R 실습 6 : 벡터오차수정(VEC)모형

1. 모형 추정
2. 예측
3. 충격반응함수
4. 예측오차의 분산분해

1. 모형 추정

- 변수:실질GNP, 총통화(M2)
- 자료:log값
- 추정기간:1977:1 - 1993:2
- 시차=1
- 기타: 공적분회귀식(상수항 미포함), 오차수정모형(상수항 포함)

① 모형

(1단계 : 공적분회귀식) $y_t = \beta m_t + u_t$ ($\because \ z_t = y_t - \beta m_t \rightarrow z_{t-1} = y_{t-1} - \beta m_{t-1}$)

(2단계 : 벡터오차수정모형) $\Delta y_t = \mu_1 + \alpha_1 \Delta y_{t-1} + \beta_1 \Delta m_{t-1} + \pi_1 (y_{t-1} - \hat{\beta} m_{t-1}) + \epsilon_{1t}$

$$\Delta m_t = \mu_2 + \gamma_1 \Delta y_{t-1} + \delta_1 \Delta m_{t-1} + \pi_2 (y_{t-1} - \hat{\beta} m_{t-1}) + \epsilon_{2t}$$

② 추정결과(OLS equation-by-equation)

```
#############
###Model VECM
#############
Full sample size: 66    End sample size: 64
Number of variables: 2  Number of estimated slope parameters 8
AIC -742.8729   BIC -723.443    SSR 1.999499
Cointegrating vector (estimated by 2OLS):
   ly         lm
r1  1 -0.9765057
```

VEC모형 추정 결과

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.12484    0.05967   2.092   0.0407 *
L(d(ly))    -0.59590    0.11556  -5.157 2.97e-06 ***
L(d(lm))    -1.88785    1.13751  -1.660   0.1022
lect         0.02313    0.06076   0.381   0.7048
```

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 0.034926   0.005467   6.389 2.73e-08 ***
L(d(ly))    0.054013   0.010587   5.102 3.64e-06 ***
L(d(lm))    0.235849   0.104215   2.263  0.02726 *
lect        0.017072   0.005567   3.067  0.00324 **
```

```
            ECT                 Intercept          ly -1               lm -1
Equation ly 0.0231(0.0608)      0.1248(0.0597)*    -0.5959(0.1156)*** -1.8879(1.1375)
Equation lm 0.0171(0.0056)**    0.0349(0.0055)***  0.0540(0.0106)***  0.2358(0.1042)*
```

2. 예측 / 3. 충격반응함수

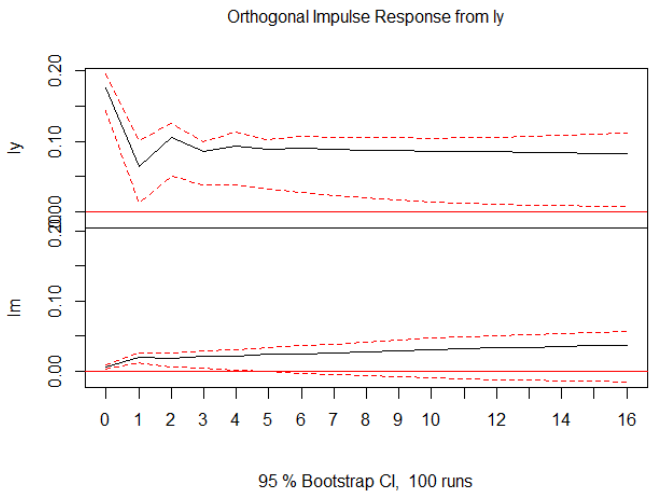
③ VEC(1)과 VAR(2) in level

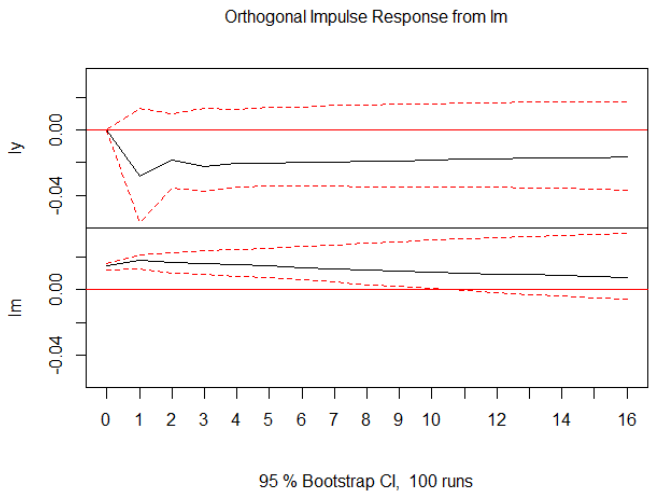
$$y_t = \mu_1 + (1+\alpha_1+\pi_1)y_{t-1} - \alpha_1 y_{t-2} + (\beta_1 - \pi_1\beta)m_{t-1} - \beta_1 m_{t-2} + v_{1t}$$
$$m_t = \mu_2 + (\gamma_1+\pi_2)y_{t-1} - \gamma_1 y_{t-2} + (1+\delta_1-\pi_2\beta)m_{t-1} - \delta_1 m_{t-2} + v_{2t}$$

④ 예측 in level

```
> predict(VECM.res, n.ahead=10)
          ly       lm
67 10.54358 11.54094
68 10.58219 11.57194
69 10.60891 11.60400
70 10.64058 11.63560
71 10.67020 11.66737
72 10.70068 11.69905
73 10.73082 11.73074
74 10.76112 11.76240
75 10.79136 11.79406
76 10.82164 11.82570
```

⑤ 충격반응함수 in level





4. 예측오차의 분산분해

⑥ 예측오차분산분해 in level

```
> fevd.ly*100
             ly       lm
 [1,] 100.00000 0.000000
 [2,]  97.74044 2.259564
 [3,]  97.54577 2.454233
 [4,]  96.99066 3.009336
 [5,]  96.77559 3.224411
 [6,]  96.56470 3.435298
 [7,]  96.43520 3.564796
 [8,]  96.33215 3.667853
 [9,]  96.25953 3.740475
[10,]  96.20503 3.794973
[11,]  96.16594 3.834062
[12,]  96.13808 3.861916
[13,]  96.11929 3.880713
[14,]  96.10758 3.892420
[15,]  96.10160 3.898402
[16,]  96.10023 3.899767
```

```
> fevd.lm*100
             ly       lm
 [1,] 14.75735 85.24265
 [2,] 44.44639 55.55361
 [3,] 48.06126 51.93874
 [4,] 52.81563 47.18437
 [5,] 56.41974 43.58026
 [6,] 59.85231 40.14769
 [7,] 62.94138 37.05862
 [8,] 65.79670 34.20330
 [9,] 68.41512 31.58488
[10,] 70.82237 29.17763
[11,] 73.03097 26.96903
[12,] 75.05636 24.94364
[13,] 76.91200 23.08800
[14,] 78.61123 21.38877
[15,] 80.16658 19.83342
[16,] 81.58998 18.41002
```

(chap10-R-1.R)

```
library(tseries)
library(vars)
library(dynlm)
library(urca)
library(tsDyn)

sample1<-("http://kanggc.iptime.org/book/data/korea(77-93).txt")
sample1_dat<-read.delim(sample1,header=T)

gnp<-ts(sample1_dat$gnp, start=c(1977,1), frequency=4)
m2<-ts(sample1_dat$m2, start=c(1977,1), frequency=4)

n<-length(gnp)

ly<-log(gnp)
lm<-log(m2)

dy=diff(ly)
dm=diff(lm)

lylm<-data.frame(ly, lm)
dydm<-data.frame(dy, dm)

VAR.res<-VAR(dydm, type="const", lag=1)
summary(VAR.res)
```

(계속)

```
lm.res<-lm(ly~lm-1)
summary(lm.res)

summary(ur.df(lm.res$resid, type="none", selectlags = c("AIC")))

ect<-resid(lm.res)
lect<-ect[1:n-1]

summary(dynlm(d(ly)~L(d(ly))+L(d(lm))+lect))
summary(dynlm(d(lm)~L(d(ly))+L(d(lm))+lect))

VECM.res<-VECM(lylm, lag=1, include=c("const"), estim="2OLS")
summary(VECM.res)

ly.irf <- irf(VECM.res, impulse="ly", response = c("ly", "lm"), n.ahead = 16, boot = TRUE)
plot(ly.irf)

lm.irf <- irf(VECM.res, impulse="lm", response = c("ly", "lm"), n.ahead = 16, boot = TRUE)
plot(lm.irf)

fevd.ly <- fevd(VECM.res, n.ahead = 16)$ly
fevd.ly*100
fevd.lm <- fevd(VECM.res, n.ahead = 16)$lm
fevd.lm*100
```