

O is uniformly distributed, O~U[0,T] Given 0, the observation x is also uniformly distributed x/0~ TL[0,0]

$$\frac{f_{\theta}(\theta)}{f} \xrightarrow{\dagger} \theta \qquad f_{\theta}(\theta) = \begin{cases} \frac{1}{T} & 0 < \theta < T \\ 0 & \text{otherwise} \end{cases}$$

$$\frac{f_{x|\theta}(z|\theta)}{f} \qquad (\frac{1}{A}, for)$$

$$f_{X|\theta}(x|\theta) = \begin{cases} \frac{1}{\theta}, & \text{for} \\ 0 \le x \le \theta \end{cases}$$
We may obtain joint density
$$f_{X|\theta}(x|\theta) = \begin{cases} \frac{1}{T\theta}, & \text{for} \\ 0 \le x \le \theta \end{cases}$$

$$f_{X|\theta}(x,\theta) = f_{X|\theta}(x|\theta) f_{\theta}(\theta) = \begin{cases} \frac{1}{T\theta}, & \text{for} \\ 0 \le x \le \theta \le T \end{cases}$$

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$$f_{x,\theta}(x,\theta) = f_{x|\theta}(x|\theta)f_{\theta}(\theta) =$$

$$f_{X}(x) = \int f_{X,\Theta}(x,\Theta)d\theta = \frac{1}{T} \int_{x}^{T} \frac{1}{\theta} d\theta = \frac{\ln(T) - \ln(x)}{T}$$

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for O < x < T.

$$f_{\theta|X}(\theta|X) = \frac{f_{X,\theta}(x,\theta)}{f_{X}(x)}$$

$$= \begin{cases} \frac{1}{\theta(\ln(\tau) - \ln(x))}, & 0 \le x \le \theta \le T \\ 0, & \text{otherwise} \end{cases}$$

$$\hat{\Theta} = E[\theta|X] = \int \theta f_{\theta|X})^{(8|X)} d\theta$$

$$= \int_{X}^{T} \frac{1}{u_{1}(T) - u_{1}(X)} d\theta$$

$$\hat{\theta} = \frac{T-x}{u(T)-u(x)}$$