

Answer

- ① i and iii can cause the t statistics not to have t distribution under H_0 as homoskedasticity is one of the CLM assumptions, and omitting an important explanatory variable may violate Assumption MLR.4. Moreover, a sample correlation of 0.95 does not violate Assumption MLR.3. It need to meet the assumption of homoskedasticity
- i) the correlation just has to be less than 1, refer no exact linear between x $E(u|x) = 0$
 - iii) if "the omitted x is correlated to other explanatory variables, $E(u|x) = 0$ is violated.

② i) The hypotheses are $H_0: \beta_3 = 0$, $H_a: \beta_3 > 0$

ii) Everything else being equal, and increase if ros by 50 points is predicted to increase salary by $100(0.00024)(50) = 1.2\%$. The effect of ros on salary is not large.

iii) As $n = 209$, then $df = 209 - 3 - 1 = 205$. So we can use $df = \infty$.

The 10% critical value for a one-tailed test is then 1.282. The t statistic on ros is $\frac{0.00024}{0.00054} \approx 0.44$, which is below the critical value 1.282, so we cannot reject H_0 at the 10% significance level. Therefore, β_{ros} isn't significant, which implies that ros does not have a significant effect on salary.

iv) Based on the t-test only, we may consider removing this variable from the model. However, we should perform the F test for joint significance of a group of independent variables as well before deciding whether or not to remove an independent variable from the model.

③ i) The 1% change in campaign expenditure by candidates A changes the vote received by candidate A by $\frac{\beta_1}{100}$ percentage points.

ii) $H_0: \beta_1 = -\beta_2$ or $\beta_1 + \beta_2 = 0$ → This means that if expenditure by A and by B change by the same percentage vote A remain unchanged.

iii) from the model, The estimated equation is

$$\text{Vote A} = 45.1 + 6.08 \log(\text{Expend A}) - 6.62 \log(\text{Expend B}) + 0.152 (\text{prtystrA})$$

11.48
15.92
-17.46
2.45

The coefficient on $\log(\text{Expend A})$ is very significant (t-statistic is 15.92), as is the coefficient on $\log(\text{Expend B})$ (t-statistic is -17.45)

The estimates imply that a 10% ceteris paribus increase in spending by candidate A increases the predicted share of the vote going to A by about 61% points. Similarly, a 10% ceteris paribus increase in spending by B reduces vote A by about .66 percentage points. These effects certainly cannot be ignored. The coefficients on $\log(\text{Expend A})$ and $\log(\text{Expend B})$ are of opposite sign. Hence there will need to test the hypothesis from ii

iv) $\hat{\text{vote A}} = \beta_0 + \beta_1 \log(\text{Expend A}) + \beta_2 [\log(\text{Expend B}) - \log(\text{Expend A})] + \beta_3 \text{prtystr A}$
 from the model

We can see that $\hat{\beta}_1 \approx -0.532$ and $\text{se}(\hat{\beta}_1) \approx 0.533$. The t-statistic for the hypothesis testing in part (ii) is $\frac{-0.532}{0.533} \approx -1$. Therefore, we fail to reject $H_0: \beta_1 = -\beta_2$.

Q8) from the dataset, the variable fsize is used for family size.

-Therefore, there are 2017 single people in

the sample of 9275

ii) when other variables = 0 then net financial wealth = -43.03987

when age increase 1 unit, net financial wealth will increase 842.7

when income increase 1 unit, net financial wealth will increase 79931.

Not surprising here

iii) Yes, it does. When β_0 or intercept rise one unit (like in this case), it means that holding other factors = 0, net financial wealth

increase \$5,000.

$\hat{\beta}_0 = -43.04$. This is an individual's net financial wealth when their income is \$0 and their age is 0, so this is the net financial wealth of newborn babies who we are unlikely to be interested in

iv) $\hat{\beta}_2 = 0.843$

$H_0: \beta_2 = 1$, $H_a: \beta_2 < 1$

$\rightarrow t = \frac{\hat{\beta}_2 - \beta_2}{\text{se}(\hat{\beta}_2)} = \frac{0.843 - 1}{0.082} = -1.7065$

the p-value is $P(T < -1.71) \approx 0.044$ which we can find from table

Therefore we can reject the null hypothesis at the 5% significance level but not at 1% significance level.

v) we get an estimate of $\hat{\beta}_1 = 0.821$ which is not very different from the estimate of 0.789 in the last regression. Since this is an omitted variable question we need to know the correlated between age & income, which we find to be only 0.039. This explains why the coefficient does not change much

(c) i) $H_0: \beta_2 - \beta_3 = 0$

$H_a: \beta_2 - \beta_3 \neq 0$

ii) d.f. = $935 - 3 - 1 = 931$

$$t = \frac{(\hat{\beta}_2 - \hat{\beta}_3) - 0}{\text{s.e.}(\hat{\beta}_2 - \hat{\beta}_3)}$$

let $\hat{\theta}_1 = \hat{\beta}_2 - \hat{\beta}_3$

$H_0: \hat{\theta}_1 = 0$

$H_a: \hat{\theta}_1 \neq 0$

$\hat{\beta}_2 = \hat{\theta}_1 + \hat{\beta}_3$

$$\log(\text{wage}) = \beta_0 + \beta_1 \text{educ} + (\theta_1 + \beta_3) \text{exper} + \beta_3 \text{tenure} + u$$

$$\log(\text{wage}) = \beta_0 + \beta_1 \text{educ} + \theta_1 \text{exper} + \beta_3 (\text{exper} + \text{tenure}) + u$$

$\hat{\theta}_1 = 0.00195$, s.e. ($\hat{\theta}_1$) = 0.00474

The 95% CI for $\hat{\theta}_1 = [0.00195 - 2.06(0.00474), 0.00195 + 2.06(0.00474)]$
= $[-0.0078, 0.0117]$

Since $\hat{\theta}_1 = 0.00195$ is the value in the confidence interval,
we accept H_0 at 95% confidence interval. Therefore, exper and tenure generate has no
the same impact on log(wage)

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