WWS 508b
Precept 6

John Palmer

March 30, 2010

this week's problem set

things to remember

The Wooldridge exercises are all in the "computer exercises" sections.

The data files you will need for them are posted on Blackboard under previous problem sets.

this week's problem set

linear combinations of parameters (taken from Wooldridge 4.4)

Let's say we're interested in the following model

$$\log(wage) = \beta_0 + \beta_1 jc + \beta_2 univ + \beta_3 exper + u$$

Using Wooldridge's TWOYEAR.RAW data, we estimate:

$$\widehat{\log(wage)} = 1.472 + .0667jc + .0769univ + .0049exper$$

where $\text{se}(\hat{\beta}_1) = .0068$ and $\text{se}(\hat{\beta}_2) = .0023$.

What is the predicted effect of a one-year increase in jc combined with a one-year increase in $univ$?

Can we put a confidence interval on this? What additional information would we need?

this week's problem set

linear combinations of parameters (taken from Wooldridge 4.4)

Can we compute $\text{se}(\hat{\beta}_1 - \hat{\beta}_2) = \text{se}(\hat{\beta}_1) - \text{se}(\hat{\beta}_2)$?

this week's problem set

linear combinations of parameters (taken from Wooldridge 4.4)

Can we compute $\text{se}(\hat{\beta}_1 - \hat{\beta}_2) = \text{se}(\hat{\beta}_1) - \text{se}(\hat{\beta}_2)$? NO!

Instead:

this week's problem set

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Instead:

$$\text{se}(\hat{\beta}_1 - \hat{\beta}_2) = \left\{[\text{se}(\hat{\beta}_1)]^2 + [\text{se}(\hat{\beta}_2)]^2 - 2\text{s}_{12}\right\}^{\frac{1}{2}}$$

where s_{12} denotes an estimate of $\text{Cov}(\hat{\beta}_1, \hat{\beta}_2)$.

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(yikes)

this week's problem set

linear combinations of parameters (taken from Wooldridge 4.4)

One easy way to figure out se($\hat{\beta} - 1 - \hat{\beta}_2$) using Stata is with the `lincom` postestimation command. In our example, for instance, after estimating the regression, we could type:

```
lincom jc + univ
```

Stata recognizes that you want to test the linear combination of the coefficients on $jc + univ$. Thus, the above syntax is equivalent to:

```
lincom _b[jc] + _b[univ]
```

Notice that Stata not only gives you a test of the hypothesis that the combination is equal to zero, it also gives you the standard error and a confidence interval.

this week's problem set

linear combinations of parameters (taken from Wooldridge 4.4)

Another way is to estimate a new model with slightly different variables. Define:

$$\theta_1 = \beta_1 + \beta_2$$

Thus,

$$\beta_1 = \theta_1 - \beta_2$$

and our model can be rewritten as:

$$\log(wage) = \beta_0 + (\theta_1 - \beta_2)jc + \beta_2 univ + \beta_3 exper + u$$

Or:

$$\log(wage) = \beta_0 + \theta_1 jc + \beta_2(univ - jc) + \beta_3 exper + u$$

this week's problem set

understanding dummy variables and interactions through performance art

The human regression ballet

regression through the origin

correction to last week...

Let's say you want to fit the model

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x$$

but you want your intercept term ($\hat{\beta}_0$) to be equal to zero. In other words, you want your regression line to run through the origin. How can you do this?

regression through the origin

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(One option would be to fit the model with the intercept, and then create a new variable $y* = y - \hat{\beta}_0$. *But this simply shifts all of the data up or down, so it is not particularly useful...*)

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(One option would be to fit the model with the intercept, and then create a new variable $y* = y - \hat{\beta}_0$. *But this simply shifts all of the data up or down, so it is not particularly useful...*)

A *much more useful* approach is to keep the data as it is, but fit a regression line to this data, forcing it to pass through the origin. You can do this in Stata by adding the option `nocontant` to the regression command. E.g.:

```
reg y x, noconstant
```