

ANNEX 4. REVENUE LOSS CALCULATION PROCEDURE

Demand: $q^D = a - bp$

Supply: $q^S = c + dp$

Equilibrium requires: $q^D = q^S = q^*$

$$\Rightarrow a - bp^* = c + dp^*$$

$$\therefore p^* = \frac{a - c}{b + d} \quad \text{and} \quad q^* = \frac{ad + bc}{b + d}$$

To model the revenue lost due to counterfeiting, we take the alternative scenario where there is no counterfeiting and the firm's demand curve is further to the right.

New demand: $q^{ND} = a + \Delta - bp$

Equilibrium now occurs where: $q^{ND} = q^S = q^{**}$

$$\Rightarrow a + \Delta - bp^{**} = c + dp^{**}$$

$$\therefore p^{**} = \frac{a - c}{b + d} + \frac{\Delta}{b + d} \quad \text{and} \quad q^{**} = \frac{ad + bc}{b + d} + \frac{\Delta d}{b + d}$$

The effect on total revenue is then found by comparing revenue levels before and after the change, as follows.

Before: $TR^* = p^* q^* = \left(\frac{a - c}{b + d} \right) \left(\frac{ad + bc}{b + d} \right)$

After: $TR^{**} = p^{**} q^{**} = \left(\frac{a - c}{b + d} + \frac{\Delta}{b + d} \right) \left(\frac{ad + bc}{b + d} + \frac{\Delta d}{b + d} \right)$

Change in revenue: $TR^{**} - TR^* = \frac{1}{(b + d)^2} [(a + \Delta - c)d\Delta + (ad + bc)\Delta]$

In percentage terms: $\frac{TR^{**} - TR^*}{TR^*} = \frac{d\Delta}{ad + bc} + \frac{\Delta}{a - c} + \frac{d\Delta^2}{(a - c)(ad + bc)}$