

[Example10-11] Seasonality

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

Seasonality への対処は、seasonal dummy を入れればいいだけ。
簡単。

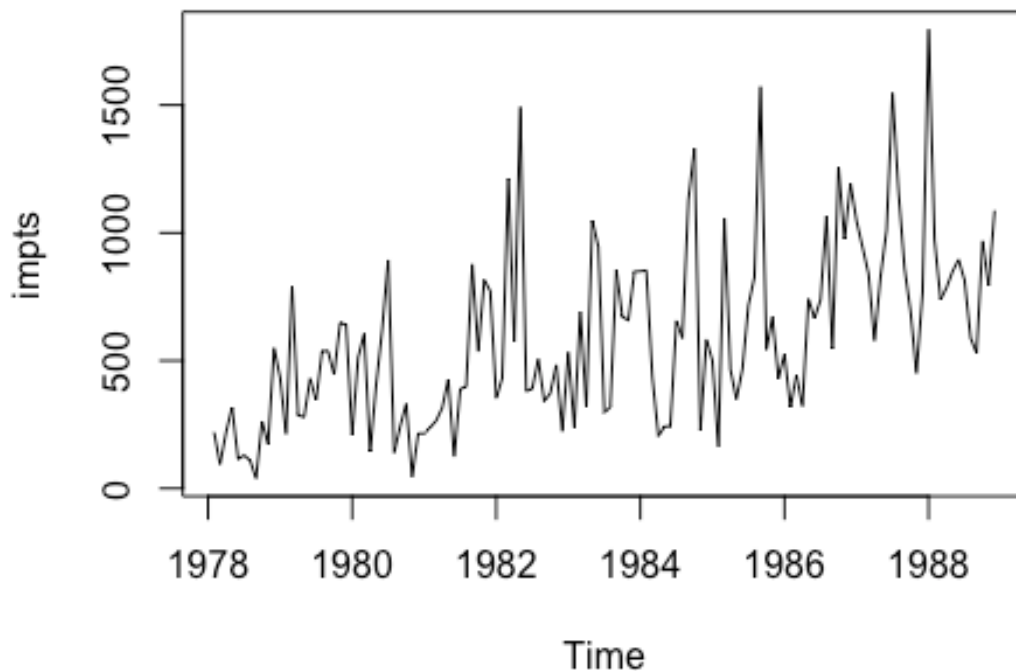
```
library(dynlm);library(lmtest)

## Loading required package: zoo

##
## Attaching package: 'zoo'

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

impts<- ts(barium$chnimp, start=c(1978,2), frequency=12)
plot(impts)
```



Define monthly time series beginning in Feb 1978

```
tsdata <- ts(barium, start=c(1978,2), frequency=12)
```

```
summary(res <- dynlm(log(chnimp) ~ log(chempi)+log(gas)+log(rtwex)+befile
6+
                                affile6+afdec6+ season(tsdata) , data=tsdata ))
```

```
##
## Time series regression with "ts" data:
## Start = 1978(2), End = 1988(12)
##
## Call:
## dynlm(formula = log(chnimp) ~ log(chempi) + log(gas) + log(rtwex) +
##       befile6 + affile6 + afdec6 + season(tsdata), data = tsdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.98535 -0.36207  0.07366  0.41786  1.37734
##
## Coefficients:
```

```
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    16.779215   32.428645    0.517   0.6059
## log(chempi)     3.265062    0.492930    6.624 1.24e-09 ***
## log(gas)        -1.278140    1.389008   -0.920   0.3594
## log(rtwex)       0.663045    0.471304    1.407   0.1622
## befile6         0.139703    0.266808    0.524   0.6016
## affile6         0.012632    0.278687    0.045   0.9639
## afdec6         -0.521300    0.301950   -1.726   0.0870 .
## season(tsddata)Feb -0.417711    0.304444   -1.372   0.1728
## season(tsddata)Mar  0.059052    0.264731    0.223   0.8239
## season(tsddata)Apr -0.451483    0.268386   -1.682   0.0953 .
## season(tsddata)May  0.033309    0.269242    0.124   0.9018
## season(tsddata)Jun -0.206332    0.269252   -0.766   0.4451
## season(tsddata)Jul  0.003837    0.278767    0.014   0.9890
## season(tsddata)Aug -0.157064    0.277993   -0.565   0.5732
## season(tsddata)Sep -0.134161    0.267656   -0.501   0.6172
## season(tsddata)Oct  0.051693    0.266851    0.194   0.8467
## season(tsddata)Nov -0.246260    0.262827   -0.937   0.3508
## season(tsddata)Dec  0.132838    0.271423    0.489   0.6255
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6012 on 113 degrees of freedom
## Multiple R-squared:  0.3583, Adjusted R-squared:  0.2618
## F-statistic: 3.712 on 17 and 113 DF,  p-value: 1.282e-05
```

default で January は抜いてある。seasonality を入れない時よりも regressor かなり増えてるのでやはり se が少し大きくなってるのが致し方なし。

ちなみに seasonality 入れないパターン

```
summary(res <- dynlm(log(chnimp) ~ log(chempi)+log(gas)+log(rtwex)+befile
6+
                        affile6+afdec6 , data=tsdata ))
```

```
##
## Time series regression with "ts" data:
## Start = 1978(2), End = 1988(12)
##
## Call:
## dynlm(formula = log(chnimp) ~ log(chempi) + log(gas) + log(rtwex) +
##       befile6 + affile6 + afdec6, data = tsdata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.03356 -0.39080  0.03048  0.40248  1.51720
##
```

```
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -17.80277   21.04537  -0.846   0.3992
## log(chempi)   3.11719    0.47920   6.505 1.72e-09 ***
## log(gas)      0.19634    0.90662   0.217   0.8289
## log(rtwex)    0.98302    0.40015   2.457   0.0154 *
## befile6       0.05957    0.26097   0.228   0.8198
## affile6      -0.03241    0.26430  -0.123   0.9026
## afdec6       -0.56524    0.28584  -1.978   0.0502 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5974 on 124 degrees of freedom
## Multiple R-squared:  0.3049, Adjusted R-squared:  0.2712
## F-statistic: 9.064 on 6 and 124 DF,  p-value: 3.255e-08
```

seasonality 入れても入れなくても log(chempi)が significant なのは変わらない。がやはり入れてない時の方がその causal effect はやや over estimate されている。