Type1Tobit

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Type1 Tobit のコマンド2種類

①vglm

②censReg

```
load("~/計量経済学演習/R data sets for 5e/mroz.RData")
mroz<-data
#install.packages("VGAM")
library(VGAM)
```

```
## Loading required package: stats4
```

```
## Loading required package: splines
```

Type1Tobit model

```
Type1Tobit<-vglm(hours~nwifeinc+educ+exper+I(exper^2)+age+kidslt6+kidsge6,tobit(Lower=0),data=mroz)
summary(Type1Tobit)
```

```
##
## Call:
## vglm(formula = hours ~ nwifeinc + educ + exper + I(exper^2) +
##     age + kidslt6 + kidsge6, family = tobit(Lower = 0), data = mroz)
##
## Pearson residuals:
##                Min      1Q  Median     3Q    Max
## mu         -8.429 -0.8331 -0.1352 0.8136  3.494
## loglink(sd) -0.994 -0.5814 -0.2366 0.2150 11.893
##
## Coefficients:
##                Estimate Std. Error z value Pr(>|z|)
## (Intercept):1  965.28505  443.93450   2.174 0.029676 *
## (Intercept):2    7.02289    0.03589 195.682  < 2e-16 ***
## nwifeinc        -8.81433    4.48480  -1.965 0.049371 *
## educ            80.64715   21.56529   3.740 0.000184 ***
## exper          131.56501   17.01343   7.733 1.05e-14 ***
## I(exper^2)      -1.86417    0.52992  -3.518 0.000435 ***
## age           -54.40524    7.34462  -7.408 1.29e-13 ***
## kidslt6      -894.02622  111.46120  -8.021 1.05e-15 ***
## kidsge6       -16.21577   38.48134  -0.421 0.673468
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Names of linear predictors: mu, loglink(sd)
##
## Log-likelihood: -3819.095 on 1497 degrees of freedom
##
## Number of Fisher scoring iterations: 6
##
## No Hauck-Donner effect found in any of the estimates
```

```
library(censReg)
```

```
## Loading required package: maxLik
```

```
## Loading required package: miscTools
```

```
##
## Please cite the 'maxLik' package as:
## Henningsen, Arne and Toomet, Ott (2011). maxLik: A package for maximum likelihood estimation in R. C
omputational Statistics 26(3), 443-458. DOI 10.1007/s00180-010-0217-1.
##
## If you have questions, suggestions, or comments regarding the 'maxLik' package, please use a forum or
'tracker' at maxLik's R-Forge site:
## https://r-forge.r-project.org/projects/maxlik/
```

```
##
## Please cite the 'censReg' package as:
## Henningsen, Arne (2017). censReg: Censored Regression (Tobit) Models. R package version 0.5. http://
CRAN.R-Project.org/package=censReg.
##
## If you have questions, suggestions, or comments regarding the 'censReg' package, please use a forum o
r 'tracker' at the R-Forge site of the 'sampleSelection' project:
## https://r-forge.r-project.org/projects/sampleselection/
```

```
TobitRes <- censReg(hours~nwifeinc+educ+exper+I(exper^2)+
                        age+kidslt6+kidsge6, data=mroz )
summary(TobitRes)
```

```
##
## Call:
## censReg(formula = hours ~ nwifeinc + educ + exper + I(exper^2) +
##     age + kidslt6 + kidsge6, data = mroz)
##
## Observations:
##         Total  Left-censored     Uncensored Right-censored
##           753           325           428             0
##
## Coefficients:
##              Estimate Std. error t value  Pr(> t)
## (Intercept)  965.30528  446.43631   2.162 0.030599 *
## nwifeinc      -8.81424    4.45910  -1.977 0.048077 *
## educ          80.64561   21.58324   3.736 0.000187 ***
## exper        131.56430   17.27939   7.614 2.66e-14 ***
## I(exper^2)    -1.86416    0.53766  -3.467 0.000526 ***
## age          -54.40501    7.41850  -7.334 2.24e-13 ***
## kidslt6     -894.02174  111.87803  -7.991 1.34e-15 ***
## kidsge6      -16.21800   38.64139  -0.420 0.674701
## logSigma       7.02289    0.03706 189.514  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Newton-Raphson maximisation, 7 iterations
## Return code 1: gradient close to zero
## Log-likelihood: -3819.095 on 9 Df
```

２つの方法で全く同じ結果を得られる。

説明変数複数あるので描画は不可能だが **Monte Carlo Simuration** で説明変数１つの状況を作って描画は可能。

```
set.seed(93876553)
x<-sort(rnorm(100)+4)
xb<- -4+x
ystar<-xb+rnorm(100)
y<-ystar
y[ystar<0]=0 #bottom coding

Eystar<-xb #本当に欲しいのはこっち
Ey<-pnorm(xb/1)*xb+1*dnorm(xb/1)

plot(x,ystar,ylab="y",pch=3)
points(x,y,pch=1) #一部上書き
lines(x,Eystar,lty=2,lwd=2)
lines(x,Ey,lty=1,lwd=2)
abline(h=0,lty=3) #点のhorizontal line
legend("topleft",c(expression(y^"*"),"y",expression(E(y^"*")),"E(y)"),lty=c(NA,NA,2,1),pch=c(3,1,NA,NA),lwd=c(1,1,2,2))
```