Regression

Thomas J. Leeper

Department of Political Science and Government
Aarhus University

November 14, 2013

Model Formulæ

- Express relationships as a formula

- Typically:
  ```
  y   x1 + x2
  ```

- Interactions:
  ```
  y   x1 * x2
  y   x1 + x2 + x1:x2
  ```

- Formula is an object

Try on your own

Understand formulae:

- "Model Formulae"

Questions so far?

Running a regression

- We already ran regressions earlier

- Let's understand what we did

The regression from earlier

```
 lm3_1 <- lm(thresh~threat + fragdum,
data = cis)

lm3_2 <- lm(thresh~threat + fragdum,
data=cis[cis$oursmpl==1,])

lm3_3 <- lm(thresh~threat13 + fragdum,
data=cis[cis$oursmpl==1,])

lm3_4 <- lm(thresh~stthroct2 + fragdum,
data=cis[cis$oursmpl==1,])
```

Running a regression

- The linear regression function is `lm`

- Specify a `formula` and a place to look for `data`

- The result is an object of class "lm"

The regression from earlier

```
 lm3_1 <- lm(thresh~threat + fragdum,
data = cis)

lm3_2 <- lm(thresh~threat + fragdum,
data=cis[cis$oursmpl==1,])

lm3_3 <- lm(thresh~threat13 + fragdum,
data=cis[cis$oursmpl==1,])

lm3_4 <- lm(thresh~stthroct2 + fragdum,
data=cis[cis$oursmpl==1,])
```

Printing

- When we run a regression, we get some default output:
  ```
  lm(thresh~threat + fragdum,
  data = cis)
  ```

Printing

■ When we run a regression, we get some default
  output:
  ```
  lm(thresh~threat + fragdum,
  data = cis)
  ```

■ This doesn't print if we store the results:
  ```
  lm3_1 <- lm(thresh~threat + fragdum,
  data = cis)
  ```

Printing

- When we run a regression, we get some default output:
  ```
  lm(thresh~threat + fragdum,
  data = cis)
  ```

- This doesn't print if we store the results:
  ```
  lm3_1 <- lm(thresh~threat + fragdum,
  data = cis)
  ```

- But we can see the results again, once stored, by simply calling:
  ```
  lm3_1
  ```

Structure and summary

- Structure: `str(lm3_1)`

- Names: `names(lm3_1)`

- Summary: `summary(lm3_1)`

Coefficients

- Coefficients:
  ```
  coef(lm3_1)
  lm3_1$coef
  coef(summary(lm3_1))
  summary(lm3_1)$coef
  ```

Try on your own

Understand OLS coefficient plotting:

- ◼ "OLS Coefficients"

Questions so far?

Fitted values and residuals

- `lm3_1$fitted`

- `lm3_1$resduals`

- `predict(lm3_1)`

Try on your own

Understand model fit:

- ■ "OLS Diagnostic Plots"

- ■ "Regression fit"

Questions so far?

Writing Output to Word

- Writing a CSV

- Using the **rtf** package:
  ```
  install.packages("rtf")
  library(rtf)
  ```

Try on your own

Output results to Word:

- "Word output"

Questions so far?

Let's work together

- ■ "Binary interactions"

- ■ "Continuous interactions"