

Assignment-6-real-.R

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```
setwd("/Users/Orachai/Documents/BE/4TH YEAR 2ND SEMESTER/EE435/Assignment 6")  
cat(rep("\n",50))
```

```
#install.packages("quantmod")  
#install.packages("fBasics")  
#install.packages("sn")  
#install.packages("PerformanceAnalytics")  
#install.packages("car")  
#install.packages("tseries")  
#install.packages("forecast")  
  
library(quantmod)
```

```
## Warning: package 'quantmod' was built under R version 4.0.4
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
```

```
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
```

```
##
```

```
##      as.Date, as.Date.numeric
```

```
## Loading required package: TTR
```

```
## Registered S3 method overwritten by 'quantmod':
```

```
##      method      from
```

```
##      as.zoo.data.frame zoo
```

```
library(fBasics)
```

```
## Warning: package 'fBasics' was built under R version 4.0.4
```

```
## Loading required package: timeDate
```

```
## Warning: package 'timeDate' was built under R version 4.0.4

## Loading required package: timeSeries

## Warning: package 'timeSeries' was built under R version 4.0.4

##
## Attaching package: 'timeSeries'

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

##
## Attaching package: 'fBasics'

## The following object is masked from 'package:TTR':
##
##     volatility
```

```
library(sn)
```

```
## Warning: package 'sn' was built under R version 4.0.4

## Loading required package: stats4

##
## Attaching package: 'sn'

## The following objects are masked from 'package:fBasics':
##
##     tr, vech

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

```
library(PerformanceAnalytics)
```

```
## Warning: package 'PerformanceAnalytics' was built under R version 4.0.4

##
## Attaching package: 'PerformanceAnalytics'

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

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

```
library(car)
```

```
## Warning: package 'car' was built under R version 4.0.4
```

```
## Loading required package: carData
```

```
##
```

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

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

```
##
```

```
## densityPlot
```

```
library(tseries)
```

```
## Warning: package 'tseries' was built under R version 4.0.4
```

```
library(forecast)
```

```
## Warning: package 'forecast' was built under R version 4.0.4
```

```
library(fGarch)
```

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

```
library(fUnitRoots)
```

```
## Warning: package 'fUnitRoots' was built under R version 4.0.4
```

```
#install.packages("fGarch")
```

```
library(fGarch)
```

```
#install.packages('MTS')
```

```
require(MTS)
```

```
## Loading required package: MTS
```

```
## Warning: package 'MTS' was built under R version 4.0.5
```

```
##
```

```
## Attaching package: 'MTS'
```

```
## The following object is masked from 'package:TTR':
```

```
##
```

```
## VMA
```

```
#1
da=read.table("m-unrate-MIILIN.txt",header=T)
head(da)
```

```
##           Mon  MI  IL  IN
## 1 1976.083 10.0 6.9 7.0
## 2 1976.167 10.0 6.8 6.8
## 3 1976.250  9.9 6.7 6.5
## 4 1976.333  9.7 6.6 6.2
## 5 1976.417  9.6 6.5 6.0
## 6 1976.500  9.4 6.5 5.8
```

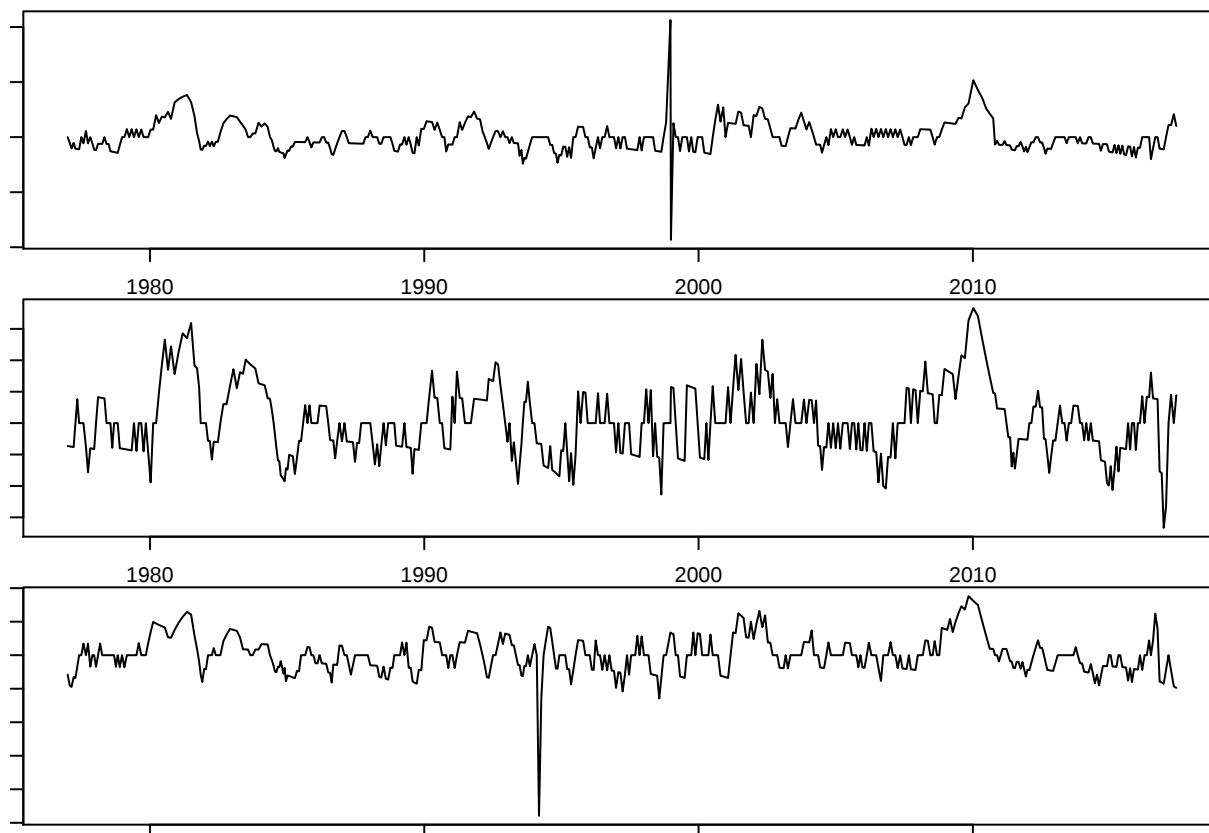
```
x=cbind(da[,2],da[,3],da[,4])
x=log(x)
zt=diffM(x)*100
#colnames(zt)=c("MIg", "ILg", "NIg")
head(zt)
```

```
##           [,1]      [,2]      [,3]
## [1,]  0.000000 -1.459880 -2.898754
## [2,] -1.005034 -1.481509 -4.512044
## [3,] -2.040887 -1.503788 -4.725288
## [4,] -1.036279 -1.526747 -3.278982
## [5,] -2.105341  0.000000 -3.390155
## [6,] -2.150621  1.526747 -1.739174
```

```
tdx=da[,1]+da[,2]/12
dim(da)
```

```
## [1] 492  4
```

```
#QUESTION 1.1)final fitted model
par(mar=c(1,1,1,1))
MTSplot(zt,tdx[2:492])
```



```
VARorder(zt)
```

```
## selected order: aic = 6
## selected order: bic = 2
## selected order: hq = 6
## Summary table:
##      p    AIC    BIC    HQ    M(p) p-value
## [1,] 0 4.5902 4.5902 4.5902  0.0000 0.0000
## [2,] 1 3.1019 3.1788 3.1321 722.0353 0.0000
## [3,] 2 2.9686 3.1225 3.0290  79.9726 0.0000
## [4,] 3 2.9328 3.1636 3.0234  33.8750 0.0001
## [5,] 4 2.9217 3.2294 3.0426  22.1688 0.0084
## [6,] 5 2.9188 3.3034 3.0699  18.2649 0.0322
## [7,] 6 2.8417 3.3033 3.0230  52.1535 0.0000
## [8,] 7 2.8516 3.3900 3.0630  12.2266 0.2008
## [9,] 8 2.8797 3.4951 3.1214   3.8389 0.9217
## [10,] 9 2.8736 3.5659 3.1455  19.2322 0.0233
## [11,] 10 2.8648 3.6340 3.1668  20.3222 0.0160
## [12,] 11 2.8775 3.7237 3.2098  10.5898 0.3049
## [13,] 12 2.8935 3.8165 3.2560   9.1179 0.4265
## [14,] 13 2.9094 3.9094 3.3021   9.0746 0.4304
```

```
m1=VAR(zt,2)
```

```
## Constant term:
```

```
## Estimates:  -0.04308488 0.02069438 -0.01722694
## Std.Error:  0.08968027 0.05526058 0.08400675
## AR coefficient matrix
## AR( 1 )-matrix
##      [,1] [,2] [,3]
## [1,] 0.199 0.276 0.131
## [2,] 0.106 0.528 0.101
## [3,] 0.151 0.274 0.568
## standard error
##      [,1] [,2] [,3]
## [1,] 0.0445 0.0735 0.0497
## [2,] 0.0274 0.0453 0.0306
## [3,] 0.0417 0.0689 0.0466
## AR( 2 )-matrix
##      [,1] [,2] [,3]
## [1,] 0.30910 -0.106 0.00562
## [2,] 0.04956 0.183 -0.08484
## [3,] -0.00612 -0.170 0.01388
## standard error
##      [,1] [,2] [,3]
## [1,] 0.0454 0.0720 0.0501
## [2,] 0.0280 0.0444 0.0309
## [3,] 0.0425 0.0675 0.0470
##
## Residuals cov-mtx:
##      [,1] [,2] [,3]
## [1,] 3.8551679 0.3071579 0.7144333
## [2,] 0.3071579 1.4637954 0.4019971
## [3,] 0.7144333 0.4019971 3.3828113
##
## det(SSE) = 17.57694
## AIC = 2.939907
## BIC = 3.093748
## HQ = 3.000321
```

```
par("mar")
```

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

```
par(mar=c(1,1,1,1))
```

```
m1a = refVAR(m1,thres=1.645)
```

```
## Constant term:
## Estimates:  0 0 0
## Std.Error:  0 0 0
## AR coefficient matrix
## AR( 1 )-matrix
##      [,1] [,2] [,3]
## [1,] 0.192 0.206 0.130
## [2,] 0.105 0.528 0.101
## [3,] 0.152 0.273 0.574
## standard error
```

```
##          [,1]    [,2]    [,3]
## [1,] 0.0441 0.0563 0.0427
## [2,] 0.0274 0.0453 0.0306
## [3,] 0.0405 0.0678 0.0392
## AR( 2 )-matrix
##          [,1]    [,2]    [,3]
## [1,] 0.3035 0.000 0.0000
## [2,] 0.0491 0.183 -0.0849
## [3,] 0.0000 -0.168 0.0000
## standard error
##          [,1]    [,2]    [,3]
## [1,] 0.0444 0.0000 0.0000
## [2,] 0.0279 0.0443 0.0309
## [3,] 0.0000 0.0661 0.0000
##
## Residuals cov-mtx:
##          [,1]    [,2]    [,3]
## [1,] 3.8745260 0.3062712 0.7153133
## [2,] 0.3062712 1.4642213 0.4016425
## [3,] 0.7153133 0.4016425 3.3837769
##
## det(SSE) = 17.68107
## AIC = 2.929521
## BIC = 3.049175
## HQ  = 2.976509
```

```
names(m1a)
```

```
## [1] "data"      "order"      "cnst"      "coef"      "aic"      "bic"
## [7] "hq"        "residuals" "secoef"    "Sigma"     "Phi"      "Ph0"
## [13] "fixed"
```

```
sig=m1a$Sigma
U=chol(sig)
names(U)
```

```
## NULL
```

```
U
```

```
##          [,1]    [,2]    [,3]
## [1,] 1.968382 0.1555955 0.3634018
## [2,] 0.000000 1.2000047 0.2875813
## [3,] 0.000000 0.0000000 1.7801722
```

```
MTSdiag(m1)
```

```
## [1] "Covariance matrix:"
##          [,1]    [,2]    [,3]
## [1,] 3.863 0.308 0.716
## [2,] 0.308 1.467 0.403
```

```

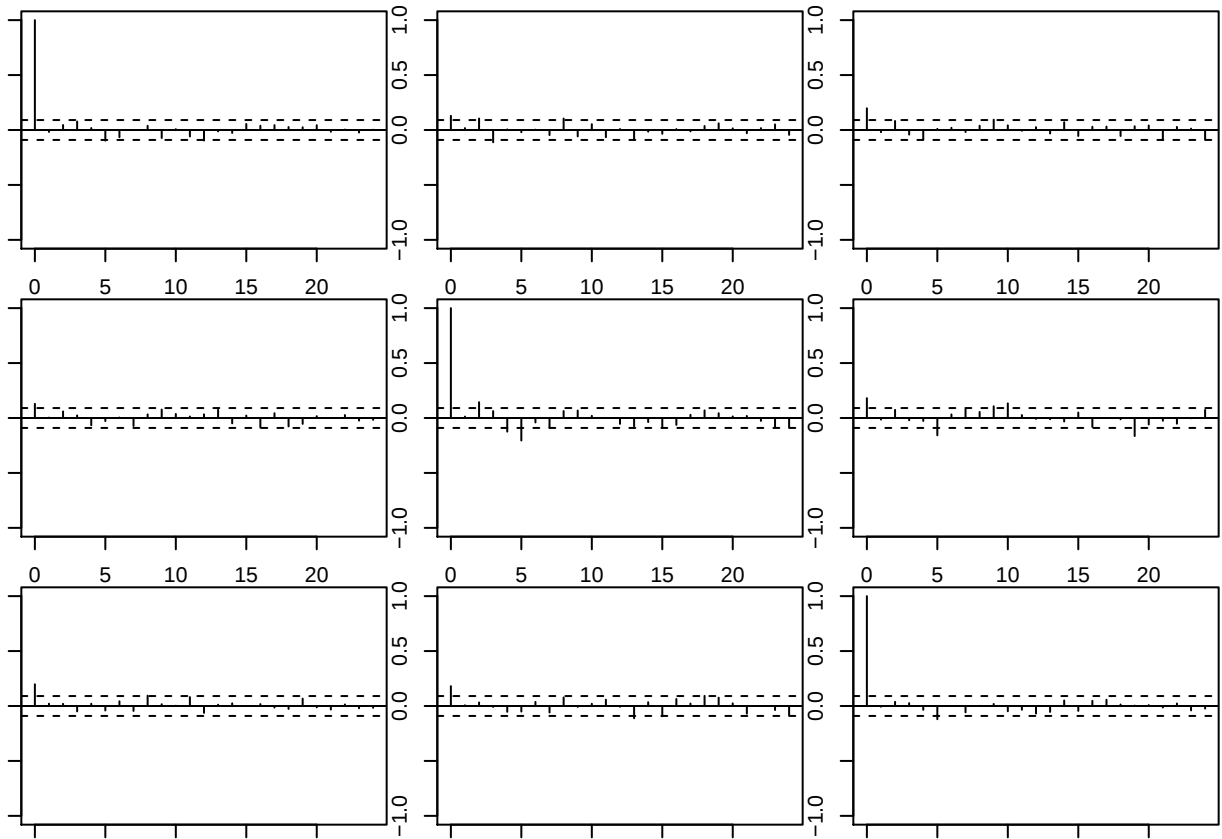
## [3,] 0.716 0.403 3.390
## CCM at lag: 0
##      [,1] [,2] [,3]
## [1,] 1.000 0.129 0.198
## [2,] 0.129 1.000 0.181
## [3,] 0.198 0.181 1.000
## Simplified matrix:
## CCM at lag: 1
## . . .
## . . .
## . . .
## CCM at lag: 2
## . + .
## . + .
## . . .
## CCM at lag: 3
## . - .
## . . .
## . . .
## CCM at lag: 4
## . . .
## . - .
## . . .
## CCM at lag: 5
## - . .
## . - -
## . . -
## CCM at lag: 6
## . . .
## . . .
## . . .
## CCM at lag: 7
## . . .
## . . .
## . . .
## CCM at lag: 8
## . + .
## . . .
## + . .
## CCM at lag: 9
## . . +
## . . +
## . . .
## CCM at lag: 10
## . . .
## . . +
## . . .
## CCM at lag: 11
## . . .
## . . .
## . . .
## CCM at lag: 12
## - . .
## . . .

```

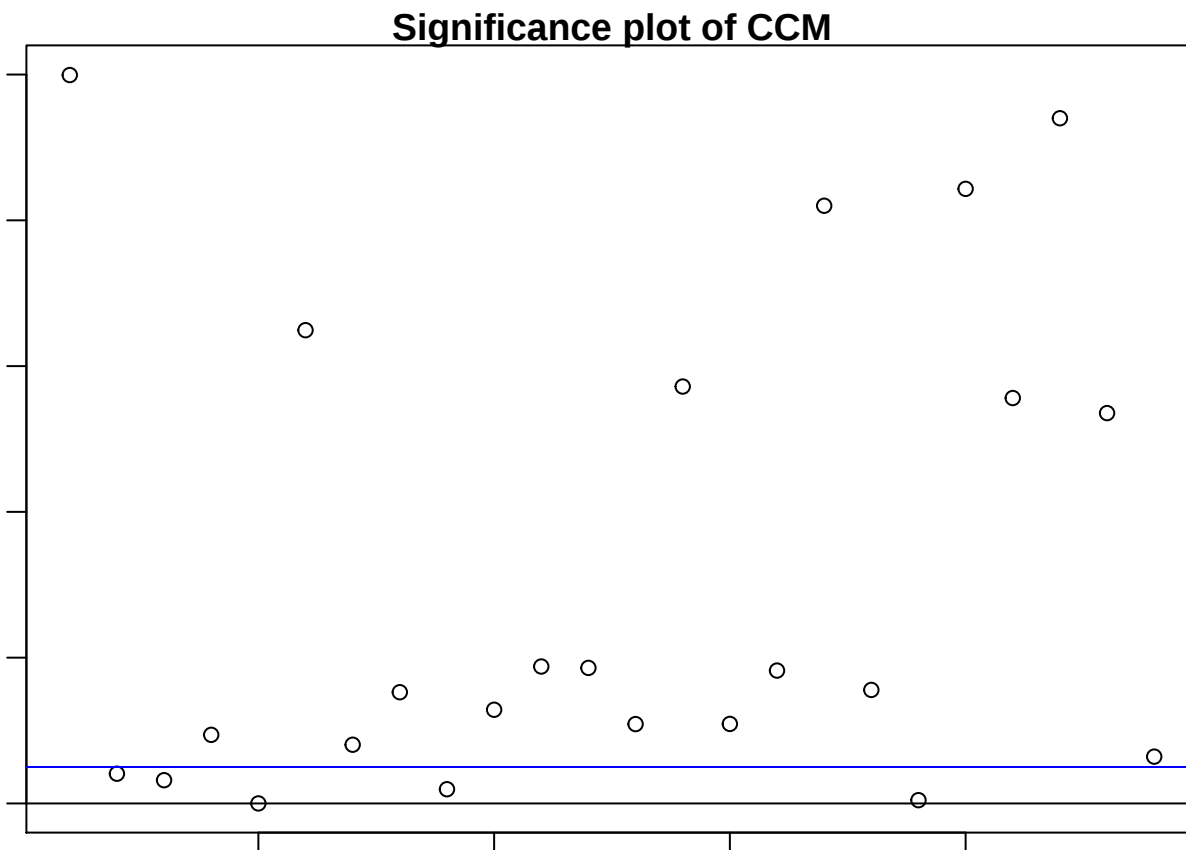
```

## . . .
## CCM at lag: 13
## . . .
## . . .
## . - .
## CCM at lag: 14
## . . .
## . . .
## . . .
## CCM at lag: 15
## . . .
## . - .
## . - .
## CCM at lag: 16
## . . .
## . . .
## . . .
## CCM at lag: 17
## . . .
## . . .
## . . .
## CCM at lag: 18
## . . .
## . . .
## . + .
## CCM at lag: 19
## . . .
## . . -
## . . .
## CCM at lag: 20
## . . .
## . . .
## . . .
## CCM at lag: 21
## . . -
## . . .
## . . .
## CCM at lag: 22
## . . .
## . . .
## . . .
## CCM at lag: 23
## . . .
## . . .
## . . .
## CCM at lag: 24
## . . .
## . . .
## . . .

```



Hit Enter for p-value plot of individual ccm:



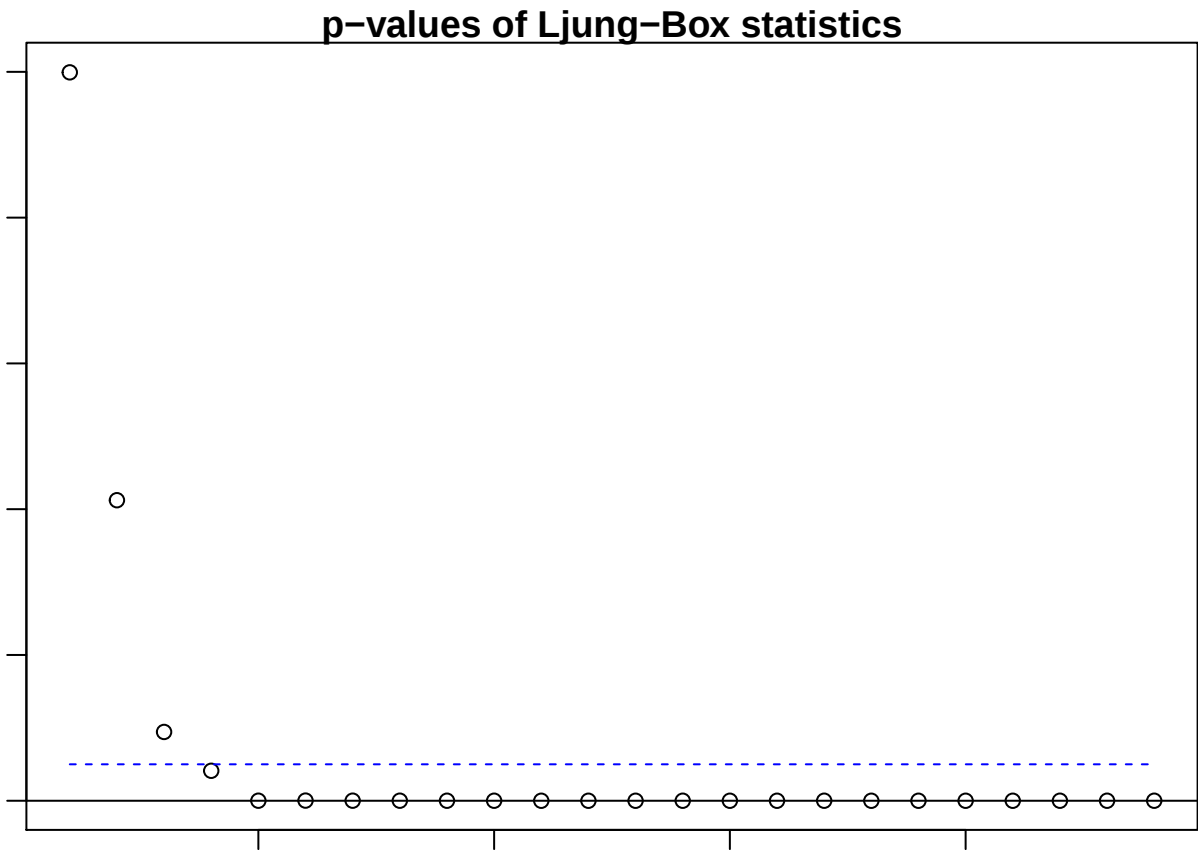
Hit Enter to compute MQ-statistics:

##

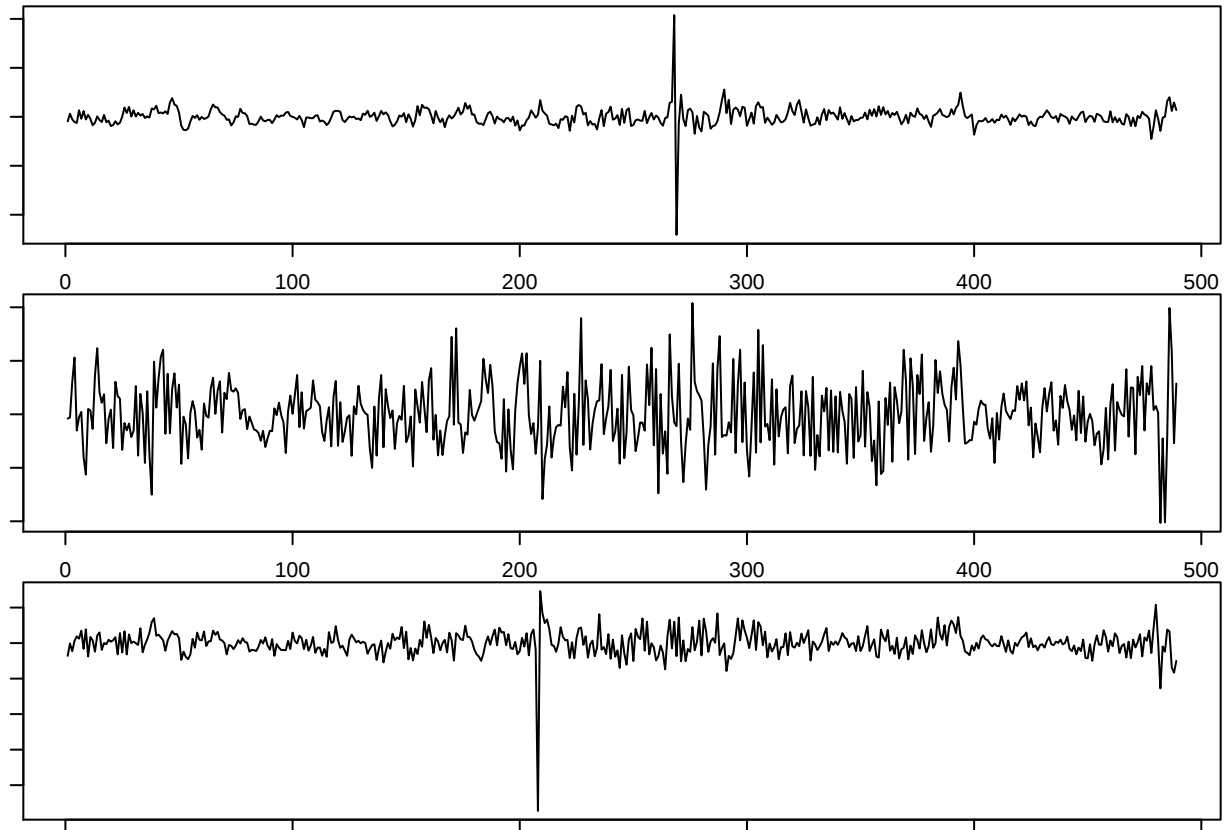
Ljung-Box Statistics:

##		m	Q(m)	df	p-value
##	[1,]	1.00	1.05	9.00	1.00
##	[2,]	2.00	18.67	18.00	0.41
##	[3,]	3.00	37.04	27.00	0.09
##	[4,]	4.00	52.00	36.00	0.04
##	[5,]	5.00	91.25	45.00	0.00
##	[6,]	6.00	98.16	54.00	0.00
##	[7,]	7.00	113.64	63.00	0.00
##	[8,]	8.00	126.92	72.00	0.00
##	[9,]	9.00	146.75	81.00	0.00
##	[10,]	10.00	160.63	90.00	0.00
##	[11,]	11.00	173.15	99.00	0.00
##	[12,]	12.00	185.71	108.00	0.00
##	[13,]	13.00	200.17	117.00	0.00
##	[14,]	14.00	207.83	126.00	0.00
##	[15,]	15.00	222.28	135.00	0.00
##	[16,]	16.00	234.92	144.00	0.00
##	[17,]	17.00	240.10	153.00	0.00
##	[18,]	18.00	253.31	162.00	0.00
##	[19,]	19.00	277.28	171.00	0.00
##	[20,]	20.00	282.19	180.00	0.00
##	[21,]	21.00	290.01	189.00	0.00
##	[22,]	22.00	293.54	198.00	0.00

```
## [23,] 23.00    301.58  207.00    0.00
## [24,] 24.00    317.81  216.00    0.00
```



```
## Hit Enter to obtain residual plots:
```



```
#QUESTION b) Impulse response function
```

```
setwd("/Users/Orachai/Documents/BE/4TH YEAR 2ND SEMESTER/EE435/Assignment 6")
cat(rep("\n",50))
```

```
#install.packages('vars')
require(vars)
```

```
## Loading required package: 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: sandwich
```

```
## Warning: package 'sandwich' was built under R version 4.0.5
```

```
## Loading required package: urca
```

```
## Warning: package 'urca' was built under R version 4.0.4

##
## Attaching package: 'urca'

## The following objects are masked from 'package:fUnitRoots':
##
##      punitroot, qunitroot, unitrootTable

## Loading required package: lmtest

##
## Attaching package: 'vars'

## The following object is masked from 'package:MTS':
##
##      VAR
```

```
da=read.table("m-unrate-MIILIN.txt",header=T)
head(da)
```

```
##      Mon  MI  IL  IN
## 1 1976.083 10.0 6.9 7.0
## 2 1976.167 10.0 6.8 6.8
## 3 1976.250  9.9 6.7 6.5
## 4 1976.333  9.7 6.6 6.2
## 5 1976.417  9.6 6.5 6.0
## 6 1976.500  9.4 6.5 5.8
```

```
x=cbind(da[,2],da[,3],da[,4])
head(x)
```

```
##      [,1] [,2] [,3]
## [1,] 10.0  6.9  7.0
## [2,] 10.0  6.8  6.8
## [3,]  9.9  6.7  6.5
## [4,]  9.7  6.6  6.2
## [5,]  9.6  6.5  6.0
## [6,]  9.4  6.5  5.8
```

```
x=log(x)
rt=diff(x)*100
colnames(rt)=c("MIg", "ILg", "NIg")
head(rt)
```

```
##      MIg      ILg      NIg
## [1,] 0.000000 -1.459880 -2.898754
## [2,] -1.005034 -1.481509 -4.512044
## [3,] -2.040887 -1.503788 -4.725288
## [4,] -1.036279 -1.526747 -3.278982
## [5,] -2.105341  0.000000 -3.390155
## [6,] -2.150621  1.526747 -1.739174
```

```
varfit=VAR(rt,p=2)
```

```
summary(varfit)
```

```
##
## VAR Estimation Results:
## =====
## Endogenous variables: MIg, ILg, NIg
## 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 = rt, p = 2)
##
##
## Estimation results for equation MIg:
## =====
## MIg = MIg.l1 + ILg.l1 + NIg.l1 + MIg.l2 + ILg.l2 + NIg.l2 + const
##
##      Estimate Std. Error t value Pr(>|t|)
## MIg.l1  0.198967   0.044522   4.469 9.81e-06 ***
## ILg.l1  0.275604   0.073512   3.749 0.000199 ***
## NIg.l1  0.130995   0.049704   2.635 0.008673 **
## MIg.l2  0.309097   0.045360   6.814 2.84e-11 ***
## ILg.l2 -0.106027   0.072016  -1.472 0.141604
## NIg.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
## 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 ILg:
## =====
## ILg = MIg.l1 + ILg.l1 + NIg.l1 + MIg.l2 + ILg.l2 + NIg.l2 + const
##
##      Estimate Std. Error t value Pr(>|t|)
## MIg.l1  0.10580    0.02743   3.856 0.000131 ***
## ILg.l1  0.52800    0.04530  11.656 < 2e-16 ***
## NIg.l1  0.10090    0.03063   3.294 0.001059 **
## MIg.l2  0.04956    0.02795   1.773 0.076841 .
## ILg.l2  0.18303    0.04438   4.125 4.37e-05 ***
## NIg.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 Nlg:
## =====
## Nlg = MIg.l1 + ILg.l1 + Nlg.l1 + MIg.l2 + ILg.l2 + Nlg.l2 + const
##
##      Estimate Std. Error t value Pr(>|t|)
## MIg.l1  0.151449   0.041706   3.631 0.000312 ***
## ILg.l1  0.273801   0.068861   3.976 8.08e-05 ***
## Nlg.l1  0.568094   0.046560  12.201 < 2e-16 ***
## MIg.l2 -0.006117   0.042490  -0.144 0.885584
## ILg.l2 -0.169976   0.067460  -2.520 0.012069 *
## Nlg.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:
##      MIg      ILg      Nlg
## MIg 3.9112 0.3116 0.7248
## ILg 0.3116 1.4851 0.4078
## Nlg 0.7248 0.4078 3.4319
##
## Correlation matrix of residuals:
##      MIg      ILg      Nlg
## MIg 1.0000 0.1293 0.1978
## ILg 0.1293 1.0000 0.1807
## Nlg 0.1978 0.1807 1.0000

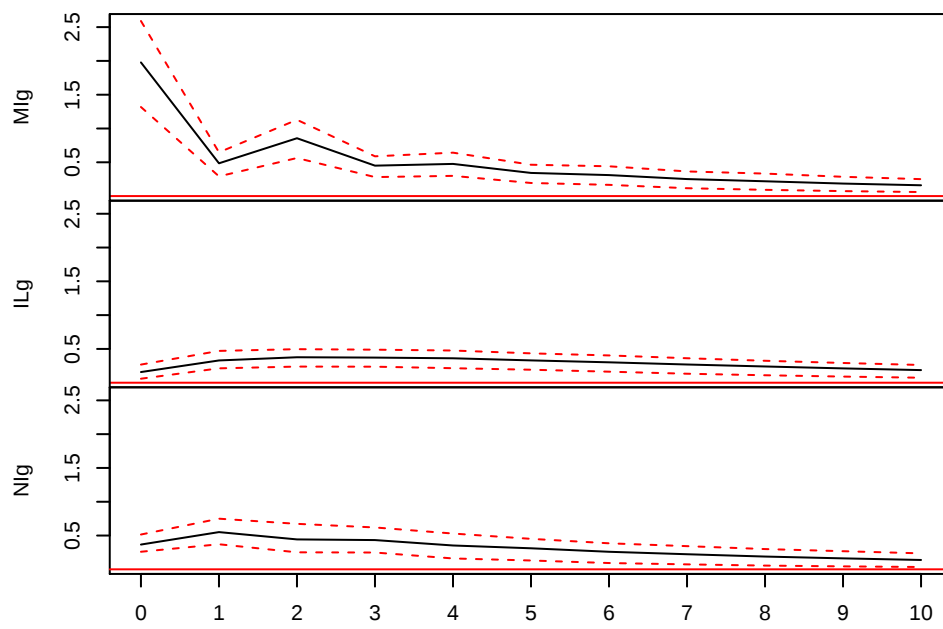
```

```

impresp=irf(varfit)
plot(impresp)

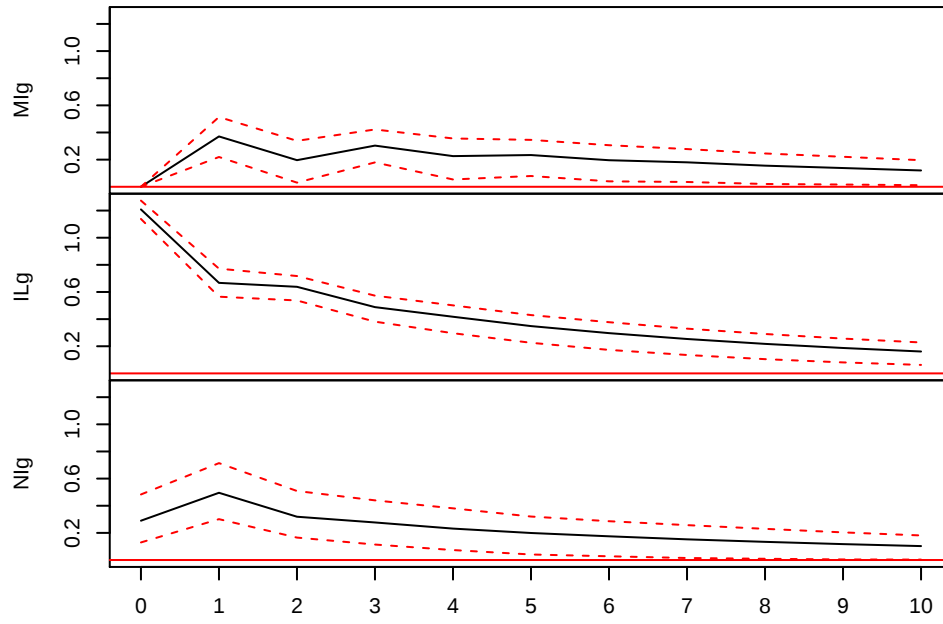
```

Orthogonal Impulse Response from Mlg



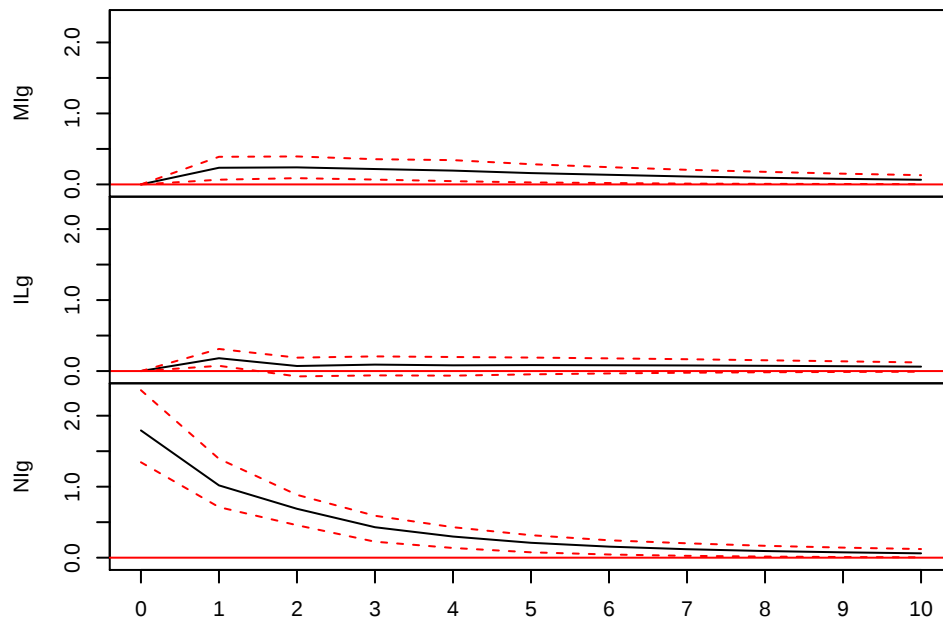
95 % Bootstrap CI, 100 runs

Orthogonal Impulse Response from ILg



95 % Bootstrap CI, 100 runs

Orthogonal Impulse Response from Nlg



95 % Bootstrap CI, 100 runs

#QUESTION 2

```
#install.packages('MTS')
require(MTS)

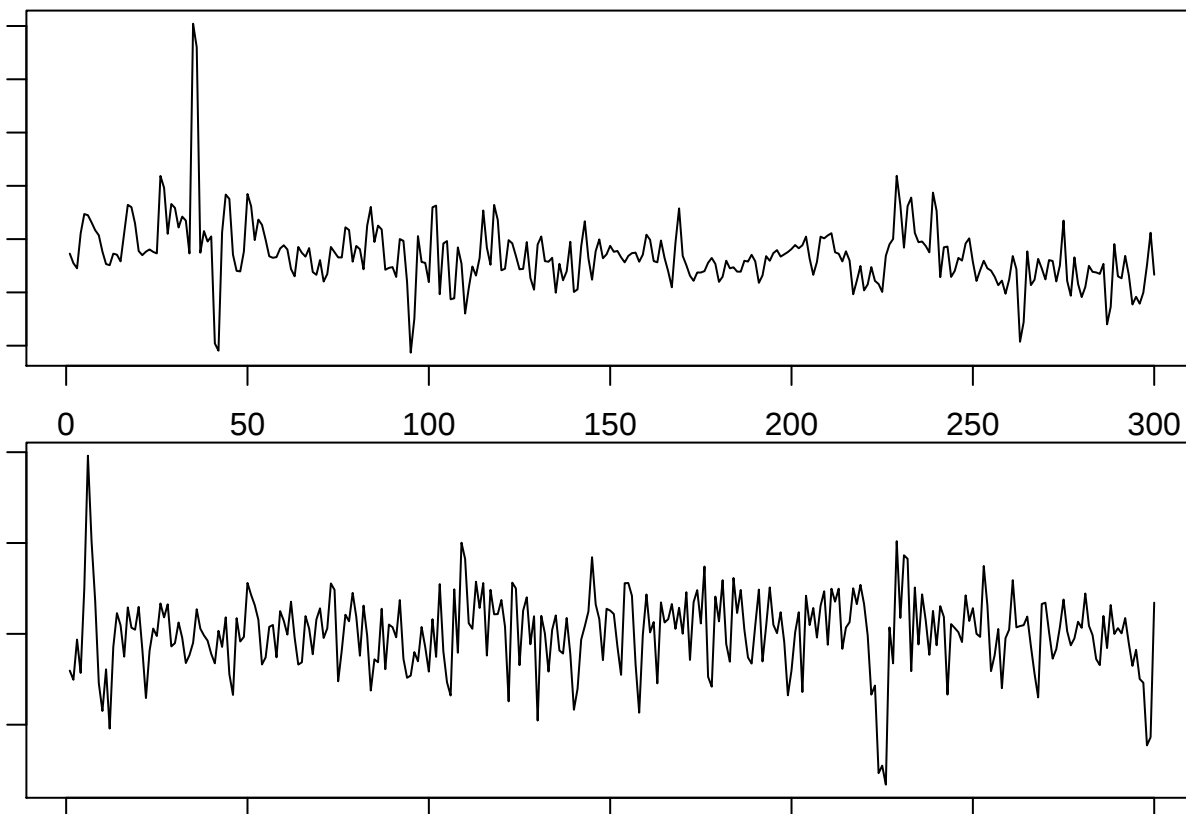
da1=read.table("m-m1cnwti.txt")
#2.1
zt1=cbind(da1$V1,da1$V2)
colnames(zt1)=c("M1","OILg")
head(zt1)
```

```
##           M1           OILg
## [1,] 1.4552500 -0.08098541
## [2,] 1.0966060 -0.10106480
## [3,] 0.9046052 -0.01255818
## [4,] 2.2153860 -0.08601287
## [5,] 2.9415170  0.09965565
## [6,] 2.8970190  0.39218860
```

```
dim(da1)
```

```
## [1] 300  2
```

```
#install.packages("MTS")
require(MTS)
MTSplot(ztl)
```



```
#2.2
VARorder(ztl)
```

```
## selected order: aic = 13
## selected order: bic = 3
## selected order: hq = 3
## Summary table:
```

##		p	AIC	BIC	HQ	M(p)	p-value
##	[1,]	0	-4.6600	-4.6600	-4.6600	0.0000	0.0000
##	[2,]	1	-4.9979	-4.9485	-4.9781	103.3453	0.0000
##	[3,]	2	-5.0163	-4.9175	-4.9768	12.6928	0.0129
##	[4,]	3	-5.1555	-5.0073	-5.0962	46.3600	0.0000
##	[5,]	4	-5.1507	-4.9532	-5.0717	6.0751	0.1936
##	[6,]	5	-5.1371	-4.8902	-5.0383	3.5990	0.4630
##	[7,]	6	-5.1348	-4.8385	-5.0162	6.6570	0.1552
##	[8,]	7	-5.1516	-4.8059	-5.0132	11.7915	0.0190
##	[9,]	8	-5.1278	-4.7327	-4.9696	0.7736	0.9420
##	[10,]	9	-5.1665	-4.7220	-4.9886	17.4902	0.0016
##	[11,]	10	-5.1692	-4.6753	-4.9715	7.7943	0.0994
##	[12,]	11	-5.1484	-4.6051	-4.9310	1.5447	0.8187
##	[13,]	12	-5.1491	-4.5565	-4.9119	7.1662	0.1274

```
## [14,] 13 -5.1824 -4.5404 -4.9255 15.5661 0.0037
```

```
m2=VAR(zt1,3)
```

```
#2.3
```

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

```
require(vars)
```

```
varfit1=VAR(zt1,p=3)
```

```
summary(varfit1)
```

```
##
```

```
## VAR Estimation Results:
```

```
## =====
```

```
## Endogenous variables: M1, OILg
```

```
## 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 = zt1, p = 3)
```

```
##
```

```
##
```

```
## Estimation results for equation M1:
```

```
## =====
```

```
## M1 = M1.l1 + OILg.l1 + M1.l2 + OILg.l2 + M1.l3 + OILg.l3 + const
```

```
##
```

```
## Estimate Std. Error t value Pr(>|t|)
```

```
## M1.l1 0.66841 0.05465 12.230 < 2e-16 ***
```

```
## OILg.l1 0.70145 0.70262 0.998 0.319
```

```
## M1.l2 -0.40451 0.06295 -6.426 5.37e-10 ***
```

```
## OILg.l2 -1.01842 0.73654 -1.383 0.168
```

```
## M1.l3 0.37999 0.05474 6.942 2.53e-11 ***
```

```
## OILg.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 OILg:
```

```
## =====
```

```
## OILg = M1.l1 + OILg.l1 + M1.l2 + OILg.l2 + M1.l3 + OILg.l3 + const
```

```
##
```

```
## Estimate Std. Error t value Pr(>|t|)
```

```
## M1.l1 0.003467 0.004573 0.758 0.449
```

```
## OILg.l1 0.296716 0.058787 5.047 7.93e-07 ***
```

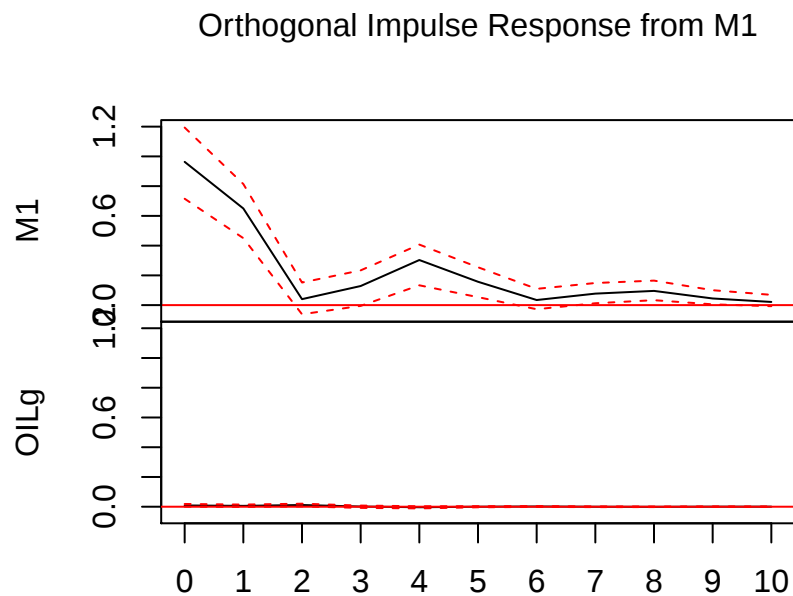
```
## M1.l2 0.007504 0.005267 1.425 0.155
```

```
## OILg.l2 0.029814 0.061626 0.484 0.629
```

```
## M1.l3 -0.007121 0.004580 -1.555 0.121
```

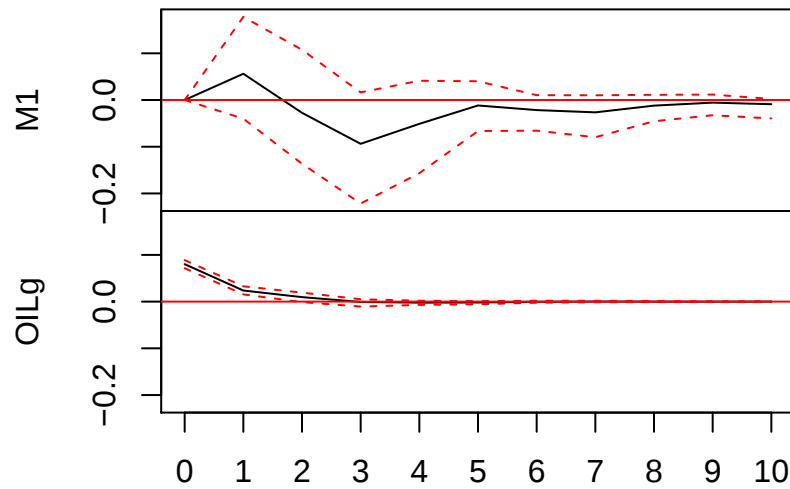
```
## OILg.l3 -0.057191  0.059854 -0.956  0.340
## const  -0.002715  0.008624 -0.315  0.753
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Residual standard error: 0.0806 on 290 degrees of freedom
## Multiple R-Squared:  0.1153, Adjusted R-squared:  0.09701
## F-statistic: 6.3 on 6 and 290 DF, p-value: 3.049e-06
##
##
## Covariance matrix of residuals:
##           M1      OILg
## M1  0.927944 0.008104
## OILg 0.008104 0.006496
##
## Correlation matrix of residuals:
##           M1      OILg
## M1  1.0000 0.1044
## OILg 0.1044 1.0000
```

```
impresp1=irf(varfit1)
plot(impresp1)
```



95 % Bootstrap CI, 100 runs

Orthogonal Impulse Response from OILg



95 % Bootstrap CI, 100 runs

```
#2.4
#VARpred(m2,6)
#2.5
fevd(varfit1,n.ahead=6)
```

```
## $M1
##           M1           OILg
## [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
##
## $OILg
##           M1           OILg
## [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
```