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6.R

mew
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```
setwd("/Users/mew/Desktop")
cat(rep("\n",50))  #clear R Console
#install.packages('vars')
require(vars)
## Loading required package: vars
## Loading required package: MASS
## Loading required package: strucchange
## 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
#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$MI,da$IL,da$IN)
X=log(x)
rt=diff(X)*100
colnames(rt) <- c('MI','IL','IN')
varfit=VAR(rt,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 = rt, p = 2)
##
##
```

$$\hat{MI}_t = \underset{(0.0445)}{0.199\,MI_{t-1}} + \underset{(0.045)}{0.31\,MI_{t-2}} + \underset{(0.0735)}{0.276\,IL_{t-1}} + \underset{(0.0497)}{0.131\,IN_{t-1}}$$

```
## 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
## Multiple R-Squared: 0.4075,  Adjusted R-squared: 0.4001
## F-statistic: 55.24 on 6 and 482 DF,  p-value: < 2.2e-16
##
##
```

$$\hat{IL}_t = \underset{(0.0274)}{0.106\,MI_{t-1}} + \underset{(0.0453)}{0.528\,IL_{t-1}} + \underset{(0.0306)}{0.1\,IN_{t-1}} + \underset{(0.044)}{0.183\,IL_{t-2}} - \underset{(0.031)}{0.085\,IN_{t-2}}$$

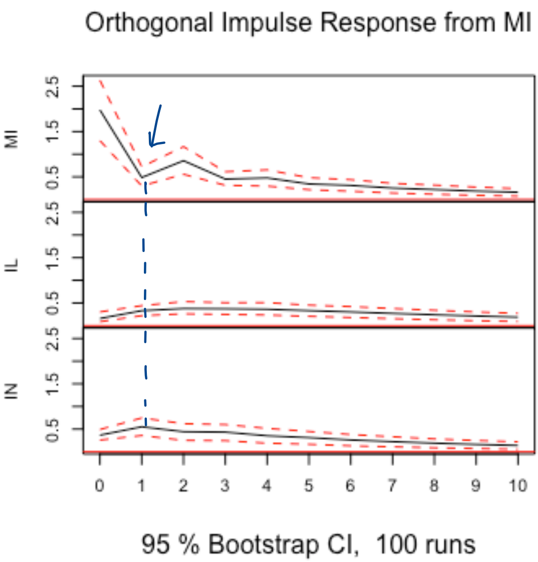
```
## Estimation results for equation IL:
## ====================================
## IL = MI.l1 + IL.l1 + IN.l1 + MI.l2 + IL.l2 + IN.l2 + const
##
##       Estimate Std. Error t value Pr(>|t|)
## MI.l1  0.10580    0.02743   3.856 0.000131 ***
## IL.l1  0.52800    0.04530  11.656  < 2e-16 ***
## IN.l1  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
##
##
```

$$\hat{IN}_t = \underset{(0.0417)}{0.15\,MI_{t-1}} + \underset{(0.069)}{0.274\,IL_{t-1}} + \underset{(0.0466)}{0.568\,IN_{t-1}} - \underset{(0.0675)}{0.17\,IL_{t-2}}$$

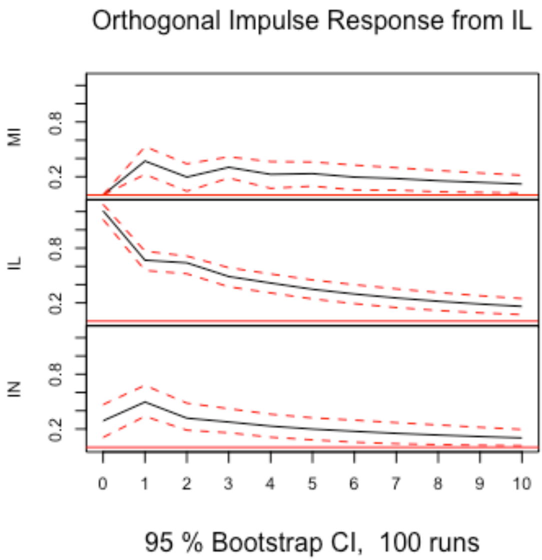
```
## Estimation results for equation IN:
## ====================================
## IN = MI.l1 + IL.l1 + IN.l1 + MI.l2 + IL.l2 + IN.l2 + const
##
##        Estimate Std. Error t value Pr(>|t|)
## MI.l1  0.151449   0.041706   3.631 0.000312 ***
## IL.l1  0.273801   0.068861   3.976 8.08e-05 ***
## IN.l1  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
## 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
impresp=irf(varfit)
plot(impresp)
```

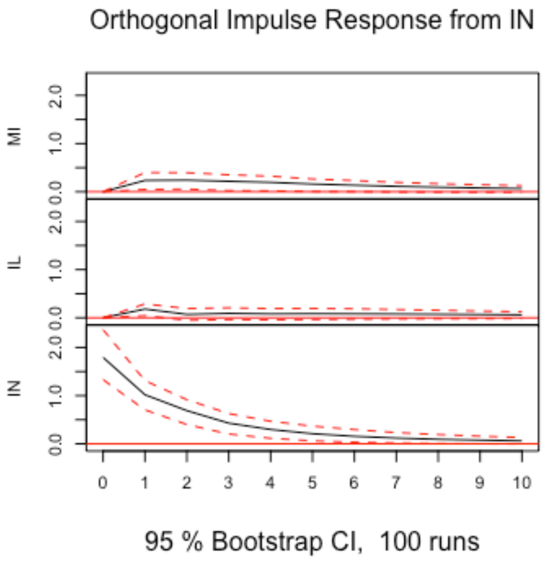
First, negative shock from MI create some positive respond to IN and IL unemployment. After 1st period, the effect will lower and convert to steady state.



For IL, it impact all for about 3 period and convert to steady state

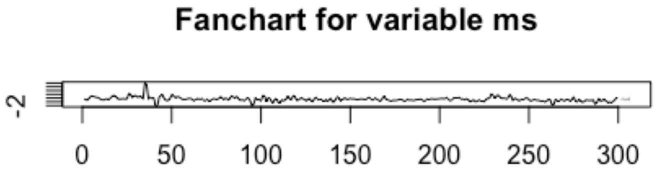


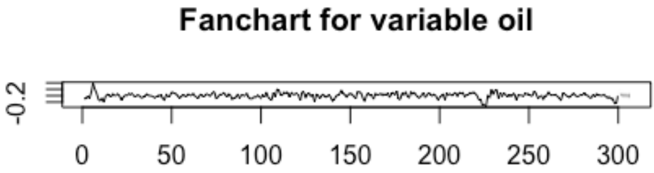
For IN, it likely to be move alone by itself and no impluse respone on others




```
#2
da2=read.table("m-m1cnwti.txt")
```

```r
zt=cbind(da2$V1,da2$V2)
colnames(zt) <- c('ms','oil')
varfit2=VAR(zt,p=3)
varfit2.prd <- predict(varfit2, n.ahead = 6, ci = 0.95)
fanchart(varfit2.prd)
```






```r
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
```

$$\hat{ms}_t = \underset{(0.103)}{0.5} + \underset{(0.055)}{0.668} ms_{t-1} - \underset{(0.063)}{0.405} ms_{t-2} + \underset{(0.055)}{0.38} ms_{t-3} + \underset{(0.7)}{0.7} oil_{t-1} - \underset{(0.74)}{1.02} oil_{t-2} - \underset{(0.715)}{0.44} oil_{t-3}$$

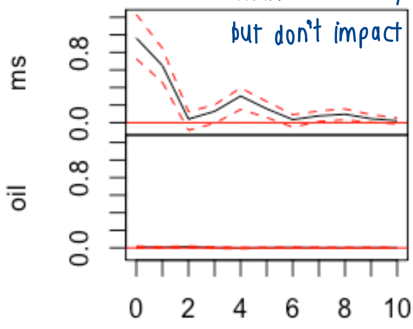
```
## ms.l2  -0.40451    0.06295  -6.426 5.37e-10 ***
## oil.l2 -1.01842    0.73654  -1.383    0.168
## ms.l3   0.37999    0.05474   6.942 2.53e-11 ***
## oil.l3 -0.43989    0.71537  -0.615    0.539
## const   0.49736    0.10308   4.825 2.26e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 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
##
##
```

$$\hat{oil}_t = \underset{(0.0086)}{-0.0027} + \underset{(0.059)}{0.30oil_{t-1}} + \underset{(0.06)}{0.030oil_{t-2}} - \underset{(0.06)}{0.057oil_{t-3}} + \underset{(0.0046)}{0.0035ms_{t-1}} + \underset{(0.005)}{0.0075ms_{t-2}} - \underset{(0.0046)}{0.007ms_{t-3}}$$

```
## 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
## 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
impresp2=irf(varfit2)
plot(impresp2)
```

Orthogonal Impulse Response from ms

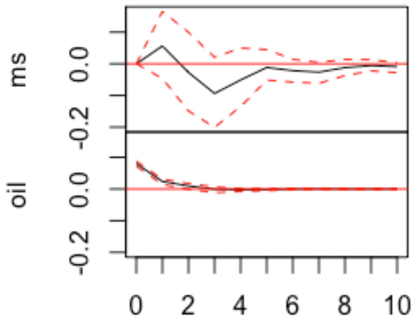
shock from money supply will impact supply growth but don't impact oil price



95 % Bootstrap CI, 100 runs

shock from oil price doesn't have clear impact on money supply but impact oil price growth for first 2 periods.

Orthogonal Impulse Response from oil



95 % Bootstrap CI, 100 runs

2.5
```
fevd(varfit2, n.head = 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
##  [7,] 0.9894121 0.010587930
##  [8,] 0.9889964 0.011003637
##  [9,] 0.9889681 0.011031888
## [10,] 0.9889622 0.011037792
##
## $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
##  [7,] 0.03445860 0.9655414
##  [8,] 0.03446099 0.9655390
##  [9,] 0.03450627 0.9654937
## [10,] 0.03452606 0.9654739
```

the money supply growth will be affected by itself 100% at current period and 0% from oil price. But after the frist period, there are shocks.

For 6 period ahead,
MS will be affect by itself 98.9% and 1.03% from oil price growth and oil price will be affect by itself 96.6% and 3.4% from money supply

24

```
predict(varfit2,6)
## $ms
##          fcst      lower    upper      CI
##  [1,] 0.8091018 -1.0789282 2.697132 1.888030
##  [2,] 1.6764551 -0.6036171 3.956527 2.280072
##  [3,] 1.4855759 -0.7964864 3.767638 2.282062
##  [4,] 1.0923405 -1.2109109 3.395592 2.303251
##  [5,] 1.2573493 -1.1234082 3.638107 2.380758
##  [6,] 1.4498503 -0.9508618 3.850562 2.400712
##  [7,] 1.3662892 -1.0357364 3.768315 2.402026
##  [8,] 1.3033927 -1.1039559 3.710741 2.407349
##  [9,] 1.3667206 -1.0480193 3.781460 2.414740
## [10,] 1.3986825 -1.0176658 3.815031 2.416348
##
## $oil
##              fcst      lower     upper       CI
##  [1,]  3.680456e-02 -0.1211647 0.1947738 0.1579692
##  [2,]  1.511540e-02 -0.1499850 0.1802158 0.1651004
##  [3,]  6.096637e-03 -0.1615940 0.1737873 0.1676906
##  [4,]  9.409539e-03 -0.1583044 0.1771235 0.1677139
##  [5,]  2.392189e-03 -0.1655178 0.1703022 0.1679100
##  [6,] -9.518535e-05 -0.1680471 0.1678567 0.1679519
##  [7,]  3.473865e-03 -0.1645145 0.1714622 0.1679883
##  [8,]  4.839982e-03 -0.1631489 0.1728288 0.1679889
##  [9,]  3.278123e-03 -0.1647147 0.1712709 0.1679928
## [10,]  2.993862e-03 -0.1650007 0.1709884 0.1679946
```