IO2 PS2 Bresnahan and Reiss (1991)

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Problem 1 :

Reproduce the results for the tire dealers reported in Table 4 of the paper. Note that Bresnahan and Reiss (1991) estimate the model imposing the constraints $\alpha_n \geq 0$ and $\gamma_n \geq 0$. You should impose the same constraints.

```
1  # Reading Data
2  data = as.data.table(read.csv("ps2.csv"))
```

Reproducing Figure 2 to get to know the data

```
1  figure2 = ggplot(data, aes(x = TPOP)) +
2                 geom_histogram(breaks = seq(0,7.5, by = 0.5)) +
3                 scale_x_continuous(limits = c(0, 7.5), oob = scales::oob_squish) +
4                 xlab("Town Population (thousands)") +
5                 ylab("Number of Towns")
6  figure2
```
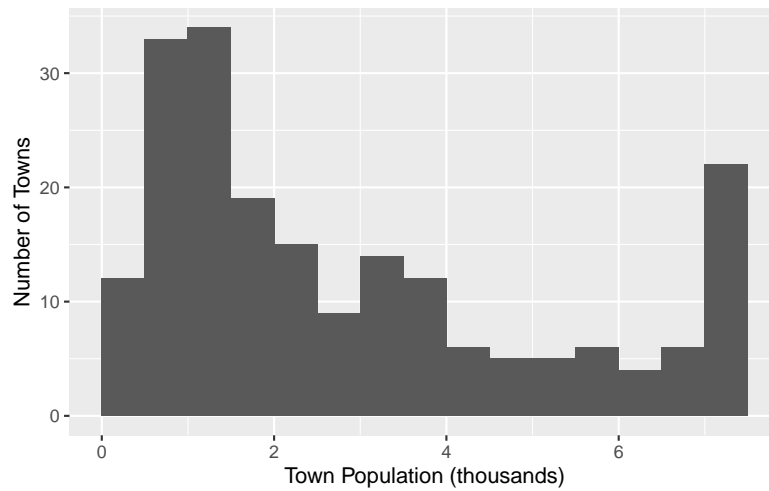
Figure 1: Number of towns by town population

Reproducing Table 3 to get to know the data

```
1  datasummary_skim(data, out = "markdown", histogram = F, title = "Replication of Table 3")
```

Table 1: Replication of Table 3

	Unique	Missing Pct.	Mean	SD	Min	Median	Max
ID	202	0	328090.8	143299.0	40013.0	320014.0	560045.0
TIRE	14	0	2.6	2.6	0.0	2.0	13.0
TPOP	195	0	3.7	5.4	0.1	2.1	45.1
NGRW	58	0	-0.1	0.1	-1.3	0.0	0.0
PGRW	119	0	0.5	1.1	0.0	0.1	7.2
OCTY	160	0	0.3	0.7	0.0	0.2	8.4
OPOP	178	0	0.4	0.7	0.0	0.1	5.8
LANDV	166	0	0.3	0.2	0.1	0.2	1.6
ELD	198	0	0.1	0.0	0.0	0.1	0.3
FFRAC	174	0	0.7	0.4	0.0	0.8	1.3
PINC	191	0	5.9	1.1	3.2	5.9	10.5
LNHDD	62	0	8.6	0.5	6.8	8.7	9.2

Main Task: Table 4

```
1  loglike = function(par, x){
2  lambda = par[1:4]
```

2

```
3   beta = par[5:8]
4   alpha = par[9:13]
5   gamma = par[14:19]
6
7   s = x$TPOP + lambda[1]*x$NRGW + lambda[2]*x$PGRW + lambda[3]*x$OCTY + lambda[4]*x$OPOP
8
9
10  }
```