The IAEA inspects state 1 with probability p and state 2 with probability $1-p$. Let state i behave illegally with probability q_i, and legally with probability $1-q_i$, $i = 1, 2$.

The unconditional expected payoffs are therefore

$$\begin{aligned}&\{[-a-(c-a)\beta_1]q_1(1-q_2)-c(1-q_1)q_2+[-a(1-\beta_1)-c\beta_1-c]q_1q_2\}p\\&\quad+\{[-a-(c-a)\beta_2]q_2(1-q_1)-c(1-q_2)q_1+[-a(1-\beta_2)-c\beta_2-c]q_1q_2\}(1-p)\\&=(c-a)[(1-\beta_1)q_1-(1-\beta_2)q_2]\cdot p+(c-a)(1-\beta_2)q_2-c(q_1+q_2)\\&\equiv E_0(p, q_1, q_2)\end{aligned} \tag{2.4}$$

to the IAEA;

$$\begin{aligned}&\{[-b_1+(b_1+d_1)\beta_1]q_1\}p+d_1q_1(1-p)\\&\quad=[-(b_1+d_1)(1-\beta_1)p+d_1]q_1 \equiv E_1(p, q_1, q_2)\end{aligned} \tag{2.5}$$

to state 1; and

$$\begin{aligned}&d_2q_2p+\{[-b_2+(b_2+d_2)\beta_2]q_2\}(1-p)\\&\quad=[-(b_2+d_2)(1-\beta_2)(1-p)+d_2]q_2 \equiv E_2(p, q_1, q_2)\end{aligned} \tag{2.6}$$

to state 2.

We assume that the three players do not cooperate. Thus, we model our problem as a non-cooperative three-person game $(\{p\}, \{q_1\}, \{q_2\}, F_0, F_1, F_2)$ with strategy sets and payoffs as given above. The equilibria (p^*, q_1^*, q_2^*) of this game are determined by the Nash conditions

$$\begin{aligned}E_0(p^*, q_1^*, q_2^*) &\geq E_0(p, q_1^*, q_2^*)\ \forall p\\E_1(p^*, q_1^*, q_2^*) &\geq E_1(p^*, q_1, q_2^*)\ \forall q_1\\E_2(p^*, q_1^*, q_2^*) &\geq E_2(p^*, q_1^*, q_2)\ \forall q_2 .\end{aligned} \tag{2.7}$$

Using $c-a>0$ and (3.4), (3.5), and (3.6), these inequalities are equivalent to

$$[(1-\beta_1)q_1^*-(1-\beta_2)q_2^*]\cdot p^* \geq [(1-\beta_1)q_1^*-(1-\beta_2)q_2^*]\cdot p\ \ \forall p \tag{2.8a}$$

$$[d_1-(b_1+d_1)(1-\beta_1)p^*]\cdot q_1^* \geq [d_1-(b_1+d_1)(1-\beta_1)p^*]\cdot q_1\ \ \forall q_1 \tag{2.8b}$$

$$\begin{aligned}&[d_2-(b_2+d_2)(1-\beta_2)(1-p^*)]\cdot q_2^*\\&\quad\geq [d_2-(b_2+d_2)(1-\beta_2)(1-p^*)]\cdot q_2\ \ \forall q_2.\end{aligned} \tag{2.8c}$$

The theorem to follow generalizes results in [9].