

# [Example10-4] FDL Model

Kei Sakamoto

## Finite Distributed Lag Model

```
load("~/計量経済学演習/R data sets for 5e/fertil3.RData")
fertil3<-data
```

```
library(dynlm);library(lmtest);library(car)
```

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

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

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

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

## Define Yearly time series beginning in 1913

```
tsdata <- ts(fertil3, start=1913)
#fertil3にyearのデータあるけどtsだとこの情報全く使っていないことになる。
```

## Linear regression of model with lags

```
res <- dynlm(gfr ~ pe + L(pe) + L(pe,2) + ww2 + pill, data=tsdata)
coeftest(res)
```

```
##
## t test of coefficients:
##
##      Estimate Std. Error t value Pr(>|t|)
## (Intercept) 95.8704975  3.2819571 29.2114 < 2.2e-16 ***
## pe          0.0726718  0.1255331  0.5789  0.5647
## L(pe)       -0.0057796  0.1556629 -0.0371  0.9705
## L(pe, 2)    0.0338268  0.1262574  0.2679  0.7896
## ww2        -22.1264975 10.7319716 -2.0617  0.0433 *
## pill       -31.3049888  3.9815591 -7.8625 5.634e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
zoodata<-zoo(fertil3,order.by=fertil3$year) #fertil3$ は必須。 yearだけだと参照できてない。
```

# OLS Estimate FDL Model

```
res2<-dynlm(gfr ~ pe + L(pe) + L(pe,2) + ww2 + pill, data=zoodata)
coefest(res2)
```

```
##
## t test of coefficients:
##
##      Estimate Std. Error t value Pr(>|t|)
## (Intercept) 95.8704975  3.2819571 29.2114 < 2.2e-16 ***
## pe          0.0726718  0.1255331  0.5789  0.5647
## L(pe)       -0.0057796  0.1556629 -0.0371  0.9705
## L(pe, 2)     0.0338268  0.1262574  0.2679  0.7896
## ww2        -22.1264975 10.7319716 -2.0617  0.0433 *
## pill       -31.3049888  3.9815591 -7.8625 5.634e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

tsでもzooでもどっちでもできる。

## F test. H0: all “pe” coefficients are=0

```
linearHypothesis(res, matchCoefs(res,"pe"))
```

```
## Linear hypothesis test
##
## Hypothesis:
## pe = 0
## L(pe) = 0
## L(pe, 2) = 0
##
## Model 1: restricted model
## Model 2: gfr ~ pe + L(pe) + L(pe, 2) + ww2 + pill
##
##   Res.Df  RSS Df Sum of Sq   F Pr(>F)
## 1     67 15460
## 2     64 13033  3   2427.1 3.973 0.01165 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

impact propensity とそれぞれのdynamic causal effect 全部0説は5%だとsignificant だけど1%だとギリrejectできない。

## Long Run Propensity(Cumulative Dynamic Causal Effect)=0 かどうかのtest。

restriction must be made by myself

## Calculating the LRP

```
b<-coef(res)
b["pe"]+b["L(pe)"]+b["L(pe, 2)"]
```

```
##      pe
## 0.1007191
```

## F test. $H_0: LRP=0$

```
linearHypothesis(res,"pe + L(pe) + L(pe, 2) = 0")
```

```
## Linear hypothesis test
##
## Hypothesis:
## pe + L(pe) + L(pe, 2) = 0
##
## Model 1: restricted model
## Model 2: gfr ~ pe + L(pe) + L(pe, 2) + ww2 + pill
##
##   Res.Df  RSS Df Sum of Sq   F Pr(>F)
## 1     65 15358
## 2     64 13033  1   2325.8 11.421 0.001241 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

**cumulative**なんだから**dynamic causal effect**が積み上がってるから、さっきよりは当然有意に出てくれないと困る。