

Paper homework

1. (i) and (iii)

Heteroskedasticity and omitting an important explanatory variable cause OLS to be invalid. Heteroskedasticity is about the error variance is non-constant or violating SLR5 (homoskedasticity). It is also in the CLM assumption which means that there is no correlation between independent variables. Where omitting an important explanatory variable violates the assumption MLR4.

2.

i.  $H_0 : \beta_3 = 0$ ,  $H_1 : \beta_3 > 0$ .

ii. The proportionate effect on salary hat is  $.00024(50) = .012$ .

To obtain the percentage effect, we multiply this by 100: 1.2%. Therefore, a 50 point ceteris paribus increase in ros is predicted to increase salary by only 1.2%. Practically speaking, this is a very small effect for such a large change in ros.

iii. The 10% critical value for a one-tailed test, using  $df = \infty$ , is obtained from Table as 1.282. The t statistic on ros is  $.00024/.00054 \approx .44$ , which is well below the critical value. Therefore, we fail to reject  $H_0$  at the 10% significance level.

iv. Based on this sample, the estimated ros coefficient appears to be different from zero only because of sampling variation. On the other hand, including ros may not be causing any harm; it depends on how correlated it is with the other independent variables (although these are very significant even with ros in the equation).

Computer questions

C1

i.  $\beta_1$  is 1% increase in expenditures by candidates. An increase in 1% vote received by candidate A

ii.  $H_0: \text{expendA} = - \text{expendB}$  or  $H_0: \text{expendA} + \text{expendB} = 0$

|                                 |            |     |            |               |   |        |
|---------------------------------|------------|-----|------------|---------------|---|--------|
| . regress voteA expendA expendB |            |     |            |               |   |        |
| Source                          | SS         | df  | MS         | Number of obs | = | 173    |
| Model                           | 25679.8879 | 2   | 12839.9439 | F(2, 170)     | = | 95.83  |
| Residual                        | 22777.3607 | 170 | 133.984474 | Prob > F      | = | 0.0000 |
|                                 |            |     |            | R-squared     | = | 0.5299 |
|                                 |            |     |            | Adj R-squared | = | 0.5244 |
| Total                           | 48457.2486 | 172 | 281.728189 | Root MSE      | = | 11.575 |

  

| voteA   | Coef.     | Std. Err. | t      | P> t  | [95% Conf. Interval] |           |
|---------|-----------|-----------|--------|-------|----------------------|-----------|
| expendA | .0383308  | .0033868  | 11.32  | 0.000 | .0316452             | .0450165  |
| expendB | -.0361275 | .0031071  | -11.63 | 0.000 | -.042261             | -.0299939 |
| _cons   | 49.619    | 1.426147  | 34.79  | 0.000 | 46.80376             | 52.43423  |

C6

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. regress lwage educ exper tenure
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| Source   | SS         | df  | MS         | Number of obs | = | 935    |
|----------|------------|-----|------------|---------------|---|--------|
| Model    | 25.6953242 | 3   | 8.56510806 | F(3, 931)     | = | 56.97  |
| Residual | 139.960959 | 931 | .150334005 | Prob > F      | = | 0.0000 |
|          |            |     |            | R-squared     | = | 0.1551 |
|          |            |     |            | Adj R-squared | = | 0.1524 |
| Total    | 165.656283 | 934 | .177362188 | Root MSE      | = | .38773 |

  

| lwage  | Coef.    | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|--------|----------|-----------|-------|-------|----------------------|----------|
| educ   | .0748638 | .0065124  | 11.50 | 0.000 | .062083              | .0876446 |
| exper  | .0153285 | .0033696  | 4.55  | 0.000 | .0087156             | .0219413 |
| tenure | .0133748 | .0025872  | 5.17  | 0.000 | .0082974             | .0184522 |
| _cons  | 5.496696 | .1105282  | 49.73 | 0.000 | 5.279782             | 5.713609 |

i.  $H_0: \beta_2 = \beta_3$  or  $H_0: \beta_2 - \beta_3 = 0$

ii.  $t = (0.015 - 0.013)/(0.0034 - 0.0026) = 2.5$

The p-value is 0.01259. where we reject null hypothesis means that it is statistically significant.

C8

i. There are 2,017 single-person households that are in the dataset. (i.e 2,017 observations)

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. regress nettfa inc age if fsize == 1
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| Source   | SS         | df    | MS         | Number of obs | = | 2,017  |
|----------|------------|-------|------------|---------------|---|--------|
| Model    | 544916.989 | 2     | 272458.495 | F(2, 2014)    | = | 136.46 |
| Residual | 4021048.06 | 2,014 | 1996.54819 | Prob > F      | = | 0.0000 |
|          |            |       |            | R-squared     | = | 0.1193 |
|          |            |       |            | Adj R-squared | = | 0.1185 |
| Total    | 4565965.05 | 2,016 | 2264.86361 | Root MSE      | = | 44.683 |

  

| nettfa | Coef.     | Std. Err. | t      | P> t  | [95% Conf. Interval] |           |
|--------|-----------|-----------|--------|-------|----------------------|-----------|
| inc    | .7993167  | .0597307  | 13.38  | 0.000 | .6821762             | .9164572  |
| age    | .8426563  | .0920169  | 9.16   | 0.000 | .6621982             | 1.023115  |
| _cons  | -43.03981 | 4.080393  | -10.55 | 0.000 | -51.04204            | -35.03758 |

ii. If  $\beta_1$  hat increase 1000 dollar increase in income means that there will be an increase in net financial wealth of 799 dollars.

If  $\beta_2$  hat increase as 1 year in age means that there will be an increase in net financial wealth of 842 dollars.

iii.  $\beta_0$  hat is equal to -43.04 this is when the age and income is equal to 0 also meaning it is about the net financial wealth of new borns so it wouldn't much of an interested data.

iv. The t-statistic is  $(0.84-1)/0.092 \approx -1.74$

One-sided alternative  $H_1 : \beta_2 < 1$  the p-value is  $P(T < -1.74) = 0.5-0.4591 = 0.0409$

Therefore we can reject the null hypothesis at the 5% significance level and at the 1% significance level.

v. We get an estimate of  $\beta_1 = 0.821$  which is not very different from the estimate of 0.799 in the last regression.

`. regress nettfa inc if fsize == 1`

| Source   | SS         | df    | MS         | Number of obs | = | 2,017  |
|----------|------------|-------|------------|---------------|---|--------|
| Model    | 377482.064 | 1     | 377482.064 | F(1, 2015)    | = | 181.60 |
| Residual | 4188482.98 | 2,015 | 2078.6516  | Prob > F      | = | 0.0000 |
|          |            |       |            | R-squared     | = | 0.0827 |
|          |            |       |            | Adj R-squared | = | 0.0822 |
| Total    | 4565965.05 | 2,016 | 2264.86361 | Root MSE      | = | 45.592 |

| nettfa | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |           |
|--------|-----------|-----------|-------|-------|----------------------|-----------|
| inc    | .8206815  | .0609     | 13.48 | 0.000 | .7012479             | .940115   |
| _cons  | -10.57095 | 2.060678  | -5.13 | 0.000 | -14.61223            | -6.529671 |