$a(a^*)$ = domestic (foreign) cost of R&D

$v(v^*)$ = R&D level of domestic (foreign) firm

t = import tariff rate

All functional relationships are assumed continuous. Notice that the foreign firm produces only for the home country's market.

Equations (2) and (2*) show first-order conditions for optimal output choice, where subscripts denote partial derivatives:

$$\pi_x = R_x(x,y) - C_x(x,v) = 0 \tag{2}$$

$$\pi^*_y = (1 - t)R^*_y(x,y) - C^*_y(y,v^*) = 0 \tag{2*}$$

Marginal production costs are considered positive and nondecreasing, as expressed below:

$$C_x > 0;\ C_{xx} \geq 0 \tag{3}$$

$$C^*_y > 0;\ C^*_{yy} \geq 0 \tag{3*}$$

We assume that, for a given firm, an increase in rival output causes a decline in both total revenue and marginal revenue. The following inequalities express these restrictions:

$$R_y < 0 \tag{4}$$

$$R^*_x < 0 \tag{4*}$$

$$\pi_{xy} = R_{xy} < 0 \tag{5}$$

$$\pi^*_{yx} = (1 - t)R^*_{yx} < 0 \tag{5*}$$