# Econ 4130

HG Nov. 2017

## Supplement to the precipitation example in lecture note for Rice chapter 8.

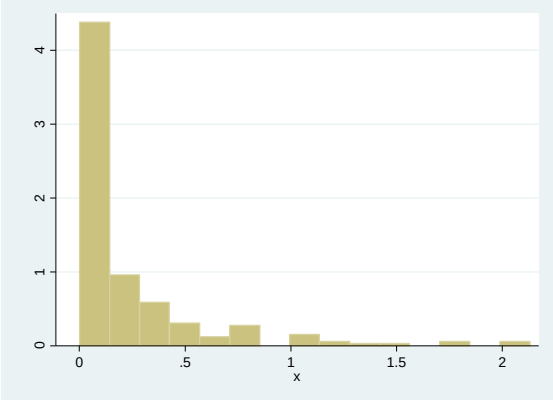
## ML-estimation in STATA for iid data.

For iid data we may use the Stata command, `mlexp`, for ml-estimation, which is a simple version of the more elaborate ml-routines in Stata.

**Illinois 1960-64**

$X_i$ = precipitation for rain storm $i$, $i = 1, 2, \ldots, n = 227$ (Rice, page 269)

(Data in `folk.uio.no/haraldg`)




Log-likelihood

$$l(\theta) = \ln L(\theta) = \sum_{i=1}^{n} l_i(\theta) = \sum_{i=1}^{n} \ln f(x_i \mid \theta) \quad \text{where}$$

$$l_i(\theta) = \alpha \ln \lambda - \ln \Gamma(\alpha) + (\alpha - 1) \ln x_i - \lambda x_i$$

The observations are in a Stata column of length $n$ = 227, called $x$.

Stata command: ("alpha" and "lambda" are my chosen names)

```
. mlexp ({alpha}*ln({lambda}) - lngamma({alpha}) - {lambda}* x + ({alpha}-1)*ln(x))

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood =  102.36745
rescale:       log likelihood =  120.86493
rescale eq:    log likelihood =  161.33438
Iteration 0:   log likelihood =  161.33438
Iteration 1:   log likelihood =  185.33931
Iteration 2:   log likelihood =  185.34772
Iteration 3:   log likelihood =  185.34772

Maximum likelihood estimation

Log likelihood =  185.34772                     Number of obs     =        227

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      /alpha |   .4407915   .0337626    13.06   0.000      .374618     .506965
     /lambda |   1.964381   .2473942     7.94   0.000     1.479497    2.449265
------------------------------------------------------------------------------
```

The postestimation command, `estat vce`, gives the asymptotic covariance matrix

```
. estat vce

Covariance matrix of coefficients of mlexp model

             | alpha      | lambda
        e(V) |      _cons |      _cons
-------------+------------+------------
alpha        |            |
       _cons |  .00113991 |
-------------+------------+------------
lambda       |            |
       _cons |  .00508001 |   .0612039
```