

$$\begin{aligned}\mathrm{tr}\,B_3 &= (1-\gamma_2)\frac{\phi_2}{1+\beta_{21}n_{1a}^*}+s_{2a} \\ \mathrm{det}\,B_3 &= (1-\gamma_2)\frac{\phi_2}{1+\beta_{21}n_{1a}^*}s_{2a}-\gamma_2\frac{\phi_2}{1+\beta_{21}n_{1a}^*}\frac{\pi_2}{1+\alpha_{21}n_{1a}^*}.\end{aligned}$$