ECOM20001 Econometrics 1

Tutorial 8 (Week 8 - Thursday)

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Question 5

This slides helps us to develop a transformed regression that allows us to use an individual hypothesis test to represent joint hypothesis test.

The null hypothesis: the sum of the coefficients on alcohol and unmarried equals the coefficient on smoker against the alternative that the equality does not hold.

Question 5

Given the initial regression:

$$\text{Birthweight}_i = \beta_0 + \beta_1 \text{ Smoker}_i + \beta_2 \text{ Alcohol}_i + \beta_3 \text{ Unmarried}_i + X_i + u_i$$

where X_i includes all other non-listed regressor.

We are trying to test:

$$H_0: \ \beta_1 = \beta_2 + \beta_3$$
$$H_1: \ \beta_1 \neq \beta_2 + \beta_3$$

Question 5

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$$\text{Birthweight}_i = \beta_0 + \beta_1\text{Smoker}_i + \beta_2\text{Alcohol}_i + \beta_3\text{Unmarried}_i + X_i + u_i$$
$$= \beta_0 + \beta_1\text{Smoker}_i + \beta_2\text{Alcohol}_i + \beta_3\text{Unmarried}_i + X_i + u_i$$

Question 5

$$\text{Birthweight}_i = \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$
$$= \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$
$$+ \beta_2 \text{Smoker}_i - \beta_2 \text{Smoker}_i + \beta_3 \text{Smoker}_i - \beta_3 \text{Smoker}_i$$

Question 5

$$\text{Birthweight}_i = \beta_0 + \beta_1\text{Smoker}_i + \beta_2\text{Alcohol}_i + \beta_3\text{Unmarried}_i + X_i + u_i$$

$$= \beta_0 + \beta_1\text{Smoker}_i + \beta_2\text{Alcohol}_i + \beta_3\text{Unmarried}_i + X_i + u_i$$

$$+ \beta_2\text{Smoker}_i - \beta_2\text{Smoker}_i + \beta_3\text{Smoker}_i - \beta_3\text{Smoker}_i$$

$$= \beta_0 + (\beta_1 - \beta_2 - \beta_3)\text{Smoker}_i + \beta_2(\text{Alcohol}_i + \text{Smoker}_i)$$

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$$\text{Birthweight}_i = \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$

$$= \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$

$$+ \beta_2 \text{Smoker}_i - \beta_2 \text{Smoker}_i + \beta_3 \text{Smoker}_i - \beta_3 \text{Smoker}_i$$

$$= \beta_0 + (\beta_1 - \beta_2 - \beta_3)\text{Smoker}_i + \beta_2(\text{Alcohol}_i + \text{Smoker}_i)$$

$$+ \beta_3(\text{Unmarried}_i + \text{Smoker}_i) + X_i + u_i$$

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$$\text{Birthweight}_i = \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$

$$= \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$
$$+ \beta_2 \text{Smoker}_i - \beta_2 \text{Smoker}_i + \beta_3 \text{Smoker}_i - \beta_3 \text{Smoker}_i$$

$$= \beta_0 + (\beta_1 - \beta_2 - \beta_3)\text{Smoker}_i + \beta_2(\text{Alcohol}_i + \text{Smoker}_i)$$
$$+ \beta_3(\text{Unmarried}_i + \text{Smoker}_i) + X_i + u_i$$

$$= \beta_0 + (\beta_1 - \beta_2 - \beta_3)\text{Smoker}_i + \beta_2(W_i) + \beta_3(Z_i) + X_i + u_i$$

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$$\text{Birthweight}_i = \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$

$$= \beta_0 + \beta_1 \text{Smoker}_i + \beta_2 \text{Alcohol}_i + \beta_3 \text{Unmarried}_i + X_i + u_i$$

$$+ \beta_2 \text{Smoker}_i - \beta_2 \text{Smoker}_i + \beta_3 \text{Smoker}_i - \beta_3 \text{Smoker}_i$$

$$= \beta_0 + (\beta_1 - \beta_2 - \beta_3)\text{Smoker}_i + \beta_2(\text{Alcohol}_i + \text{Smoker}_i)$$

$$+ \beta_3(\text{Unmarried}_i + \text{Smoker}_i) + X_i + u_i$$

$$= \beta_0 + (\beta_1 - \beta_2 - \beta_3)\text{Smoker}_i + \beta_2(W_i) + \beta_3(Z_i) + X_i + u_i$$

$$= \beta_0 + \gamma \text{Smoker}_i + \beta_2(W_i) + \beta_3(Z_i) + X_i + u_i$$