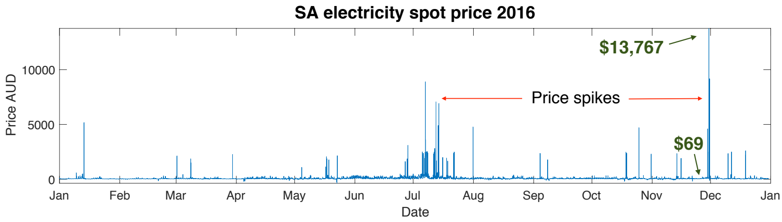
South Australia has some of the highest and most volatile prices



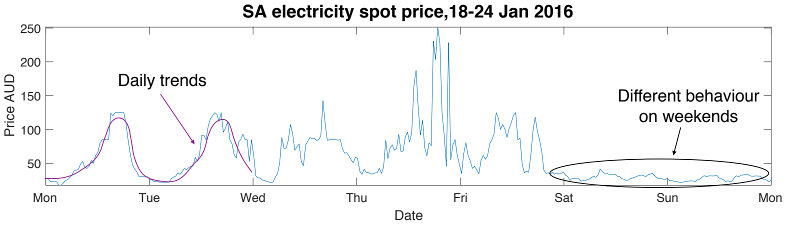
Aim: Model randomness in electricity prices - *spikes & drops.*
Why? Risk management & financial valuation

The model

$$\overbrace{P(t)}^{\text{price process}} = \overbrace{y(t)}^{\text{seasonal component}} + \overbrace{X(t)}^{\text{stochastic component}}$$

$$X(t) = \begin{cases} B(t) = a + bB(t-1) + \sigma\epsilon(t) & \text{when } R(t) = 1, \\ S(t) + q_2 \sim LN(\mu_S, \sigma_S) + q_2 & \text{when, } R(t) = 2, \end{cases}$$

$R(t)$ evolves with probabilities $p_{ij} = P(R(t) = j | R(t-1) = i)$.



Results.

$$X(t) = \begin{cases} B(t) = a + bB(t-1) + \sigma\epsilon(t) & \text{when } R(t) = 1, \\ S(t) + q_2 \sim LN(\mu_S, \sigma_S) + q_2 & \text{when, } R(t) = 2, \end{cases}$$

$$p_{ij} = P(R(t) = j | R(t-1) = i).$$

Parameter	Interpretation	Posterior mean
p_{11}	$p(\text{Base at time } t+1 \mid \text{Base at time } t)$	0.95
p_{22}	$p(\text{Spike at time } t+1 \mid \text{Spike at time } t)$	0.66
a	-	-0.60
b	$corr(X(t+1), X(t))$	0.50
σ	$var(X(t+1) \mid X(t))$	424
μ_S	-	4.5
σ_S	-	1.2

- Mean spike size = \$314.90 (above the trend)
- Spike std. dev. = \$1,363.89