Yen-Chun Chen chenyenc@oregonstate.edu

$$F_{\text{or}} \quad \mathcal{Y} = \beta_o + \beta_i \mathcal{X} \rightarrow \hat{\beta}_i = \frac{S_{xy} - n\bar{\chi}\bar{y}}{S_{xx} - n\bar{\chi}^2} \quad , \hat{\beta}_o = \bar{y} - \hat{\beta}_i \bar{\chi}$$

(a) If 
$$\overline{\chi} = 0$$
.

If 
$$\overline{X} = 0$$
,
$$\hat{\beta}_{1} = \frac{Sxy - 0}{Sxx - 0} = \frac{Sxy}{Sxx}$$

$$\hat{\beta}_{0} = \overline{y} - \hat{\beta}_{1} \cdot 0 = \overline{y}$$

$$\beta_1 = \frac{S_{XX}}{S_{XX}} = \frac{S_{XX}}{S_{XX}} + \beta_0 = \beta_1 - \beta_1 - 0 = \overline{\beta} + \overline{\beta}$$

$$(b) \quad \overline{\chi} = \sqrt{\frac{2}{x_i}} \chi_{\lambda} = 0 \quad \Rightarrow \quad \frac{n}{\lambda_i} \chi_{\lambda} = 0$$

$$\rightarrow \frac{\chi_{(-j)}}{\chi_{(-j)}} = \frac{1}{N-1} \left[ \left( \sum_{i=1}^{n} \chi_{i} \right) - \chi_{j} \right] = \frac{-\chi_{j}}{N-1}$$

$$\overline{y} = \frac{1}{N} \underbrace{\sum_{i=1}^{N} y_i}_{i} = N \underbrace{y}_{i}$$

$$\overline{y} = \frac{1}{n} \sum_{i=1}^{n} y_i = n \overline{y}$$

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$$y = n \underset{x_{i-1}}{\underbrace{\downarrow}} x_{i} \rightarrow \underset{x_{i-1}}{\underbrace{\downarrow}} y_{i} = n y$$

$$y(-i) = \frac{1}{n-1} \left[ \left( \underset{x_{i-1}}{\underbrace{\uparrow}} y_{i} \right) - y_{i} \right] = \frac{n \cdot \overline{y} - y_{i}}{n-1} \xrightarrow{\text{th}}$$

$$\frac{C}{\beta_{i}} = \frac{S_{xy} - n \overline{x} \overline{y}}{S_{xx} - n \overline{x}^{2}}, \quad \widehat{\beta}_{o} = \overline{y} - \widehat{\beta}_{i} \overline{x}$$

$$\frac{\widehat{\Sigma}}{\widehat{\Sigma}_{i}} = \frac{\widehat{\Sigma}_{xy} - n \overline{x}^{2}}{\widehat{\Sigma}_{xx} - n \overline{x}^{2}}, \quad \widehat{\beta}_{o} = \overline{y} - \widehat{\beta}_{i} \overline{x}$$

$$\begin{aligned} \frac{1}{|x|} & = \frac{-x_j}{|x|} \\ -x_j & = \frac{-x_j}{|x|} \end{aligned}$$

$$y_i = n \overline{y}$$

$$\frac{\hat{\beta}^{(i)} - N_{-1} (\chi_{i}) \Delta \lambda}{\hat{\beta}_{i}} = \frac{\hat{\beta}_{xy} - N \bar{\chi} \bar{y}}{\hat{\beta}_{xx} - N \bar{\chi}^{2}}, \hat{\beta}_{o} = \bar{y} - \hat{\beta}_{i} \bar{x}$$

$$\frac{\hat{\beta}^{(i-j)} - \frac{\sum_{i \neq j} \chi_{i} y_{i} - (N_{-1})}{\sum_{i \neq j} \chi_{i}^{2} - (N_{-1})} \frac{\bar{\chi}^{(ij)}}{\bar{\chi}^{(ij)}^{2}} + \hat{\beta}_{o}^{(ij)} = \frac{\bar{y}^{(ij)} - \hat{\beta}_{i}^{(ij)}}{\bar{\chi}^{(ij)}} \frac{\bar{\chi}^{(ij)}}{\bar{\chi}^{(ij)}} + \hat{\beta}_{i}^{(ij)} \frac{\chi_{j}}{\bar{\chi}^{(ij)}} + \hat{\beta}_{i}^{(ij)}$$

$$\hat{\beta}^{(i)} = \frac{\sum_{i=1}^{n} \chi_{i} y_{i} - (n-i)}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i} - (n-i)} \frac{\chi^{(i)}}{\chi^{(i)}} \frac{y_{(i)}}{y_{(i)}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} - (n-i)}{\sum_{i=1}^{n} \chi_{i}^{2} - (n-i)} \frac{\chi^{(i)}}{\chi^{(i)}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + (y_{i}) \cdot \frac{(+\chi_{i}) \cdot (n\bar{y}-y_{i})}{(p_{i}-1)(n-1)}}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + (y_{i}) \cdot \frac{(+\chi_{i}) \cdot (n\bar{y}-y_{i})}{(p_{i}-1)(n-1)}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + y_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} - \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} - \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} y_{i}^{2} - \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2}} 
= \frac{\sum_{i=1}^{n} \chi_{i}^{2} \chi_{i}^{2} - \chi_{i}^{2} y_{i}^{2} + \chi_{i}^{2} y_{i}^{2} - \chi_{i}^{2} y_{i}^{2}}{\sum_{i=1}^{n} \chi_{i}^{2} -$$

$$(\mathcal{C})$$

$$\frac{y_{j} - \hat{y}_{j}}{y_{j}} = y_{j} - \hat{\beta}_{o}^{(ij)} - \hat{\beta}_{f}^{(ij)} \cdot \chi_{j}} = \frac{n(y_{j} - \bar{y})}{n - 1} - \frac{1}{n - 1} \hat{\beta}_{f}^{(ij)} \cdot \chi_{j}}$$

$$\frac{y_{j} - y_{j}}{y_{j}} = y_{j} - y_$$

$$= \frac{n(3j-\overline{3})}{n-1} - \frac{1}{n-1} \widehat{\beta}_{i}^{(-j)} \chi_{j} - \widehat{\beta}_{i}^{(-j)} \chi_{\bar{j}}$$

$$n(3j-\overline{3}) \qquad n(3j-\overline{3}) \sim n$$

$$= \frac{n(3j-\overline{3})}{n-1} - \frac{1}{n-1} \widehat{\beta}_{i}^{(-j)}$$

$$= \frac{n(3j-\overline{3})}{n-1} - \frac{n}{n-1} \widehat{\beta}_{i}^{(-j)}$$

$$= \frac{n(\mathcal{J}_{j} - \overline{\mathcal{Y}})}{n-1} - \frac{n}{n-1} \widehat{\beta}^{(-j)} \chi_{\hat{j}} = \frac{n}{n-1} \left( \mathcal{Y}_{j} - \widehat{\mathcal{Y}} - \widehat{\beta}^{(-j)} \chi_{\hat{j}} \right)$$

$$= \frac{\eta}{n-1} \left( y_{j} - \overline{y} - \frac{(n-1) S_{xy} - n x_{j} (y_{j})}{(n-1) S_{xx} - n x_{j}^{2}} \right)$$

$$=\frac{\eta}{n-1}\left(y_j-\overline{y}-\frac{(n-1)}{(n-1)}\frac{S_{xy}-n\chi_j(y_j-\overline{y})}{(n-1)}\chi_j\right)$$

$$\frac{(n-1) S_{xx} - n \chi_{j}^{2}}{(1) S_{xx} - n^{2} \chi_{j}^{2}} - n \cdot (n-1)$$

$$= \frac{(y_j - \overline{y}) \left( n \cdot (n-1) S_{xx} - n^2 X_j^2 \right) - n \cdot \left( (n-1) S_{xy} - n X_j \left( y_j - \overline{y} \right) \right) X_j}{\left( y_j - \overline{y} \right) \left( y_j - \overline{y} \right) \left( y_j - \overline{y} \right) \right) X_j}$$

$$\frac{(N-1) \left[ (n-1) \left[ x_{X} - n_{X_{i}}^{2} \right] - N_{i} \left[ x_{X} - n_{X_{i}}^{2} \right] \right]}{(n-1) \left[ x_{X} - n_{X_{i}}^{2} \right]}$$

Given that 
$$|-h_j| = \frac{(n-1)S_{xx} - nX_j^2}{n_1 S_{xx}} \implies (n-1)S_{xx} - nX_j^2 = (1-h_j) N \cdot S_{xx}$$

$$\frac{(y_{i}-\overline{y})[\gamma_{i}(n_{-1}) S_{xx} - \gamma_{i}^{b} \chi_{i}^{z}] - \gamma_{i} [(n_{+1}) S_{xy} - \gamma_{i} \chi_{i} (y_{i}-\overline{y})]\chi_{i}}{(y_{i}-\overline{y})[\gamma_{i}(n_{-1}) S_{xy} - \gamma_{i} \chi_{i} (y_{i}-\overline{y})]\chi_{i}}$$

$$\Rightarrow \frac{\left(y_{j}-\overline{y}\right)(n-1)S_{xx}}{(n-1)S_{xx}\left(1-h_{i}\right)} - \frac{\left(y_{j}-\overline{y}\right)N\cdot\chi_{j}^{2}}{(n-1)S_{xx}\left(1-h_{i}\right)} - \frac{(n-1)S_{xx}\chi_{j}}{(n-1)S_{xx}\left(1-h_{i}\right)} + \frac{\left(y_{j}-\overline{y}\right)\chi_{j}^{2}}{(n-1)S_{xx}\left(1-h_{i}\right)}$$

$$\Rightarrow \frac{\left( y_{1} - \overline{y} \right) (y_{1} - y_{2}) \cdot y_{1}}{\left( y_{1} - \overline{y} \right) \cdot y_{2}} - \frac{\left( y_{1} - \overline{y} \right) \cdot y_{2}}{\left( y_{1} - y_{2} \right)} - \frac{\left( y_{1} - \overline{y} \right) \cdot y_{2}}{\left( y_{1} - y_{2} \right)} - \frac{\left( y_{1} - y_{2} \right) \cdot y_{2}}{\left( y_{1} - y_{2} \right)} + \frac{\left( y_{2} - \overline{y} \right) \cdot y_{2}}{\left( y_{1} - y_{2} \right)} + \frac{\left( y_{2} - \overline{y} \right) \cdot y_{2}}{\left( y_{1} - y_{2} \right)}$$

$$\frac{-\beta_{i}X_{j}}{1-h_{j}} = \frac{\beta_{i}X_{j} \cdot n \cdot S_{XX}}{(h-1)S_{XX} - n \cdot X_{j}^{2}}$$

$$= \frac{n \cdot S_{XX} \cdot \chi_{j}^{2}}{(n-1) \cdot S_{XX} - n \cdot \chi_{j}^{2}} \cdot \frac{(n-1) \cdot S_{XX} - n \cdot \chi_{j}^{2}}{(n-1) \cdot S_{XX} - n \cdot \chi_{j}^{2}}$$

$$= \frac{n(n-1) S_{XX} S_{XY} \cdot \chi_j - n^2 S_{XX} \cdot \chi_j^2 (y_j - \overline{y})}{\left((h-1) S_{XX} - n \chi_j^2\right)^2}$$