

$$\ell(\beta) = \prod_{i=1}^N \left[\frac{e^{\beta' x_i}}{1 + e^{\beta' x_i}} \right]^{\mathbb{1}(y_i)} \left[\frac{1}{1 + e^{\beta' x_i}} \right]^{1 - \mathbb{1}(y_i)}$$