Chapter 10 - Regression Analysis with Time Series Data

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Exercise 10.10

Upload packages

```
library(wooldridge)
library(lmreg)
library(car)
```

Upload database

```
data<-wooldridge::intdef

attach(data)
```

Consider the model estimated in (10.15); use the data in INTDEF.RAW.

(i) Find the correlation between `inf` and `def` over this sample period and comment.

```
round(cor(inf, def),3)
```

```
## [1] 0.097
```

The correlation between `inf` and `def` is equal to 9.7% over this sample period.

(ii) Add a single lag of inf and def to the equation and report the results in the usual form.

```
lm1<-lm(i3~inf+def+inf_1+def_1)

summary(lm1)
```

```
##
## Call:
## lm(formula = i3 ~ inf + def + inf_1 + def_1)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -4.3082 -0.8513  0.3243  1.0437  2.7108
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.6115     0.4008   4.021 0.000196 ***
## inf           0.3426     0.1254   2.732 0.008671 **
## def          -0.1897     0.2213  -0.857 0.395471
## inf_1         0.3820     0.1336   2.859 0.006175 **
## def_1         0.5693     0.1968   2.893 0.005637 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.66 on 50 degrees of freedom
##   (1 observation deleted due to missingness)
## Multiple R-squared:  0.685,  Adjusted R-squared:  0.6598
## F-statistic: 27.18 on 4 and 50 DF,  p-value: 5.193e-12
```

The estimated equation is expressed as follows

$$\hat{i3} = 1.61 + 0.34inf_t - 0.18def_t + 0.38inf_{t-1} + 0.56def_{t-1}$$

(iii) Compare the estimated LRP for the effect of inflation with that in equation (10.15). Are they vastly different?

In progress..

(iv) Are the two lags in the model jointly significant at the 5% level?

```
linearHypothesis(lm1, c("inf_1=0","def_1=0"))
```

```
## Linear hypothesis test
##
## Hypothesis:
## inf_1 = 0
## def_1 = 0
##
## Model 1: restricted model
## Model 2: i3 ~ inf + def + inf_1 + def_1
##
##   Res.Df    RSS Df Sum of Sq      F   Pr(>F)
## 1     52 166.48
## 2     50 137.72  2    28.756 5.2199 0.008733 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The null hypothesis is rejected at the 1% significance level. Hence, there's evidence that this two lagged variables influence the T-3 bill rate.