

5.1 Basic Set-up

$$\max_{L,S,K} \quad f(L,S,K) - wL - pS - rK$$

$$f_L = w \qquad f_S = p \qquad f_K = r$$

$$T=pS$$

$$S^*=S$$

$$\begin{aligned} f(L,S,K) &= f_LL + f_SS + f_KK \\ wL + pS &= f(L,S,K) - f_KK \end{aligned}$$

$$Y \equiv wL + T + r\bar{K}$$

$$\begin{aligned} Y &= wL + pS + r\bar{K} \\ Y &= f(L,S,K) - f_KK + r\bar{K} \\ Y &= f(L,S,K) + r(\bar{K} - K) \end{aligned}$$

$$\begin{aligned} \max_S \quad & U(Y,S^*) \\ \max_S \quad & U\left(f(L,S,K) + r(\bar{K} - K), S\right) \end{aligned}$$

$$\begin{aligned} \frac{\partial U}{\partial S} &= U_Y \left(f_S + f_K \frac{\partial K}{\partial S} - r \frac{\partial \bar{K}}{\partial S} \right) + U_{S^*} \stackrel{!}{=} 0 \\ U_Y \cdot f_S &= -U_{S^*} \end{aligned}$$

$$f_S = -\frac{U_{S^*}}{U_Y}$$