Forcasting American Economy

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library(readxl)  
library(ggplot2)  
library("dplyr")

## Warning: package 'dplyr' was built under R version 4.1.3

##   
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

pacman::p\_load(tidyverse, haven, lmtest, stargazer,   
 ARDL, modelsummary, car)  
df = read\_excel('../Assignment\_Module2\_Part1.xlsx')  
  
# Bit of a lazy technique to delete till 1960; but it brings you home  
df <-df[-c(1:51), ]  
# idem  
df.2013 <-df[-c(217:239), ]  
  
# A bit of a Verbose code in order to generate all the columns  
# This could be useful in order to provide a more indepth   
columns <- c("gdpg", "interest", "cpi", "nettrade")  
for (col in columns){  
 for(Ln in 1:8) {  
 df[paste0(col,".L",Ln)] <- lag(df[col], n = Ln)  
 }  
}  
columns <- c("gdpg", "interest", "cpi", "nettrade")  
for (col in columns){  
 for(Ln in 1:8) {  
 df.2013[paste0(col,".L",Ln)] <- lag(df.2013[col], n = Ln)  
 }  
}  
  
Reg.19602013.L0 <- lm(cpi ~ gdpg+interest+nettrade, data = df.2013)  
  
df.2013$ehat <- residuals(Reg.19602013.L0)  
df.2013$ehat\_l1 <- lag(df.2013$ehat, n = 1)  
df.2013$ehat\_l2 <- lag(df.2013$ehat, n = 2)  
df.2013$ehat\_l3 <- lag(df.2013$ehat, n = 3)  
df.2013$ehat\_l4 <- lag(df.2013$ehat, n = 4)  
df.2013$ehat\_l5 <- lag(df.2013$ehat, n = 5)  
df.2013$ehat\_l6 <- lag(df.2013$ehat, n = 6)  
df.2013$ehat\_l7 <- lag(df.2013$ehat, n = 7)  
df.2013$ehat\_l8 <- lag(df.2013$ehat, n = 8)  
  
df.2013 %>% select(ehat:ehat\_l2) %>% cor(use = "pairwise")

## ehat ehat\_l1 ehat\_l2  
## ehat 1.0000000 0.5797699 0.3080656  
## ehat\_l1 0.5797699 1.0000000 0.5811507  
## ehat\_l2 0.3080656 0.5811507 1.0000000

df.2013 %>% select(ehat:ehat\_l3) %>% cor(use = "pairwise")

## ehat ehat\_l1 ehat\_l2 ehat\_l3  
## ehat 1.0000000 0.5797699 0.3080656 0.4618665  
## ehat\_l1 0.5797699 1.0000000 0.5811507 0.3102325  
## ehat\_l2 0.3080656 0.5811507 1.0000000 0.5812268  
## ehat\_l3 0.4618665 0.3102325 0.5812268 1.0000000

df.2013 %>% select(ehat:ehat\_l4) %>% cor(use = "pairwise")

## ehat ehat\_l1 ehat\_l2 ehat\_l3 ehat\_l4  
## ehat 1.0000000 0.5797699 0.3080656 0.4618665 0.5034426  
## ehat\_l1 0.5797699 1.0000000 0.5811507 0.3102325 0.4654935  
## ehat\_l2 0.3080656 0.5811507 1.0000000 0.5812268 0.3103158  
## ehat\_l3 0.4618665 0.3102325 0.5812268 1.0000000 0.5809097  
## ehat\_l4 0.5034426 0.4654935 0.3103158 0.5809097 1.0000000

df.2013 %>% select(ehat:ehat\_l5) %>% cor(use = "pairwise")

## ehat ehat\_l1 ehat\_l2 ehat\_l3 ehat\_l4 ehat\_l5  
## ehat 1.0000000 0.5797699 0.3080656 0.4618665 0.5034426 0.3673534  
## ehat\_l1 0.5797699 1.0000000 0.5811507 0.3102325 0.4654935 0.5032166  
## ehat\_l2 0.3080656 0.5811507 1.0000000 0.5812268 0.3103158 0.4656771  
## ehat\_l3 0.4618665 0.3102325 0.5812268 1.0000000 0.5809097 0.3109682  
## ehat\_l4 0.5034426 0.4654935 0.3103158 0.5809097 1.0000000 0.5822655  
## ehat\_l5 0.3673534 0.5032166 0.4656771 0.3109682 0.5822655 1.0000000

df.2013 %>% select(ehat:ehat\_l6) %>% cor(use = "pairwise")

## ehat ehat\_l1 ehat\_l2 ehat\_l3 ehat\_l4 ehat\_l5 ehat\_l6  
## ehat 1.0000000 0.5797699 0.3080656 0.4618665 0.5034426 0.3673534 0.1943089  
## ehat\_l1 0.5797699 1.0000000 0.5811507 0.3102325 0.4654935 0.5032166 0.3680101  
## ehat\_l2 0.3080656 0.5811507 1.0000000 0.5812268 0.3103158 0.4656771 0.5032240  
## ehat\_l3 0.4618665 0.3102325 0.5812268 1.0000000 0.5809097 0.3109682 0.4658301  
## ehat\_l4 0.5034426 0.4654935 0.3103158 0.5809097 1.0000000 0.5822655 0.3112345  
## ehat\_l5 0.3673534 0.5032166 0.4656771 0.3109682 0.5822655 1.0000000 0.5823766  
## ehat\_l6 0.1943089 0.3680101 0.5032240 0.4658301 0.3112345 0.5823766 1.0000000

df.2013 %>% select(ehat:ehat\_l7) %>% cor(use = "pairwise")

## ehat ehat\_l1 ehat\_l2 ehat\_l3 ehat\_l4 ehat\_l5 ehat\_l6  
## ehat 1.0000000 0.5797699 0.3080656 0.4618665 0.5034426 0.3673534 0.1943089  
## ehat\_l1 0.5797699 1.0000000 0.5811507 0.3102325 0.4654935 0.5032166 0.3680101  
## ehat\_l2 0.3080656 0.5811507 1.0000000 0.5812268 0.3103158 0.4656771 0.5032240  
## ehat\_l3 0.4618665 0.3102325 0.5812268 1.0000000 0.5809097 0.3109682 0.4658301  
## ehat\_l4 0.5034426 0.4654935 0.3103158 0.5809097 1.0000000 0.5822655 0.3112345  
## ehat\_l5 0.3673534 0.5032166 0.4656771 0.3109682 0.5822655 1.0000000 0.5823766  
## ehat\_l6 0.1943089 0.3680101 0.5032240 0.4658301 0.3112345 0.5823766 1.0000000  
## ehat\_l7 0.2473946 0.1989050 0.3684954 0.5028754 0.4647247 0.3131989 0.5835410  
## ehat\_l7  
## ehat 0.2473946  
## ehat\_l1 0.1989050  
## ehat\_l2 0.3684954  
## ehat\_l3 0.5028754  
## ehat\_l4 0.4647247  
## ehat\_l5 0.3131989  
## ehat\_l6 0.5835410  
## ehat\_l7 1.0000000

df.2013 %>% select(ehat:ehat\_l8) %>% cor(use = "pairwise")

## ehat ehat\_l1 ehat\_l2 ehat\_l3 ehat\_l4 ehat\_l5 ehat\_l6  
## ehat 1.0000000 0.5797699 0.3080656 0.4618665 0.5034426 0.3673534 0.1943089  
## ehat\_l1 0.5797699 1.0000000 0.5811507 0.3102325 0.4654935 0.5032166 0.3680101  
## ehat\_l2 0.3080656 0.5811507 1.0000000 0.5812268 0.3103158 0.4656771 0.5032240  
## ehat\_l3 0.4618665 0.3102325 0.5812268 1.0000000 0.5809097 0.3109682 0.4658301  
## ehat\_l4 0.5034426 0.4654935 0.3103158 0.5809097 1.0000000 0.5822655 0.3112345  
## ehat\_l5 0.3673534 0.5032166 0.4656771 0.3109682 0.5822655 1.0000000 0.5823766  
## ehat\_l6 0.1943089 0.3680101 0.5032240 0.4658301 0.3112345 0.5823766 1.0000000  
## ehat\_l7 0.2473946 0.1989050 0.3684954 0.5028754 0.4647247 0.3131989 0.5835410  
## ehat\_l8 0.2986118 0.2520156 0.1990714 0.3678770 0.5018860 0.4669115 0.3138267  
## ehat\_l7 ehat\_l8  
## ehat 0.2473946 0.2986118  
## ehat\_l1 0.1989050 0.2520156  
## ehat\_l2 0.3684954 0.1990714  
## ehat\_l3 0.5028754 0.3678770  
## ehat\_l4 0.4647247 0.5018860  
## ehat\_l5 0.3131989 0.4669115  
## ehat\_l6 0.5835410 0.3138267  
## ehat\_l7 1.0000000 0.5820630  
## ehat\_l8 0.5820630 1.0000000

#acf(df.2013$ehat\_l3)  
  
Reg.19602013.L1 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,1,1,1))  
Reg.19602013.L2 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,2,2,2))  
Reg.19602013.L3 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,3,3,3))  
Reg.19602013.L4 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,4,4,4))  
Reg.19602013.L5 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,5,5,5))  
Reg.19602013.L6 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,6,6,6))  
Reg.19602013.L7 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,7,7,7))  
Reg.19602013.L8 <- ardl(cpi ~ gdpg+interest+nettrade, data = df.2013, order = c(1,8,8,8))  
models <- list(Reg.19602013.L1, Reg.19602013.L2,Reg.19602013.L3,Reg.19602013.L4,Reg.19602013.L5,Reg.19602013.L6,Reg.19602013.L7,Reg.19602013.L8)  
#modelsummary(models)  
  
bgt\_1\_6 <- bgtest(Reg.19602013.L6, order = 1)  
bgt\_1\_6

##   
## Breusch-Godfrey test for serial correlation of order up to 1  
##   
## data: Reg.19602013.L6  
## LM test = 0.75397, df = 1, p-value = 0.3852

bgt\_1\_7 <- bgtest(Reg.19602013.L7, order = 1)  
bgt\_1\_7

##   
## Breusch-Godfrey test for serial correlation of order up to 1  
##   
## data: Reg.19602013.L7  
## LM test = 1.8, df = 1, p-value = 0.1797

bgt\_1\_8 <- bgtest(Reg.19602013.L8, order = 1)  
bgt\_1\_8

##   
## Breusch-Godfrey test for serial correlation of order up to 1  
##   
## data: Reg.19602013.L8  
## LM test = 1.6018, df = 1, p-value = 0.2056

Reg.19602018.L8 <- ardl(cpi ~ gdpg+interest+nettrade, data = df, order = c(1,8,8,8))  
  
#df$residuals <- c(NA,NA,NA,NA,NA,NA,residuals(Reg.19602018.L8))