Profits = dividends d

$$d = pf(x) - wx = pf(x) - \underbrace{wx_0}_{\text{fixed costs}} - \underbrace{wc}_{\text{fixed cost}} - w(x-c)$$

Profits / dividends with optimal $\dot{x}$

$$d = pf(\dot{x}) - w\dot{x} = pf(\dot{x}) - wc - \underbrace{w(\dot{x}-c)}_{= \sum \alpha_i pf(\dot{x})}$$

$$d + wc = pf(\dot{x}) - \sum \alpha_i pf(\dot{x})$$

$$d + wc = \underbrace{(1 - \sum \alpha_i)}_{\text{profit share}} f(\dot{x})$$

fixed cost adjustment, constant

$$d(x_1) = p\underbrace{f(x_1)}_{= A\prod_{i=1}^{k}\left(\frac{\alpha_i \omega_1}{\alpha_1 \omega_i}(x_1 - c_1)\right)^{\alpha_i}} - wc - \omega_1 \frac{\sum \alpha_i}{\alpha_1}(x_1 - c_1)$$

$$= A(x_1 - c_1)^{\sum \alpha_i} \left(\frac{\omega_1}{\alpha_1}\right)^{\sum \alpha_i} \prod \left(\frac{\alpha_i}{\omega_i}\right)^{\alpha_i}$$

$$\frac{\partial d(x_1)}{\partial x_1} = pA \sum \alpha_i (x_1 - c_1)^{\sum \alpha_i - 1} \left(\ \right)^{\cdots} \prod \left(\ \right)^{\cdots} - \omega_1 \frac{\sum \alpha_i}{\alpha_1} = 0$$

$$pA(x_1 - c_1)^{\sum \alpha_i - 1} \left(\prod \left(\frac{\alpha_i}{\omega_i}\right)^{\alpha_i}\right) = \left(\frac{\omega_1}{\alpha_1}\right)^{1 - \sum \alpha_i}$$

$$\Rightarrow \left(\frac{\omega_1}{\alpha_1}(x_1 - c_1)\right)^{\sum \alpha_i - 1} = \underbrace{\frac{1}{p \cdot A} \prod \omega_i^{\alpha_i} \prod \left(\frac{1}{\alpha_i}\right)^{\alpha_i}}_{\text{getCBHelperProduct}^{-1}}$$