$$\pi = \left(\frac{p}{p_0}\right)^{R/c_p} \qquad \theta = T\left(\frac{p_0}{p}\right)^{R/c_p}$$

$$\frac{1}{\theta} = \frac{1}{T}\left(\frac{p}{p_0}\right)^{R/c_p}$$

$$-c_p\theta\frac{\partial \pi}{\partial x} = -c_p \underbrace{T\left(\frac{p_0}{p}\right)^{R/c_p}}_{\theta} \underbrace{\frac{R}{c_p}\left(\frac{1}{p_0}\right)^{R/c_p} p^{R/c_p - 1}\frac{\partial p}{\partial x}}_{\frac{\partial \pi}{\partial x}}$$

$$\frac{RT}{c_p p \theta}$$

$$p = \rho R T$$

$$= -\frac{1}{\rho}\frac{\partial p}{\partial x}$$