Appendix D: Derivations of (A34)

Derivations of (A34). Applying $\tilde{\lambda}^{-1/\kappa}\phi = 0$, $\phi = 0$, or $g = 0$ to (A33a)–(A33e) yields

$$\frac{\tilde{\lambda}(\rho+g)'}{(\rho+g)} = \frac{\tilde{\lambda}}{\rho+g}\frac{1-\theta}{\theta}\left(\ln\tilde{\lambda}+\kappa\right)\left(\tilde{\lambda}^{-1/\kappa}\phi\right)', \tag{D1}$$

$$\left(\tilde{\lambda}^{-1/\kappa}\phi\right)' = \frac{\rho}{\theta\tilde{\lambda}}\frac{1-(1-\theta)\tilde{\lambda}}{\tilde{\lambda}-1}, \tag{D2}$$

$$\left(\frac{\tilde{\lambda}-1/\left(1+\kappa\right)}{\tilde{\lambda}-1}\right)' = -\frac{\kappa}{1+\kappa}\frac{1}{(\tilde{\lambda}-1)^2}, \tag{D3}$$

and

$$\phi' = \left(\tilde{\lambda}^{1/\kappa}\right)\left(\tilde{\lambda}^{-1/\kappa}\phi\right)', \tag{D4}$$

in which we have used for $\left(\tilde{\lambda}^{-1/\kappa}\phi\right)'$

$$\frac{(1-\theta)^{1/\theta}}{\beta e^{\kappa(1-\theta)/\theta}} = \frac{\tilde{\lambda}^{-1/\kappa}\phi+\rho}{(\tilde{\lambda}-1)/\tilde{\lambda}^{1/\theta}} = \frac{\rho\tilde{\lambda}^{1/\theta}}{\tilde{\lambda}-1} \tag{D5}$$

from (A23) and $\tilde{\lambda}^{-1/\kappa}\phi = 0$. Substituting these into (A33) yields

$$\Psi(\tilde{\lambda}) = \frac{\tilde{\lambda}}{\rho}\left[\frac{1-\theta}{\theta}\left(\ln\tilde{\lambda}+\kappa\right)+(\alpha\zeta)\frac{(1+\kappa)\rho}{\beta}\frac{\tilde{\lambda}^{1/\kappa}(\tilde{\lambda}-1)}{(1+\kappa)\tilde{\lambda}-1}\right]\left(\tilde{\lambda}^{-1/\kappa}\phi\right)'+\frac{1-\theta}{\theta}-\frac{\kappa}{(1+\kappa)\tilde{\lambda}-1}\frac{\tilde{\lambda}}{\tilde{\lambda}-1}. \tag{D6}$$

Combining (D2) and (D6) yields (A34). ■