

$$Y_{RK} = \left(1 - \frac{\pi^2}{2}\right) Y_{NK} \quad (1)$$

$$Y_{RL} = \left(1 + \gamma(\pi - \pi^e) - \frac{\pi^2}{2}\right) Y_{NL} \quad (2)$$

$$\pi_L^* = \gamma \left(1 - \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi}\right) \quad (3)$$

$$\pi_G = P\pi_L \quad (4)$$

$$\pi_D = \Phi\pi_G + \pi_B \quad (5)$$

$$\pi = \alpha\pi_D + \pi_W \quad (6)$$

$$\pi = \alpha(\Phi P\pi_L + \pi_B) + \pi_W \quad (7)$$

$$U_G = -(\pi - \pi_G)^2 \quad (8)$$

$$\frac{\mathfrak{g}U_G}{\mathfrak{g}\alpha} = -2(\pi - \pi_G) \frac{\mathfrak{g}(\pi - \pi_G)}{\mathfrak{g}\alpha} \quad (9)$$

$$\pi - \pi_G = \alpha\Phi P\gamma \left(1 - \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi}\right) \quad (10)$$

$$+ \alpha\pi_B - P\gamma \left(1 - \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi}\right)$$

$$+ \pi_W$$

$$\frac{\mathfrak{g}(\pi - \pi_G)}{\mathfrak{g}\alpha} = \Phi P\gamma \left(1 - \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi}\right) \quad (11)$$

$$- P\gamma \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi\mathfrak{g}\alpha} (\alpha\Phi - 1)$$

$$+ \pi_B$$

$$\alpha^* = \frac{\left(1 - \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi}\right)}{\frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi\mathfrak{g}\alpha}} + \frac{1}{\Phi} + \frac{\pi_B}{\Phi P\gamma \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi\mathfrak{g}\alpha}} \quad (12)$$

$$\frac{\mathfrak{g}\alpha^*}{\mathfrak{g}P} = - \frac{\frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi\mathfrak{g}P}}{\frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi\mathfrak{g}\alpha}} - \frac{\pi_B}{\Phi P^2\gamma \frac{\mathfrak{g}\pi^e}{\mathfrak{g}\pi\mathfrak{g}\alpha}} \quad (13)$$