

$$\begin{aligned}
&= \sigma - 1 \frac{1}{k - (\sigma - 1)f + (\varphi^*)^k f_x \left[ k \left( \frac{\tau}{\varphi_x^*} + t \right)^{\sigma - 1} \left[ 1 + (k(\varphi_x^*)^k g(\varphi_x^*))^{\frac{1}{\sigma - 1}} \right]^{1 - \sigma} - (\varphi_x^*)^{-k} \right]} \quad (1) \\
g(\varphi_x^*) &= \int_{\varphi_x^*}^{\infty} \varphi^{\sigma - 1 - (k + 1)} (\tau + t\varphi)^{1 - \sigma} d\varphi \quad (2) \\
&\varphi_x^* \frac{1}{\tau + t\varphi_x^* - \varphi^* \left[ \frac{f}{f_x} \right]^{\frac{1}{1 - \sigma}}} \quad (3) \\
&= \delta f_e \left( \frac{\varphi^*}{\varphi_{\min}} \right)^k \\
(4)
\end{aligned}$$