Limited Dependent Variables

Week 20

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Limted Dependent Variable

- What is a limited dependent variable? Limited dependent variables are dependent variables that have limited ranges, usually either discontinuous or range bounded.

Censoring and Truncation

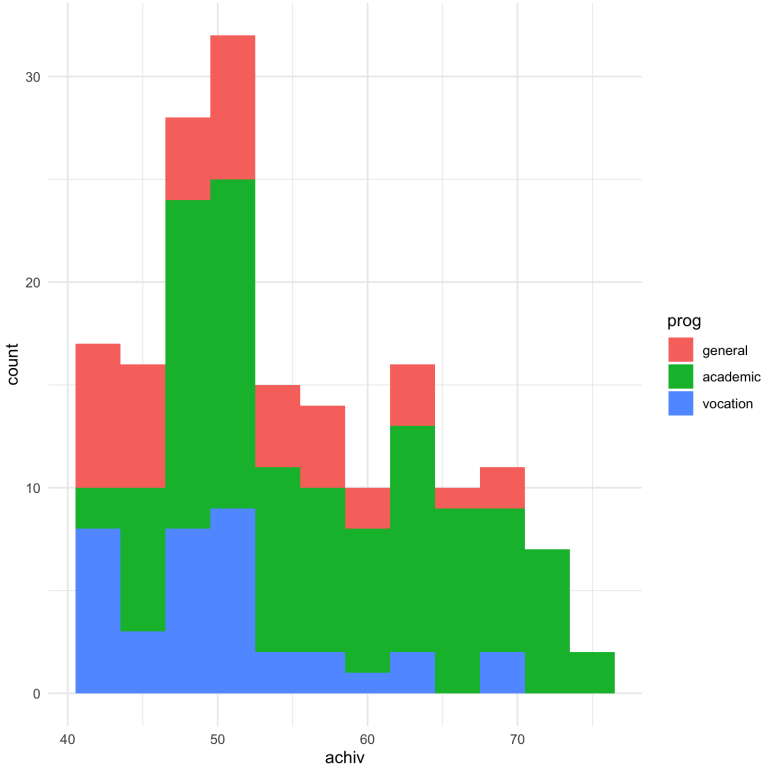
- Censoring is when the limit observations are in the sample.
- Truncation is when the observations are not in the sample.

Truncated Regression

Truncated regression addresses the bias introduced when using OLS regression with truncated data.

Truncated Regression in R

```
library(truncreg)
dat <- read.dta("https://stats.idre.ucla.edu/stat/data/truncreg.dta")
ggplot(dat, aes(achiv, fill = prog)) +
  geom_histogram(binwidth=3) +
  theme_minimal()
```



Truncated Regression in R

```
m <- truncreg(achiv ~ langscore + prog, data = dat, point = 40, directi
screenreg(m)
```

```
##
## ============================
##                  Model 1
## ----------------------------
## (Intercept)       11.30
##                   (6.77)
## langscore          0.71 ***
##                   (0.11)
## progacademic       4.06 *
##                   (2.05)
## progvocation      -1.14
##                   (2.67)
## sigma              8.75 ***
##                   (0.67)
## ----------------------------
## Num. obs.          178
## Log Likelihood  -591.31
## AIC             1192.62
## BIC             1208.53
## ============================
## *** p < 0.001; ** p < 0.01; * p < 0.05
```

Tobit Model

The tobit model, also called a censored regression model, is designed to estimate linear relationships between variables when there is either left- or right-censoring in the dependent variable (also known as censoring from below and above, respectively).

Tobit Model in R

```
library(VGAM)
acad_apt = read_csv("https://stats.idre.ucla.edu/stat/data/tobit.csv") %
  mutate(prog = factor(prog, labels = c('acad', 'general', 'vocational')
```

Tobit Model in R

```
m2 <- vglm(apt ~ read + math + prog, tobit(Upper = 800), data = acad_apt
screenreg(m2)
```

```
##
## ============================
##                  Model 1
## ----------------------------
## (Intercept):1     209.56 ***
##                   (32.55)
## (Intercept):2       4.18 ***
##                    (0.05)
## read                2.70 ***
##                    (0.62)
## math                5.91 ***
##                    (0.71)
## proggeneral       -12.71
##                   (12.41)
## progvocational    -46.14 ***
##                   (13.71)
## ----------------------------
## Log Likelihood  -1041.06
## DF                394
## Num. obs.         400
## ============================
```

Heckit Model

Heckit Model in R