x_i = change in FED interest rate
y_i = change in inflation
w_i = weight

$y = bx_i + c$

$$~~\text{Total}~~ \text{cost} = \sum_{i=1}^{n} w_i (y_i - (y))^2$$

$$~~\text{Total}~~ \text{cost} = \sum_{i=1}^{n} w_i (y_i - (bx+c))^2$$

* Goal is to find values of b and c that minimize the Total Cost the most. Do this by setting partial derivatives with respect to b and c and set to zero.

* -2 cancels out

$$\frac{\partial \text{cost}}{\partial c} = \sum_{i=1}^{n} -2w_i (y_i - bx_i - c) = 0$$

$$\frac{\partial \text{cost}}{\partial c} = \sum_{i=1}^{n} w_i y_i - b \sum_{i=1}^{n} w_i x_i - c \sum_{i=1}^{n} w_i = 0$$

$$= \boxed{c \sum_{i=1}^{n} w_i + b \sum_{i=1}^{n} w_i x_i = \sum_{i=1}^{n} w_i y_i} \quad (1)$$

$$\frac{\partial \text{cost}}{\partial b} = \sum_{i=1}^{n} -2w_i x_i (y_i - bx_i - c) = 0$$

$$= \sum_{i=1}^{n} w_i x_i y_i - b \sum_{i=1}^{n} w_i x_i^2 - c \sum_{i=1}^{n} w_i x_i = 0$$

$$\boxed{= b \sum_{i=1}^{n} w_i x_i^2 + c \sum_{i=1}^{n} w_i x_i = \sum_{i=1}^{n} w_i x_i y_i} \quad (2)$$

* Simplifying some terms

$W = \sum_{i=1}^{n} w_i$, $S_x = \sum_{i=1}^{n} w_i x_i$, $S_y = \sum_{i=1}^{n} w_i y_i$,

$S_{xx} = \sum_{i=1}^{n} w_i x_i^2$, $S_{xy} = \sum_{i=1}^{n} w_i x_i y_i$

(1) $cW = S_y - bS_x$

(2) $bS_{xx} + cS_x = S_{xy}$

* Solve for c in (1) and plug into (2) for b.

(1) $cW = S_y - bS_x$

$$\boxed{c = \frac{S_y - bS_x}{W}}$$

(2) $b S_{xx} + c S_x = S_{xy}$

$$b S_{xx} + S_x\left(\frac{S_y - b S_x}{W}\right) = S_{xy}$$

$$b S_{xx} + \frac{S_x S_y}{W} - b\,\frac{S_x^2}{W} = S_{xy}$$

$$b\left(S_{xx} - \frac{S_x^2}{W}\right) + \frac{S_x S_y}{W} = S_{xy}$$

$$b\left(S_{xx} - \frac{S_x^2}{W}\right) = S_{xy} - \frac{S_x S_y}{W}$$

$$\boxed{b = \frac{S_{xy} - \frac{S_x S_y}{W}}{S_{xx} - \frac{S_x^2}{W}}}$$