Assignment6_6104640427.R

user

2021-05-19

```
setwd("/Users/user/Desktop/Arm/EE435 R")
cat(rep("\n",50))

#install.packages("vars")
library(vars)

## Warning: package 'vars' was built under R version 4.0.5

## Loading required package: MASS

## Loading required package: strucchange

## Warning: package 'strucchange' was built under R version 4.0.5

## Loading required package: zoo

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

## Loading required package: sandwich

## Loading required package: urca

## Loading required package: lmtest

library(fGarch)

## Warning: package 'fGarch' was built under R version 4.0.5

## Loading required package: timeDate

## Loading required package: timeSeries

##
## Attaching package: 'timeSeries'

## The following object is masked from 'package:zoo':
##
##     time<-

## Loading required package: fBasics
```

```
library(quantmod)

## Loading required package: xts

## Loading required package: TTR

##
## Attaching package: 'TTR'

## The following object is masked from 'package:fBasics':
##
##     volatility

## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo

library(fBasics)
library(sn)

## Loading required package: stats4

##
## Attaching package: 'sn'

## The following object is masked from 'package:fBasics':
##
##     vech

## The following object is masked from 'package:stats':
##
##     sd

library(PerformanceAnalytics)

##
## Attaching package: 'PerformanceAnalytics'

## The following objects are masked from 'package:timeDate':
##
##     kurtosis, skewness

## The following object is masked from 'package:graphics':
##
##     legend

library(car)

## Loading required package: carData

##
## Attaching package: 'car'
```

```
## The following object is masked from 'package:fBasics':
##
##     densityPlot

library(tseries)
library(forecast)

require(vars)

#1



un = read.table("m-unrate-MIILIN.txt",header=T)
x=cbind (un$MI,un$IL,un$IN)
x=log(x)
unt=diff(x)*100
colnames(unt) <- c('MI','IL','IN')
varfit=VAR(unt,p=2)
summary(varfit)

##
## VAR Estimation Results:
## =========================
## Endogenous variables: MI, IL, IN
## Deterministic variables: const
## Sample size: 489
## Log Likelihood: -2782.463
## Roots of the characteristic polynomial:
## 0.8686 0.6789 0.4943 0.4486 0.3738 0.0756
## Call:
## VAR(y = unt, p = 2)
##
##
## Estimation results for equation MI:
## ===================================
## MI = MI.l1 + IL.l1 + IN.l1 + MI.l2 + IL.l2 + IN.l2 + const
##
##         Estimate Std. Error t value Pr(>|t|)
## MI.l1  0.198967   0.044522   4.469 9.81e-06 ***
## IL.l1  0.275604   0.073512   3.749 0.000199 ***
## IN.l1  0.130995   0.049704   2.635 0.008673 **
## MI.l2  0.309097   0.045360   6.814 2.84e-11 ***
## IL.l2 -0.106027   0.072016  -1.472 0.141604
## IN.l2  0.005618   0.050137   0.112 0.910836
## const -0.043085   0.089680  -0.480 0.631141
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Residual standard error: 1.978 on 482 degrees of freedom
```

(1.1)

$$\widehat{MI}_t = \underset{(0.0897)}{-0.0431} + \underset{(0.0445)}{0.199}\, MI_{t-1} + \underset{(0.0454)}{0.3091}\, MI_{t-2} + \underset{(0.0735)}{0.2756}\, IL_{t-1} + \underset{(0.0497)}{0.1309}\, IN_{t-1}$$

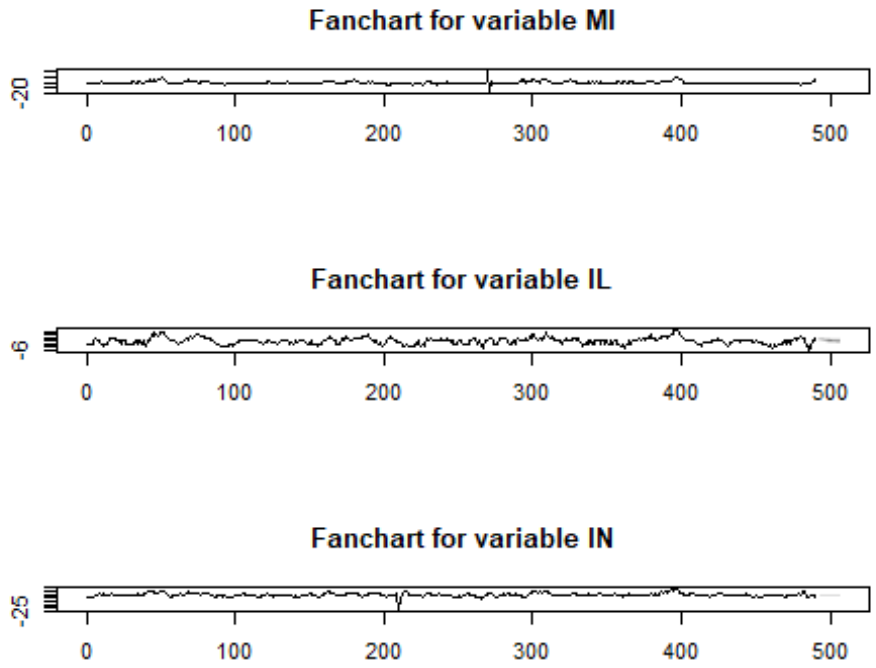
```
## Multiple R-Squared: 0.4075,  Adjusted R-squared: 0.4001
## F-statistic: 55.24 on 6 and 482 DF,  p-value: < 2.2e-16
##
##
## Estimation results for equation IL:
## ===================================
## IL = MI.l1 + IL.l1 + IN.l1 + MI.l2 + IL.l2 + IN.l2 + const
##
##       Estimate Std. Error t value Pr(>|t|)
## MI.l1  0.10580    0.02743   3.856 0.000131 ***
## IL.l1  0.52800    0.04530  11.656  < 2e-16 ***
## IN.l1  0.10090    0.03063   3.294 0.001059 **
## MI.l2  0.04956    0.02795   1.773 0.076841 .
## IL.l2  0.18303    0.04438   4.125 4.37e-05 ***
## IN.l2 -0.08484    0.03089  -2.746 0.006255 **
## const  0.02069    0.05526   0.374 0.708207
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Residual standard error: 1.219 on 482 degrees of freedom
## Multiple R-Squared: 0.6581,  Adjusted R-squared: 0.6539
## F-statistic: 154.7 on 6 and 482 DF,  p-value: < 2.2e-16
##
##
## Estimation results for equation IN:
## ===================================
## IN = MI.l1 + IL.l1 + IN.l1 + MI.l2 + IL.l2 + IN.l2 + const
##
##        Estimate Std. Error t value Pr(>|t|)
## MI.l1  0.151449   0.041706   3.631 0.000312 ***
## IL.l1  0.273801   0.068861   3.976 8.08e-05 ***
## IN.l1  0.568094   0.046560  12.201  < 2e-16 ***
## MI.l2 -0.006117   0.042490  -0.144 0.885584
## IL.l2 -0.169976   0.067460  -2.520 0.012069 *
## IN.l2  0.013880   0.046965   0.296 0.767705
## const -0.017227   0.084007  -0.205 0.837607
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Residual standard error: 1.853 on 482 degrees of freedom
## Multiple R-Squared: 0.5205,  Adjusted R-squared: 0.5145
## F-statistic:  87.2 on 6 and 482 DF,  p-value: < 2.2e-16
##
##
##
## Covariance matrix of residuals:
##        MI     IL     IN
## MI 3.9112 0.3116 0.7248
```

$$\hat{IL}_t = \underset{(0.0553)}{0.0207} + \underset{(0.045)}{0.578}\, IL_{t-1} + \underset{(0.044)}{0.183}\, IL_{t-2} + \underset{(0.0274)}{0.1058}\, MI_{t-1} + \underset{(0.0306)}{0.1209}\, IN_{t-1} - \underset{(0.0309)}{0.0848}\, IN_{t-2}$$

$$\hat{IN}_t = \underset{(0.0864)}{-0.0172} + \underset{(0.047)}{0.5681}\, IN_{t-1} + \underset{(0.042)}{0.1514}\, MI_{t-1} + \underset{(0.068)}{0.2738}\, IL_{t-1} - \underset{(0.067)}{0.1649}\, IL_{t-2}$$

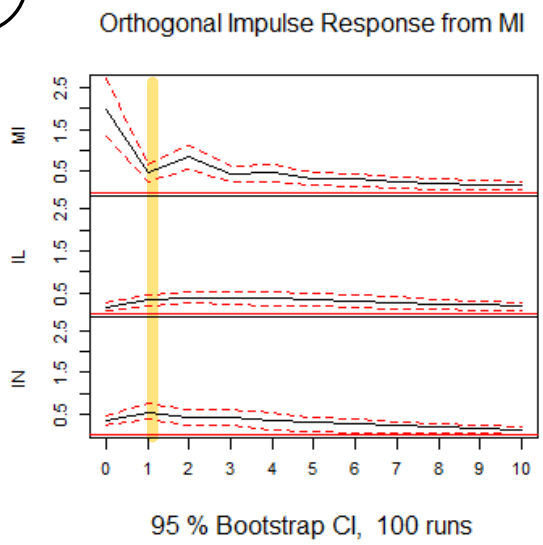
```
## IL 0.3116 1.4851 0.4078
## IN 0.7248 0.4078 3.4319
##
## Correlation matrix of residuals:
##        MI     IL     IN
## MI 1.0000 0.1293 0.1978
## IL 0.1293 1.0000 0.1807
## IN 0.1978 0.1807 1.0000

varfit.prd <- predict(varfit, n.ahead =15, ci = 0.95)
fanchart(varfit.prd)
```




```
impresp=irf(varfit)
plot(impresp)
```

1.2



For the only 1st period:

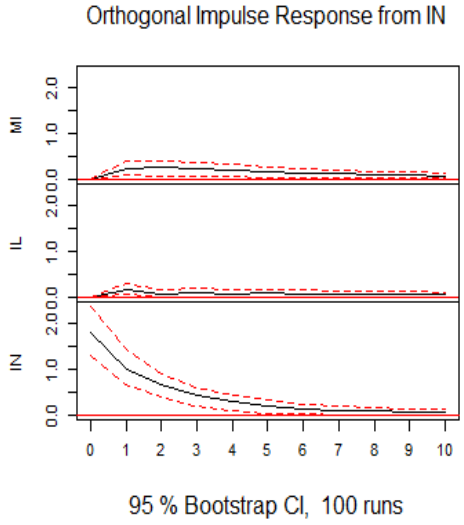
neg. shock from MI

create some positive

impulse response of unemployment rate in another 2 state, AKA -IN and IL

means the labor employed more in MI

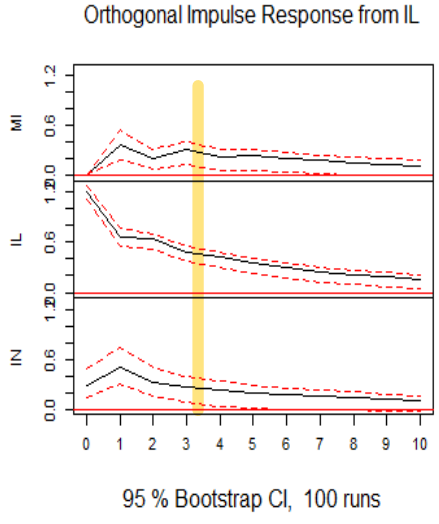
create less a bit higher unemployment in other 2 states.



unemployment rate in IN

likely to be solely move by it self and

not likely to create impluse response effect on other 2 states.



For some certain period (3)

unemployment rate in IL that fall down will

increase the unemployment rate in other 2 states

it is likely that ppl. from other 2 states move

to work and have jobs in IL.

```r
#2

msoil = read.table("m-m1cnwti.txt",header=F)
zt=cbind (msoil$V1,msoil$V2)
colnames(zt) <- c('ms','oil')
varfit2=VAR(zt,p=3)
summary(varfit2)

##
## VAR Estimation Results:
## =========================
## Endogenous variables: ms, oil
## Deterministic variables: const
## Sample size: 297
## Log Likelihood: -75.104
## Roots of the characteristic polynomial:
## 0.7754 0.6964 0.6964 0.4487 0.4487 0.3284
## Call:
## VAR(y = zt, p = 3)
##
##
## Estimation results for equation ms:
## ===================================
## ms = ms.l1 + oil.l1 + ms.l2 + oil.l2 + ms.l3 + oil.l3 + const
##
##         Estimate Std. Error t value Pr(>|t|)
## ms.l1    0.66841    0.05465  12.230  < 2e-16 ***
## oil.l1   0.70145    0.70262   0.998    0.319
## ms.l2   -0.40451    0.06295  -6.426 5.37e-10 ***
## oil.l2  -1.01842    0.73654  -1.383    0.168
## ms.l3    0.37999    0.05474   6.942 2.53e-11 ***
## oil.l3  -0.43989    0.71537  -0.615    0.539
## const    0.49736    0.10308   4.825 2.26e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Residual standard error: 0.9633 on 290 degrees of freedom
## Multiple R-Squared: 0.3901,  Adjusted R-squared: 0.3775
## F-statistic: 30.91 on 6 and 290 DF,  p-value: < 2.2e-16
##
##
## Estimation results for equation oil:
## ====================================
## oil = ms.l1 + oil.l1 + ms.l2 + oil.l2 + ms.l3 + oil.l3 + const
##
##         Estimate Std. Error t value Pr(>|t|)
## ms.l1    0.003467   0.004573   0.758    0.449
## oil.l1   0.296716   0.058787   5.047 7.93e-07 ***
## ms.l2    0.007504   0.005267   1.425    0.155
```

2.2

$\hat{ms}_t = \underset{(0.10)}{0.497} + \underset{(0.055)}{0.668}\, ms_{t-1} - \underset{(0.063)}{0.405}\, ms_{t-2} + \underset{(0.055)}{0.38}\, ms_{t-3}$

```
        Estimate Std. Error t value Pr(>|t|)
ms.l1   0.003467   0.004573   0.758    0.449
oil.l1  0.296716   0.058787   5.047 7.93e-07 ***
ms.l2   0.007504   0.005267   1.425    0.155
```

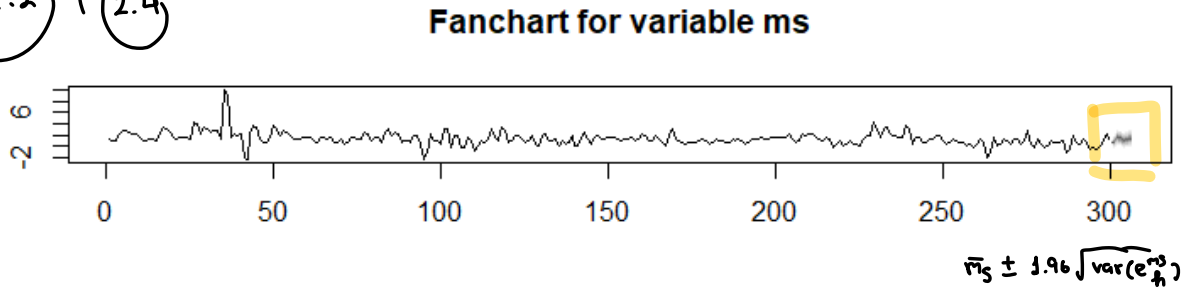
$$\widehat{oil}_t = -0.002 + 0.297\ oil_{t-1}$$
$$(0.004) \quad (0.059)$$

```
## oil.l2  0.029814   0.061626   0.484    0.629
## ms.l3  -0.007121   0.004580  -1.555    0.121
## oil.l3 -0.057191   0.059854  -0.956    0.340
## const  -0.002715   0.008624  -0.315    0.753
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Residual standard error: 0.0806 on 290 degrees of freedom
## Multiple R-Squared: 0.1153,  Adjusted R-squared: 0.09701
## F-statistic:   6.3 on 6 and 290 DF,  p-value: 3.049e-06
##
##
##
## Covariance matrix of residuals:
##           ms      oil
## ms  0.927944 0.008104
## oil 0.008104 0.006496
##
## Correlation matrix of residuals:
##         ms    oil
## ms  1.0000 0.1044
## oil 0.1044 1.0000
```

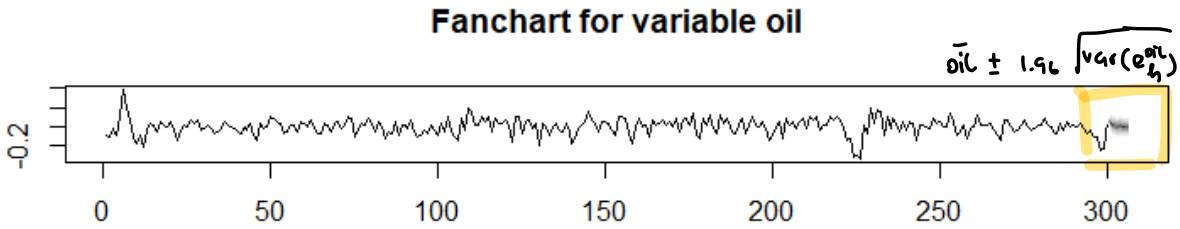
```
varfit2.prd <- predict(varfit2, n.ahead = 6, ci = 0.95)
```

```
fanchart(varfit2.prd)
```

2.2 + 2.4



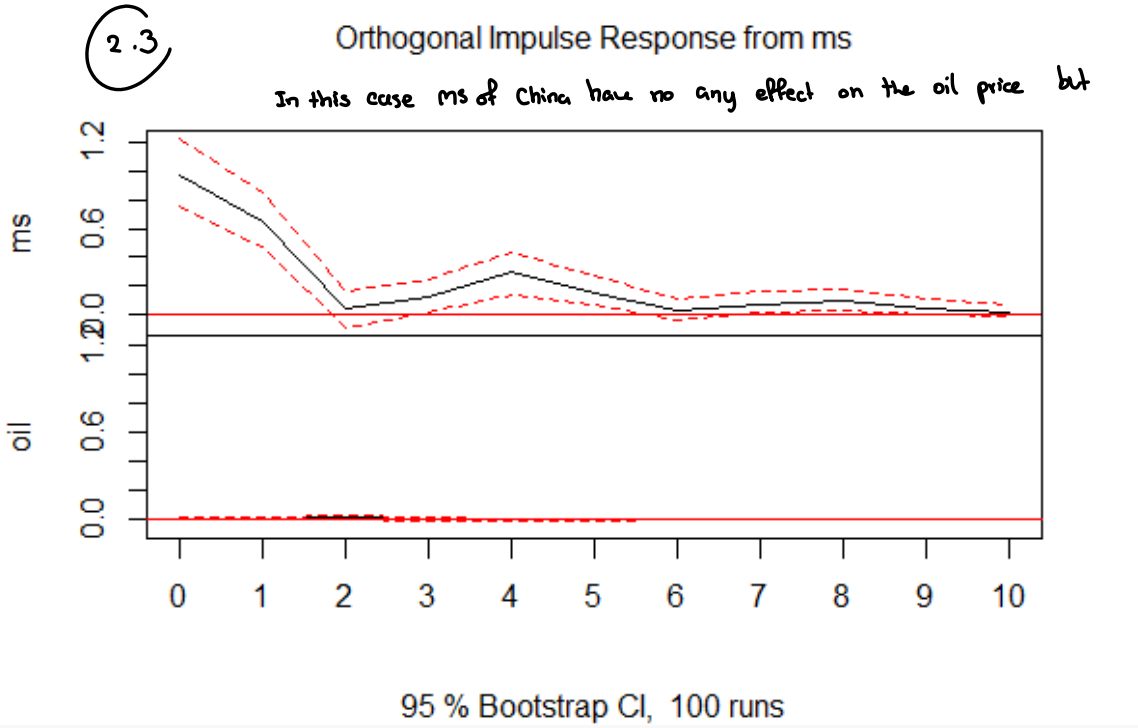
$\bar{ms} \pm 1.96\sqrt{var(e^{ms}_h)}$



$\bar{oil} \pm 1.96\sqrt{var(e^{oil}_h)}$

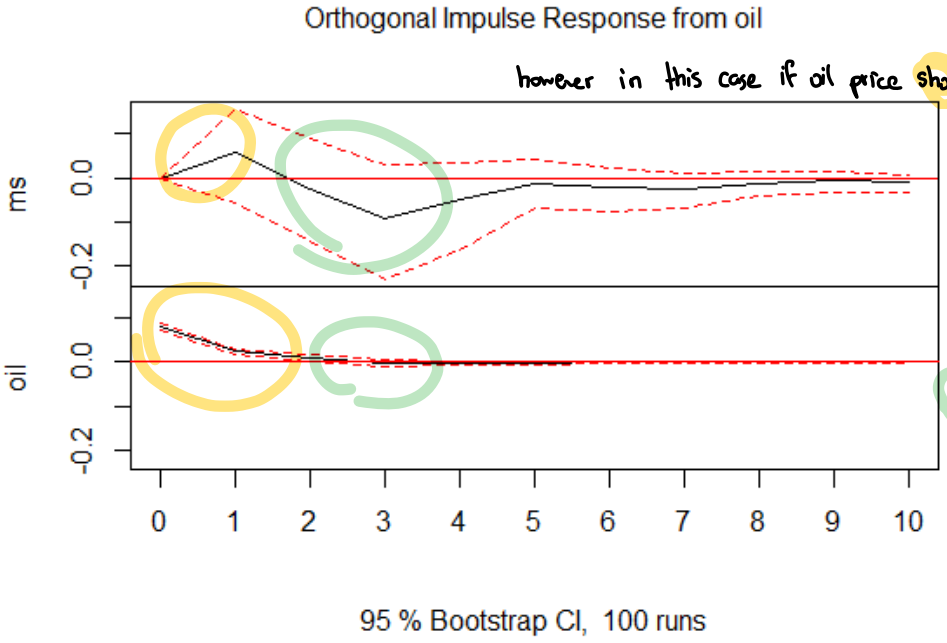
```
impresp=irf(varfit2)
```

2.3



In this case ms of China have no any effect on the oil price but

```
plot(impresp)
```



however in this case if oil price shock which means it goes down then we can see that the shock might lower economic activity and require china's central bank to input the money in to the economies. Later when the oil price is quite stable, the MS injected will be inverse trend to prevent the hotheated econ.

2.5

```
fevd(varfit2,n.ahead = 6)
$ms
            ms          oil
[1,] 1.0000000 0.000000000
[2,] 0.9976640 0.002336045
[3,] 0.9971155 0.002884469
[4,] 0.9908030 0.009196979
[5,] 0.9896296 0.010370432
[6,] 0.9897108 0.010289214

$oil
              ms       oil
[1,] 0.01089392 0.9891061
[2,] 0.01477258 0.9852274
[3,] 0.03227375 0.9677262
[4,] 0.03247842 0.9675216
```

```
[5,] 0.03407249 0.9659275
[6,] 0.03405620 0.9659438
```