

In-Class Lab 10

ECON 425 (Justin Heflin, West Virginia University)

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The purpose of this lab is to practice using R for time series models. The lab may be completed as a group. To receive credit, upload your .R script to the appropriate place on eCampus (“In-Class Labs” folder).

For starters

Open a new R script (named ICL10_XYZ.R, where XYZ are your initials)

Clean out/“Sweep” R Studio

Click the broom in the Environment panel (top-right), it is directly below the Tutorial button. Also, in the bottom-right panel, click the Plots button and then click the broom in that panel. This should help with loading things into R.

R Packages

```
install.packages("dplyr")
```

```
library(ggplot2)
library(wooldridge)
library(dplyr)
library(modelsummary)
library(sandwich)
library(lmtest)
```

Load the data

We are going to use the `intdef` data-set from the `wooldridge` R Package

```
macro_data <- as.data.frame(intdef)
summary(macro_data)
```

This data-set is time-series with annual observations from 1948 to 2003 (56 observations) on 13 variables.

Variable Names and brief description:

- `i3`: 3 month Treasury bill rate
- `inf`: CPI inflation rate

- rec: federal receipts, percent GDP
- out: federal outlays, percent GDP
- def: out - rec

Plot time series data

Let's have a look at the inflation rate for the US over the period 1948-2003:

```
ggplot(macro_data, aes(year, inf)) + geom_line()
```

Determinants of interest rate using a Distributed Lag Model

Now let's estimate the following regression model:

$$i3_t = \beta_0 + \beta_1 inf_t + \beta_2 inf_{t-1} + \beta_3 inf_{t-2} + \beta_4 def_t + u_t$$

```
regression <- lm(i3 ~ inf + lag(inf,1) + lag(inf,2) + def, data = macro_data)
summary(regression)
```

Using Newey-West Standard Errors on Distributed Lag Model

```
NW_VCOV <- NeweyWest(regression)
coefest(regression, vcov. = NW_VCOV)
```

Determinants of interest rate using a Lagged Dependent Variable Model

$$i3_t = \beta_0 + \beta_1 inf_t + \beta_2 i3_{t-1} + \beta_3 i3_{t-2} + \beta_4 def_t + u_t$$

```
regression_2 <- lm(i3 ~ inf + lag(i3, 1) + lag(i3,2) + def, data = macro_data)
summary(regression_2)
```

Using Newey-West Standard Errors on Lagged Dependent Variable Model

```
NW_VCOV_2 <- NeweyWest(regression_2)
coefest(regression_2, vcov. = NW_VCOV_2)
```

Determinants of interest rate using both classes of Dynamic Models

$$i3_t = \beta_0 + \beta_1 inf_t + \beta_2 inf_{t-1} + \beta_3 i3_{t-1} + \beta_4 def_t + u_t$$

```
regression_3 <- lm(i3 ~ inf + lag(inf,1) + lag(i3,1) + def, data = macro_data)
summary(regression_3)
```

Using Newey-Standard Errors on Dynamic Model

```
NW_VCOV_3 <- NeweyWest(regression_3)
coefest(regression_3, vcov. = NW_VCOV_3)
```