Macroeconometrics - Homework 4

Gabriel Konecny

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Exercise 2:

Below we replicate figure 2.

```
#1. Compute reduced form error terms using data and posterior distributions of parameters
# = (Data - model) where for model use posterior version of Kilian model (1) in reduced form
# You should get as many as we have samples from posterior. Take median of them.
#2. Compute structural error terms using by premultiplying with B_inv which is shock.col
#Once you have structural errors look on slide 61 on slide set 16_ts-multi
#Theta_j should be #IRFchol_median[4,,j]
#for bigger j it might be needed to recompute it (e.g. change forecast period)
#Have a look on pictures which are in same folder with this code
```

. . . . . .

Place for figure 2

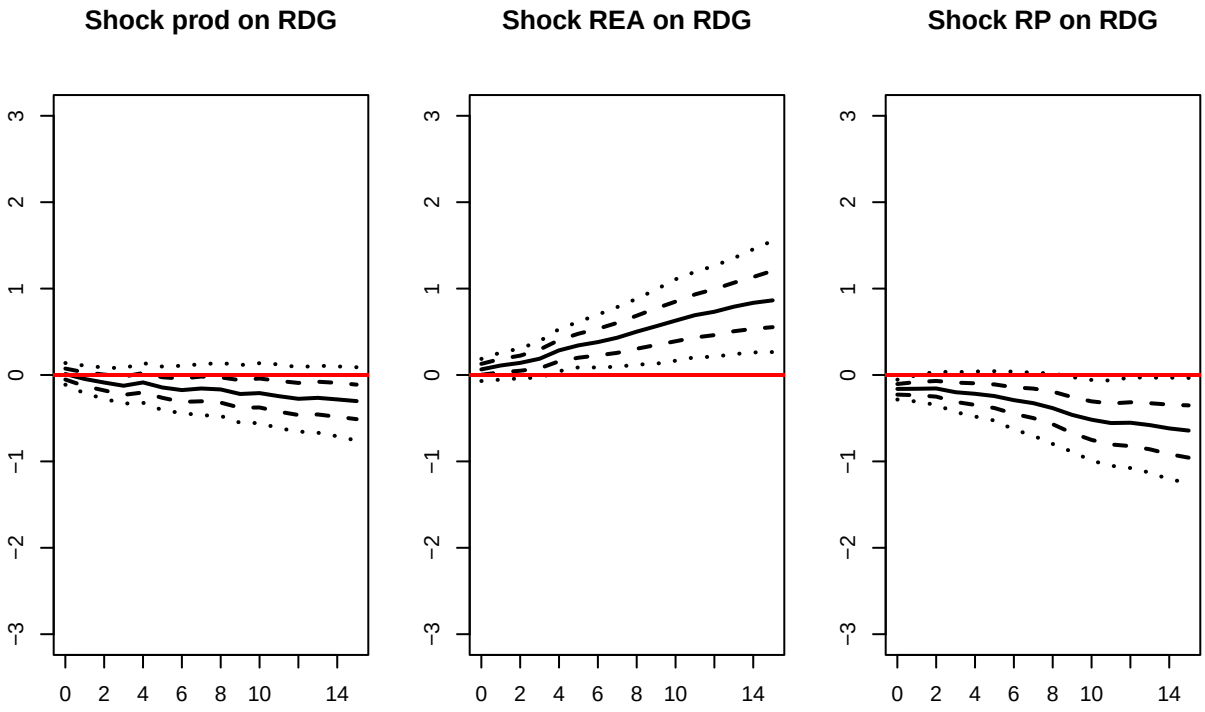
. . . . . .

Below we replicate the lower panel of figure 3. The IRFs remind of those in the paper by Kilian, but are more smooth with values pushed more towards zero due to our prior. If we wanted to get IRFs which correspond more to those in the paper, we could increase the value of λ_1.

```
# Code for replication of figure 3:
#New storage for cumulative IRFs
IRFchol_store2 <- IRFchol_store

for (i in 1:4) {
IRFchol_store2[, 4, i, ] <- t(apply(IRFchol_store[, 4, i, ], 1, cumsum))
}
#Quantiles over the first dimension (number of saved draws)
IRFchol_low.68 <- apply(IRFchol_store2, c(2,3,4), quantile, 0.16,na.rm=TRUE)
IRFchol_high.68 <- apply(IRFchol_store2, c(2,3,4), quantile, 0.84,na.rm=TRUE)
IRFchol_low.95 <- apply(IRFchol_store2, c(2,3,4), quantile, 0.025,na.rm=TRUE)
IRFchol_high.95 <- apply(IRFchol_store2, c(2,3,4), quantile, 0.975,na.rm=TRUE)
IRFchol_median2 <- apply(IRFchol_store2, c(2,3,4), median, na.rm=TRUE)
#Start plotting the IRFs w.r.t. different shocks

par(mfrow=c(1,3),mar=c(6,2,6,2))
sign.list <- c(-1,1,1)
for(jj in seq_along(sign.list)){
for(ii in 4:4){
plot.ts(sign.list[jj]*IRFchol_median2[ii,jj,], ylab="", main=paste0("Shock ",colnames(Y)[jj], " on ",co
lines(sign.list[jj]*IRFchol_low.68[ii,jj,], lty = 2, lwd=2)
lines(sign.list[jj]*IRFchol_high.68[ii,jj,], lty = 2, lwd=2)
lines(sign.list[jj]*IRFchol_low.95[ii,jj,], lty = 3, lwd=2)
lines(sign.list[jj]*IRFchol_high.95[ii,jj,], lty = 3, lwd=2)
abline(h=0,col="red",lwd=2)
axis(1, at = seq(1, nhor, by = 2), labels = seq(0, nhor - 1, by = 2))
}}
```



Sign restrictions:

```
# Code for replication sign restriction
#New storage for cumulative IRFs
IRFsign_store2 <- IRFsign_store

for (i in 1:4) {
IRFsign_store2[, 4, i, ] <- t(apply(IRFsign_store[, 4, i, ], 1, cumsum))
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#Start plotting the IRFs w.r.t. different shocks

par(mfrow=c(1,3),mar=c(6,2,6,2))
sign.list <- c(-1,1,1)
main.list <- c("Oil supply shock", "Aggregate demand shock", "Oil-specific demand shock")
for(jj in seq_along(sign.list)){
for(ii in 4:4){
plot.ts(sign.list[jj]*IRFsign_median2[ii,jj,], ylab="", main=paste0("Shock ",colnames(Y)[jj], " on ",co
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lines(sign.list[jj]*IRFsign_low.95[ii,jj,], lty = 3, lwd=2)
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lines(sign.list[jj]*IRFsign_high.95[ii,jj,], lty = 3, lwd=2)
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axis(1, at = seq(1, nhor, by = 2), labels = seq(0, nhor - 1, by = 2))
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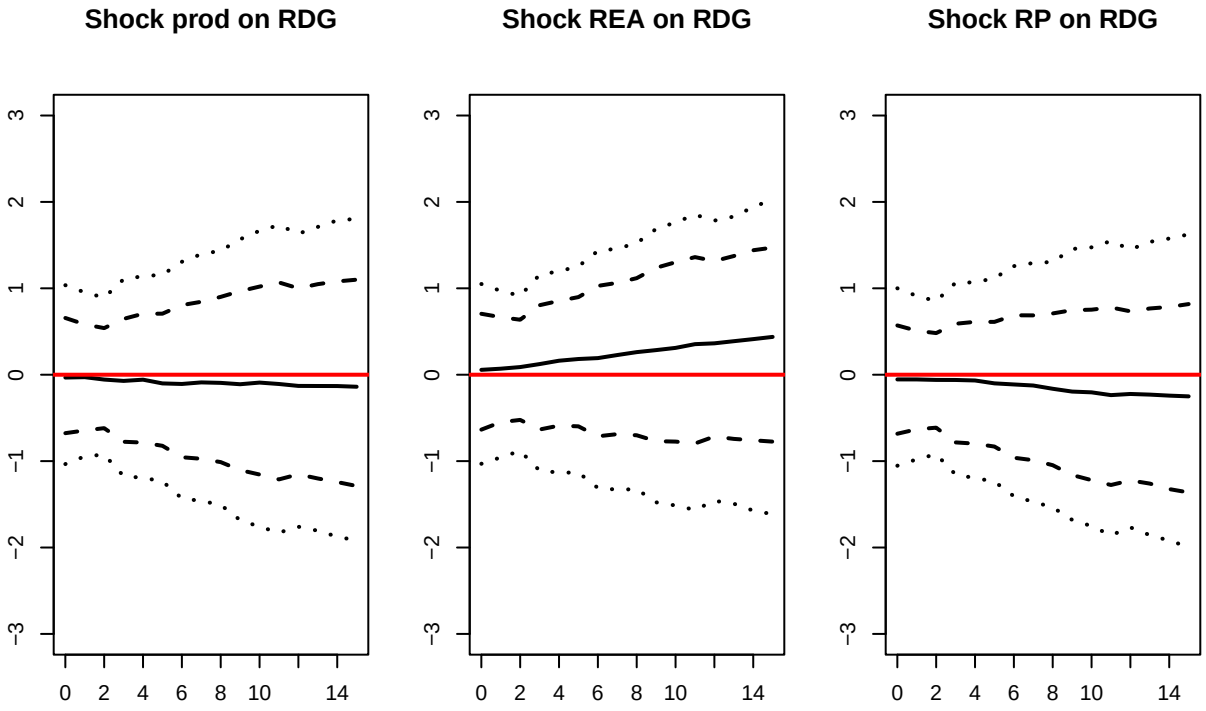

Think of other variables:

We decided to use the Variable “S.P.500” from the dataset “current.csv” and as a measure for the CPI the Variable “CPIAUCSL”.

```
FRED <- read.csv("current.csv",sep = ",", dec = ".")[-1,]
data.SP.CPI.raw <- ts(FRED[c("S.P.500","CPIAUCSL")], start=c(1959,1),frequency=12)
data.SP.CPI <- window(data.SP.CPI.raw, start = c(1973, 1), end = c(2006, 12))
data.returns.inf <- diff(log(data.SP.CPI)) * 100
SP.RR <- (1 + data.returns.inf[,1]) / (1 + data.returns.inf[,2]) - 1

data.returns <- ts(data.frame(data.kilian[,1:3], SP.RR), start = c(1972, 12), frequency=12)

Traw <- nrow(data.returns)
Yraw <- data.returns
```

We again estimate the VAR and the impulse response functions:

```
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}}
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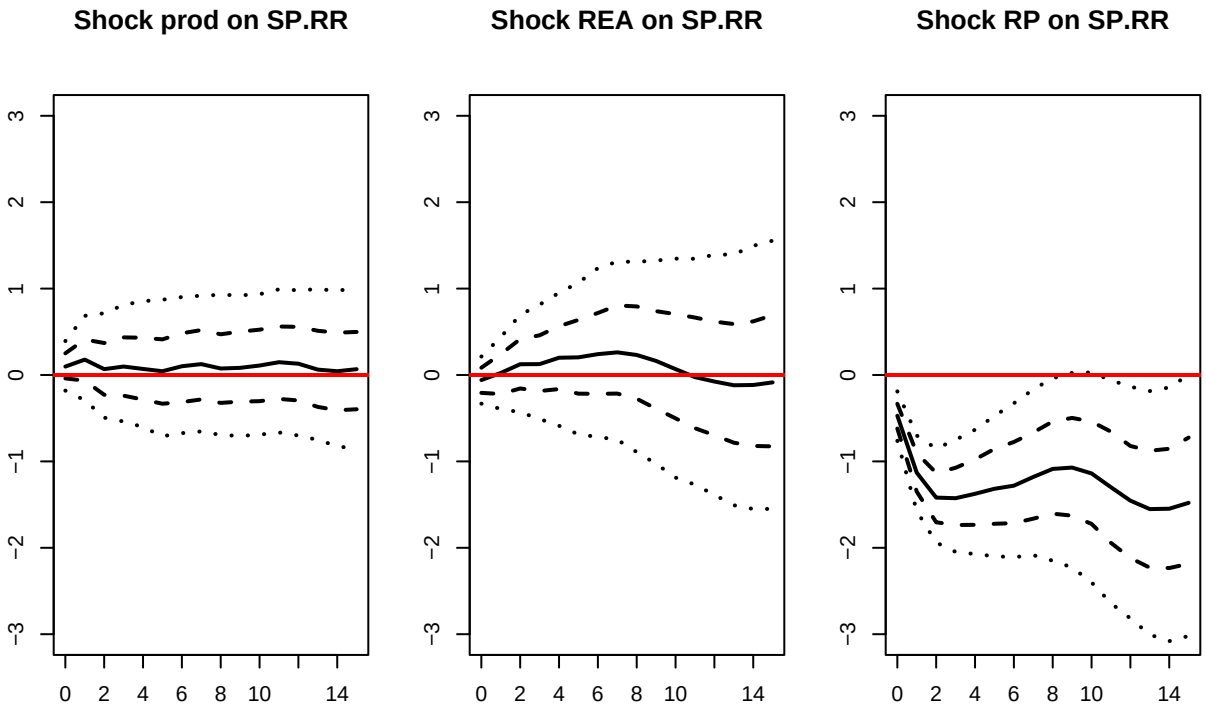

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}}
```