

Quantile Regressions: A Refresher

- **OLS Regression:** min sum of squared residuals

$$\beta^{OLS} = \arg \min_{\beta} \sum_t (y_t - \alpha - \beta x_t)^2$$

- *Predicted value:* $E[y | x] = \alpha + \beta x$

- **Quantile Regression:** min weighted absolute values

$$\beta^q = \arg \min_{\beta} \sum_t \begin{cases} q |y_t - \alpha - \beta x_t| & \text{if } y_t - \alpha - \beta x_t \geq 0 \\ 1 - q |y_t - \alpha - \beta x_t| & \text{if } y_t - \alpha - \beta x_t < 0 \end{cases}$$

- *Predicted value:* $VaR_q | x = F_y^{-1}(q | x) = \alpha_q + \beta_q x$

Note out (non-traditional) sign convention!