

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.

Reproducing Figure 2 to get to know the data

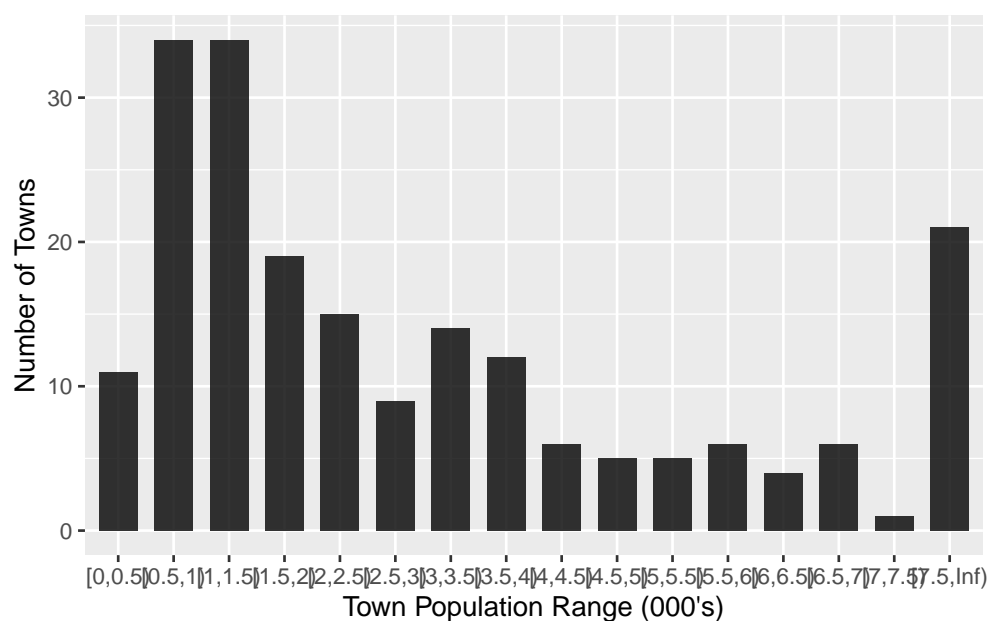


Figure 1: Number of towns by town population

Reproducing Table 3 to get to know the data

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: Replication of Table 4

I struggled a lot at first, since I could not find any errors with my loglikelihood function but the optimizer was not matching the paper's numbers. Turns out I needed to increase the maximum number of iterations because it was way too low.

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Warning in cbind(estimates_far$par, true_par, far_se, true_se): number of rows  
of result is not a multiple of vector length (arg 4)
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Table 2: MLE Parameter Estimates

Parameter	Estimate	BR1991 Estimate	SE	BR1991 SE
lambda1	-0.533987848507727	-0.53	0.418299051712935	0.43
lambda2	2.22787935181503	2.25	0.981666732237924	0.75
lambda3	0.345305767004185	0.34	0.652735251251504	0.59
lambda4	0.226770452766841	0.23	0.411591386294592	0.94
beta1	-0.485302444468921	-0.49	0.635590441960678	0.75
beta2	-0.0304466669535868	-0.03	0.0294733583342392	0.04
beta3	0.0038632357547186	0.004	0.056330388948306	0.06
beta4	-0.0201136993919561	-0.02	0.0773587214407682	0.08

Parameter	Estimate	BR1991 Estimate	SE	BR1991 SE
alpha1	0.858446790406606	0.86	0.466165327210634	0.45
alpha2	0.0343716559105718	0.03	0.116538958538671	0.15
alpha3	0.148724666282821	0.15	0.0958828076428892	0.1
alpha4	0	0	0.077588618908011	0.05
alpha5	0.0807742262273422	0.08	0.0502082594099363	0.23
gamma1	0.528747078719361	0.53	0.222664580616225	0.21
gamma2	0.755722657682977	0.76	0.187374177520827	0.21
gamma3	0.469028820071817	0.46	0.204878053938124	0.12
gamma4	0.598624250274113	0.6	0.237840022906353	0.2
gamma5	0.119649009238977	0.12	0.174718508578071	0.34
gamma_L	-0.740163620392938	-0.74	0.404667504284418	0.43
Log Likelihood	-263.091539419704	-263.158019516175		