Now for a CES

$$Q = A\left[\delta K^{-\rho} + (1-\delta)L^{-\rho}\right]^{-1/\rho}$$

(1) linearly homogeneous
(2) ρ is the substitution parameter
(3) δ is the distribution parameter
Marginal products

$$\begin{aligned}
\frac{dQ}{dL} &= -1/\rho A\left[\delta K^{-\rho} + (1-\delta)L^{-\rho}\right]^{-1/\rho-1}\left[-\rho(1-\delta)L^{-\rho-1}\right] \\
&= \frac{Q\rho(1-\delta)L^{-\rho-1}}{\rho\left[\delta K + (1-\delta)L^{-\rho}\right]} \\
&= \frac{Q(1-\delta)L^{-\rho-1}}{(Q/A)^{-\rho}} \\
&= \frac{(1-\delta)\left(Q/L\right)^{\rho+1}}{A^{\rho}}
\end{aligned}$$

Now set this equal to the real wage:

$$\frac{w}{p} = \frac{(1-\delta)\left(Q/L\right)^{\rho+1}}{A^{\rho}}$$

what does this mean in terms of shares:

$$\begin{aligned}
\frac{wL}{pQ} &= \frac{L(1-\delta)\left(Q/L\right)^{\rho+1}}{QA^{\rho}} \\
&= \frac{L(1-\delta)\left(Q\right)^{\rho+1}}{QA^{\rho}L^{-(\rho+1)}} = \frac{(1-\delta)\left(Q/L\right)^{\rho}}{A^{\rho}}
\end{aligned}$$

$$\begin{aligned}
\frac{rK}{pQ} &= \frac{\delta K\left(Q/K\right)^{\rho+1}}{QA^{\rho}} \\
&= \frac{\delta\left(Q/K\right)^{\rho}}{A^{\rho}}
\end{aligned}$$

Share add up to one?

$$\frac{wL}{pQ} + \frac{rK}{pQ} = \frac{(1-\delta)\left(Q/L\right)^{\rho}}{A^{\rho}} + \frac{\delta\left(Q/K\right)^{\rho}}{A^{\rho}} = \frac{(1-\delta)\left(Q/L\right)^{\rho} + \delta\left(Q/K\right)^{\rho}}{A^{\rho}}$$

$$Q = A\left[\delta K^{-\rho} + (1-\delta)L^{-\rho}\right]^{-1/\rho}$$

$$Q^{\rho}\left[\delta K^{-\rho} + (1-\delta)L^{-\rho}\right] = A$$

$$Q = A\left[\delta K^{-\rho} + (1-\delta)L^{-\rho}\right]^{-1/\rho}$$

When $\rho = 1$ we should have a CD

$$Q = \left[\delta K^{-1} + (1-\delta)L^{-1}\right]^{-1}$$

n

$$Q = \frac{1}{\delta K^{-1} + (1-\delta)L^{-1}}$$

$$Q = \frac{KL}{\delta L + (1-\delta)K}$$