File S6

Proof of Result 6

In view of (33), the symmetric equilibrium $(\bar{\mathbf{x}}, \bar{\mathbf{y}})$ is internally stable if

$$\frac{(1-2\mu)^2(1+s)^2}{(1+s\bar{x})^2\big[1+s(1-\tilde{x})\big]^2} < 1, \tag{S6.1}$$

as $\bar{x} = \bar{y}$ and $\tilde{x} = \tilde{y}$, where, by (S5.1)

$$\tilde{x} = \frac{\big[(s+1)(1-m_B) - m_B\big]\bar{x} + m_B}{s\bar{x}+1}. \tag{S6.2}$$

Thus

$$1 + s(1-\tilde{x}) = (1+s) - s \cdot \frac{\big[(1+s) - m_B(2+s)\big]\bar{x} + m_B}{s\bar{x}+1}. \tag{S6.3}$$

Hence

$$(1+s\bar{x})\big[1+s(1-\tilde{x})\big] = (1+s)(1+s\bar{x}) - s\big[(1+s) - m_B(s+2)\big]\bar{x} - sm_B, \tag{S6.4}$$

or

$$(1+s\bar{x})\big[1+s(1-\tilde{x})\big] = (1+s) + sm_B\big[(s+2)\bar{x} - 1\big]. \tag{S6.5}$$

For condition (S6.1) to be satisfied, since $(1+s\bar{x})\big[1+s(1-\tilde{x})\big] > 0$, it is sufficient that

$$(1+s) + sm_B\big[(s+2)\bar{x} - 1\big] > (1+s), \tag{S6.6}$$

or that $\bar{x} > \frac{1}{s+2}$. But

$$R\left(\frac{1}{s+2}\right) = \frac{s}{(s+2)^2} + \big[2 - m_B(s+2)\big]\frac{1}{s+2} - (1-m_B), \tag{S6.7}$$

or

$$R\left(\frac{1}{s+2}\right) = \frac{s}{(s+2)^2} + \frac{2}{s+2} - 1 = -\frac{s(1+s)}{(s+2)^2} < 0. \tag{S6.8}$$

Thus $R(\frac{1}{s+2}) < 0$ and $R(1) > 0$, and so $\bar{x} > \frac{1}{s+2}$ as desired.