

# Dummy-Interaction and Conditioning

Kei Sakamoto

2019/10/13

```
load("~/計量経済学演習/R data sets for 5e/gpa3.RData")
gpa3<-data
```

## Model with full interaction with female dummy (only for spring data)

```
(reg<-lm(cumgpa~female*(sat+hsperc+tothrs), data=gpa3, subset=(spring==1)))
```

```
##
## Call:
## lm(formula = cumgpa ~ female * (sat + hsperc + tothrs), data = gpa3,
##   subset = (spring == 1))
##
## Coefficients:
## (Intercept)      female          sat          hsperc          tothrs
##  1.4808117   -0.3534862    0.0010516   -0.0084516    0.0023441
## female:sat female:hsperc female:tothrs
##  0.0007506   -0.0005498   -0.0001158
```

## 4 monomials and 3 cross product (total 7 terms)

## F-Test $H_0$ : all coeffs with names containing “female” ==0 説

```
library(car)
```

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

```
linearHypothesis(reg, matchCoefs(reg, "female"))
```

```
## Linear hypothesis test
##
## Hypothesis:
## female = 0
## female:sat = 0
## female:hspc = 0
## female:tothrs = 0
##
## Model 1: restricted model
## Model 2: cumgpa ~ female * (sat + hspc + tothrs)
##
##   Res.Df  RSS Df Sum of Sq   F   Pr(>F)
## 1    362 85.515
## 2    358 78.355  4   7.1606 8.1791 2.545e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

all 0は流石にないって(何かしらのregressor通して男女差はある)

## Estimate difference between gender

### Estimate model for *males*

```
lm(cumgpa~sat+hspc+tothrs, data=gpa3, subset=(spring==1&female==0))
```

```
##
## Call:
## lm(formula = cumgpa ~ sat + hspc + tothrs, data = gpa3, subset = (spring ==
##   1 & female == 0))
##
## Coefficients:
## (Intercept)      sat      hspc      tothrs
##  1.480812    0.001052   -0.008452    0.002344
```

### Estimate model for *females*

```
lm(cumgpa~sat+hspc+tothrs, data=gpa3, subset=(spring==1&female==1))
```

```
##
## Call:
## lm(formula = cumgpa ~ sat + hspc + tothrs, data = gpa3, subset = (spring ==
##   1 & female == 1))
##
## Coefficients:
## (Intercept)      sat      hspc      tothrs
##  1.127325    0.001802   -0.009001    0.002228
```

男女間でsat,hspc,tothrsの動きによる効果は違う。