.05(5,2026)} = 2.21$$

$F_{cal} > F_{cri} \rightarrow$ reject homoscedasticity we can be sure that there is heteroscedasticity in the model