

ONLINE APPENDIX FOR ‘BUREAUCRATIC MINIMAL SQUAWK BEHAVIOR:
THEORY AND EVIDENCE FROM REGULATORY AGENCIES’

This Appendix consider the cases where $\gamma \in (1 - \theta_S, 1 - \theta_D)$ and $\gamma \in (\theta_D, \theta_S)$.

No Reputation Benchmark. First, take the case where $\gamma \in (1 - \theta_S, 1 - \theta_D)$. Using (2), the (l, θ_D) regulator chooses g since she realizes that her low cost signal is more likely to be incorrect than correct. All other types behave as in the text. Alternatively, take the case where $\gamma \in (\theta_D, \theta_S)$. Using (2), the (h, θ_D) regulator now chooses t since she realizes that her high cost signal is more likely to be incorrect than correct. Again, all other types behave as in the text. In both cases, the regulator behaves efficiently; a signal that is likely to be incorrect *should* be ignored.

No Squawk Benchmark.

Lemma 1. *The subgame following no disclosure ($d = \emptyset$) has a unique equilibrium. There are critical values, $\delta_{\emptyset}^{p'} = \delta_{\emptyset}^{p'}(\gamma, \mathbf{z}) > 0$ and $\delta_{\emptyset}^{q'} = \delta_{\emptyset}^{q'}(\gamma, \mathbf{z}) > 0$, such that the (l, θ_S) regulator chooses t , (h, θ_S) chooses g , and:*

- (i) *if the prior on low cost satisfies, $1 - \theta_S < \gamma < 1 - \theta_D$, then (h, θ_D) chooses g , and*
 - (a) *if reputation is of low importance, $\delta \leq \delta_{\emptyset}^{p'}$, (l, θ_D) chooses g*
 - (b) *if reputation is of high importance, $\delta > \delta_{\emptyset}^{p'}$, there is tough bias: (l, θ_D) plays t with probability $p(d = \emptyset, \delta, \gamma, \mathbf{z}) \in (0, 1)$;*
- (ii) *if the prior on low cost satisfies $\theta_D < \gamma < \theta_S$, then (l, θ_D) chooses t , and*
 - (a) *if reputation is of low importance, $\delta \leq \delta_{\emptyset}^{q'}$, (h, θ_D) chooses t*
 - (b) *if reputation is of high importance, $\delta > \delta_{\emptyset}^{q'}$, there is generous bias: (h, θ_D) plays t with probability $q(d = \emptyset, \delta, \gamma, \mathbf{z}) \in (0, 1)$.*

Proof. Pure Strategy Equilibrium, Part (i) (a). The regulator’s equilibrium strategy is $\sigma = (1, 0, 0, 0)$. The task is to show that, when $1 - \theta_S < \gamma < 1 - \theta_D$ and the evaluator expects $\tilde{\sigma} = (1, 0, 0, 0)$, (A.1) is positive for (l, θ_S) and negative for (l, θ_D) and (h, θ) if

$$\delta < \delta_{\emptyset}^{p'} = \frac{-\Pi(l, \theta_D, \gamma)W}{\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 0, 0), \gamma)}.$$

From (A.5), $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 0, 0), \gamma) > 0$. *Step 1:* (A.1) is negative for (l, θ_D) because $\Pi(l, \theta_D, \gamma) < 0$ and $\delta < \delta_{\emptyset}^{p'}$. *Step 2:* (A.1) is positive for (l, θ_S) because $\Pi(l, \theta_S, \gamma) > 0$ and $\Delta_{\emptyset} > 0$. *Step 3:* It follows from Step 1 and (A.2) that (A.1) is negative for (h, θ_D) . This, together with (A.4) implies that (A.1) is negative for (h, θ_S) .

Tough Hybrid Equilibrium, Part (i) (b). The regulator's equilibrium strategy is $\sigma = (1, 0, p, 0)$, with $p \in (0, 1)$. The task is to show that, when the evaluator expects $\tilde{\sigma} = (1, 0, \tilde{p}, 0)$, we can find a value of $\delta > \delta_{\emptyset}^{p'}$ such that (A.1) is equal to zero for (l, θ_D) , positive for (l, θ_S) and negative for (h, θ) . *Step 1:* With $\Pi(l, \theta_D, \gamma) < 0$, $\tilde{p}$ must ensure that $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma) > 0$. Indeed, the smaller δ the more positive this term must be. Suppose $\delta < \delta_{\emptyset}^{p'}$. We saw above that, with $\tilde{p} = 0$, such a value of δ ensures that (A.1) is negative for (l, θ_D) . With $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma)$ decreasing in $\tilde{p}$ it follows that there cannot be a value of $\tilde{p}$ such that (A.1) is equal to zero. Alternatively, suppose that $\delta = \delta_{\emptyset}^{p'}$. A value of $\tilde{p} = 0$ will ensure that (A.1) is equal to zero for (l, θ_D) . Now increase δ slightly. To keep (A.1) equal to zero, we simply require a larger value of $\tilde{p}$. From (A.5), $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 1, 1), \gamma) < 0$ for all γ . This ensures that $p(d = \emptyset, \delta, \gamma, \mathbf{z})$ is bounded away from one. *Step 2:* It follows from Step 1 and (A.2) that (A.1) is negative for (h, θ_D) . *Step 3:* It follows from Step 1 and (A.3) that (A.1) is positive for (l, θ_S) . Likewise, it follows from Step 2 and (A.4) that (A.1) is negative for (h, θ_S) .

Pure Strategy Equilibrium, Part (ii) (a). The regulator's equilibrium strategy is $\sigma = (1, 0, 1, 1)$. The task is to show that, when $\theta_D < \gamma < \theta_S$ and the evaluator expects $\tilde{\sigma} = (1, 0, 1, 1)$, (A.1) is positive for (l, θ) and (h, θ_D) and negative for (h, θ_S) if

$$\delta < \delta_{\emptyset}^{q'}(\gamma, \mathbf{z}) = \frac{\Pi(h, \theta_D, \gamma)W}{-\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 1, 1), \gamma)}.$$

From (A.5), $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 1, 1), \gamma) < 0$ for all γ . *Step 1:* (A.1) is positive for (h, θ_D) because $\Pi(h, \theta_D, \gamma) > 0$ and $\delta < \delta_{\emptyset}^{q'}$. *Step 2:* (A.1) is negative for (h, θ_S) because $\Pi(h, \theta_S, \gamma) < 0$ and $\Delta_{\emptyset} < 0$. *Step 3:* It follows from Step 1 and (A.2) that (A.1) is positive for (l, θ_D) . Likewise, it follows from Step 1 and (A.3) that (A.1) is positive for (l, θ_S) .

Generous Hybrid Equilibrium, Part (ii) (b). The regulator's equilibrium strategy is $\sigma = (1, 0, 1, q)$, with $q \in (0, 1)$. The task is to show that, when the evaluator expects $\tilde{\sigma} = (1, 0, 1, \tilde{q})$, we can find a value of $\delta > \delta_{\emptyset}^{q'}$ such that (A.1) is equal to zero for (h, θ_D) , positive for (l, θ) and negative for (h, θ_S) . *Step 1:* With $\Pi(h, \theta_D, \gamma) > 0$, $\tilde{q}$ must ensure that $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma) < 0$. Indeed, the smaller δ the more negative this term must be. Suppose $\delta < \delta_{\emptyset}^{q'}$. We saw above that, with $\tilde{q} = 1$, such a value of δ ensures that (A.1) is positive for (h, θ_D) . With $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma)$ decreasing in $\tilde{q}$ it follows that there cannot be a value of $\tilde{q}$ such that (A.1) is equal to zero. Alternatively, suppose that $\delta = \delta_{\emptyset}^{q'}$. A value of $\tilde{q} = 1$ will ensure that (A.1) is equal to zero for (h, θ_D) . Now increase δ slightly. To keep (A.1) equal to zero, we simply require a smaller value of $\tilde{q}$. From (A.5), $\Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 1, 0), \gamma) > 0$ for $\gamma > \frac{1}{2}$. This ensures that $q(d = \emptyset, \delta, \gamma, \mathbf{z})$ is bounded away from zero. *Step 2:* It follows from Step 1 and (A.2) that (A.1) is positive for (l, θ_D) . *Step 3:* It follows from Step 2 and (A.3) that (A.1) is positive for (l, θ_S) . Likewise, it follows from Step 1 and (A.4) that (A.1) is negative for (h, θ_S) . ■

Squawk Model Recall that $\bar{\gamma}(\mathbf{z})$ can be bigger or smaller than θ_D . To ease the comparison with Lemma 1 above, I will assume that $\bar{\gamma}(\mathbf{z}) < \theta_D$ (this ensures that (l, θ_D) chooses t for all $\gamma > \theta_D$ and so, if anything, makes squawking on tough less attractive).

Lemma 2. *The subgame following squawk on tough ($d = t$) has a unique equilibrium. There is a critical value, $0 < \delta_t^{q'} = \delta_t^{q'}(\gamma, \mathbf{z}) < \delta_{\emptyset}^{q'}$, such that the (l, θ_S) regulator chooses t , (h, θ_S) chooses g , and:*

(i) *if the prior on low cost satisfies $1 - \theta_S < \gamma < 1 - \theta_D$, then (h, θ_D) chooses g and*

(a) *if reputation is of low importance, $\delta \leq \delta_{\emptyset}^{p'}$, (l, θ_D) chooses g*

(b) *if reputation is of high importance, $\delta > \delta_{\emptyset}^{p'}$, there is tough bias: (l, θ_D) plays t with probability $p(d = t, \delta, \gamma, \mathbf{z}) < p(d = \emptyset, \delta, \gamma, \mathbf{z}) \in (0, 1)$.*

(ii) *if the prior on low cost satisfies $\theta_D < \gamma < \theta_S$, then (l, θ_D) chooses t and*

(a) *if reputation is of low importance, $\delta \leq \delta_t^{q'}$, (h, θ_D) chooses t*

(b) *if reputation is of high importance, $\delta > \delta_t^{q'}$, there is generous bias: (h, θ_D) plays t with probability $q(d = t, \delta, \gamma, \mathbf{z}) < q(d = \emptyset, \delta, \gamma, \mathbf{z}) \in (0, 1]$.*

Proof. Pure Strategy Equilibrium, Part (i) (a). The regulator's equilibrium strategy is $\sigma = (1, 0, 0, 0)$. The task is to show that, when $1 - \theta_S < \gamma < 1 - \theta_D$ and the evaluator expects $\tilde{\sigma} = (1, 0, 0, 0)$, (A.8) is positive for (l, θ_S) and negative for (h, θ) and (l, θ_D) if $\delta < \delta_{\emptyset}^{p'}$. Under these beliefs $\mu(\omega = l, a = t, \tilde{\sigma}) = \mu(\omega = h, a = t, \tilde{\sigma}) = \mu(a = t, \tilde{\sigma}) = 1 > \mu(a = g, \tilde{\sigma})$, implying that $\Delta_t(s, \theta, \tilde{\sigma} = (1, 0, 0, 0), \gamma) = \Delta_{\emptyset}(\tilde{\sigma} = (1, 0, 0, 0), \gamma) > 0$. *Step 1:* (A.8) is negative for (l, θ_D) because $\Pi(l, \theta_D, \gamma) < 0$ and $\delta < \delta_{\emptyset}^{p'}$. *Step 2:* (A.8) is positive for (l, θ_S) because $\Pi(l, \theta_S, \gamma) > 0$ and $\Delta_t > 0$. *Step 3:* It follows from Step 1 and (A.9) that (A.8) is negative for (h, θ_D) . This, together with (A.11) implies that (A.8) is negative for (h, θ_S) .

Tough Hybrid Equilibrium, Part (i) (b). The regulator's equilibrium strategy is $\sigma = (1, 0, p, 0)$, with $p \in (0, 1)$. The task is to show that, when the evaluator expects $\tilde{\sigma} = (1, 0, \tilde{p}, 0)$, we can find a value of $\delta > \delta_{\emptyset}^{p'}$ such that (A.8) is equal to zero for (l, θ_D) , positive for (l, θ_S) and negative for (h, θ) . *Step 1.* With $\Pi(l, \theta_D, \gamma) < 0$, $\tilde{p}$ must ensure that $\Delta_t(l, \theta_D, \tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma) > 0$. Indeed, the smaller δ the more positive this term must be. Suppose $\delta < \delta_{\emptyset}^{p'}$. We saw above that, with $\tilde{p} = 0$, such a value of δ ensures that (A.8) is negative for (l, θ_D) . With $\Delta_t(l, \theta_D, \tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma)$ decreasing in $\tilde{p}$ it follows that there cannot be a value of $\tilde{p}$ such that (A.8) is equal to zero. Alternatively, suppose that $\delta = \delta_{\emptyset}^{p'}$. A value of $\tilde{p} = 0$ will ensure that (A.8) is equal to zero for (l, θ_D) . Now increase δ slightly. To keep (A.8) equal to zero, we simply require a larger value of $\tilde{p}$. Since $\Delta_t(l, \theta_D, \tilde{\sigma} = (1, 0, 1, 1), \gamma) < 0$ for all γ , $p(d = t, \delta, \gamma, \mathbf{z})$ is bounded away from one. Note $\Delta_t(l, \theta_D, \tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma) < \Delta_{\emptyset}(\tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma)$ for any $\tilde{p} > 0$. This fact ensures that $p(d = t, \delta, \gamma, \mathbf{z}) < p(d = \emptyset, \delta, \gamma, \mathbf{z})$. *Step 2:* It follows from Step

1 and (A.9) that (A.8) is negative for (h, θ_D) . *Step 3:* It follows from Step 1 and (A.10) that (A.8) is positive for (l, θ_S) . Likewise, it follows from Step 2 and (A.11) that (A.7) is negative for (h, θ_S) .

Pure Strategy Equilibrium, Part (ii) (a). The regulator's equilibrium strategy is $\sigma = (1, 0, 1, 1)$. The task is show that, when $\theta_D < \gamma < \theta_S$ and the evaluator expects $\tilde{\sigma} = (1, 0, 1, 1)$, (A.8) is positive for (l, θ) and (h, θ_D) and negative for (h, θ_S) if

$$\delta \leq \delta_t^{q'}(\gamma, \mathbf{z}) = \frac{\Pi(h, \theta_D, \gamma)W}{-\Delta_t(h, \theta_D, \tilde{\sigma} = (1, 0, 1, 1), \gamma)}.$$

Given these beliefs, $\mu(a = t, \tilde{\sigma}) \leq \mu(a = g, \tilde{\sigma}) = 1$ implying that $\Delta_t(s, \theta, \tilde{\sigma} = (1, 0, 1, 1), \gamma) < 0$ for all γ . Equation (8) establishes that $\Delta_t(h, \theta_D, \tilde{\sigma} = (1, 0, 1, 1), \gamma) < \Delta_\emptyset(\tilde{\sigma} = (1, 0, 1, 1), \gamma)$ for all γ , and hence that $\delta_t^{q'} < \delta_\emptyset^{q'}$. *Step 1:* (A.8) is positive for (h, θ_D) because $\Pi(h, \theta_D, \gamma) > 0$ and $\delta < \delta_t^{q'}$. *Step 2:* (A.8) is negative for (h, θ_S) because $\Pi(h, \theta_S, \gamma) < 0$ and $\Delta_t < 0$. *Step 3:* It follows from Step 1 and (A.9) that (A.8) is positive for (l, θ_D) . This, together with (A.10) implies that (A.8) is positive for (l, θ_S) .

Generous Hybrid Equilibrium, Part (ii) (b). The regulator's equilibrium strategy is $\sigma = (1, 0, 1, q)$, with $q \in (0, 1)$. The task is to show that, when the evaluator expects $\tilde{\sigma} = (1, 0, 1, \tilde{q})$, we can find a value of $\delta > \delta_t^{q'}$ such that (A.8) is equal to zero for (h, θ_D) , positive for (l, θ) and negative for (h, θ_S) . *Step 1.* With $\Pi(h, \theta_D, \gamma) > 0$, $\tilde{q}$ must ensure that $\Delta_t(h, \theta_D, \tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma) < 0$. Indeed, the smaller δ the more negative this term must be. Suppose $\delta < \delta_t^{q'}$. We saw above that, with $\tilde{q} = 1$, such a value of δ ensures that (A.8) is positive for (h, θ_D) . With $\Delta_t(h, \theta_D, \tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma)$ decreasing in $\tilde{q}$ it follows that there cannot be a value of $\tilde{q}$ such that (A.8) is equal to zero. Alternatively, suppose that $\delta = \delta_t^{q'}$. A value of $\tilde{q} = 1$ will ensure that (A.8) is equal to zero for (h, θ_D) . Now increase δ slightly. To keep (A.8) equal to zero, we simply require a smaller value of $\tilde{q}$. Recall that $\Delta_t(h, \theta_D, \tilde{\sigma} = (1, 0, 1, 0), \gamma) > 0$ for $\gamma > \bar{\gamma}$, where $\bar{\gamma} > \theta_D$. Consequently, if $\gamma \geq \bar{\gamma}$, $q(d = t, \delta, \gamma, \mathbf{z})$ is bounded away from zero for all δ . If $\gamma < \bar{\gamma}$, then for δ sufficiently high a value of $\tilde{q} = 0$ ensures (A.8) is equal to zero. (Beyond, this we have a generous pure strategy equilibrium). *Step 2:* It follows from Step 1 and (A.9) that (A.8) is positive for (l, θ_D) . *Step 3:* It follows from Step 2 and (A.10) that (A.8) is positive for (l, θ_S) . Likewise, it follows from Step 1 and (A.11) that (A.8) is negative for (h, θ_S) . ■

Recall that $\underline{\gamma}(\mathbf{z})$ can be bigger or smaller than $1 - \theta_D$. To ease the comparison with Lemmas 1 and 2 above, I will assume that $\underline{\gamma}(\mathbf{z}) > 1 - \theta_D$ (this ensures that (h, θ_D) chooses g for all $\gamma < 1 - \theta_D$ and so, if anything, makes squawking on generous more attractive).

Lemma 3. The subgame following squawk on generous ($d = g$) has a unique equilibrium. There is a critical value, $0 < \delta_g^{p'} = \delta_g^{p'}(\gamma, \mathbf{z}) < \delta_{\emptyset}^{p'}$, such that the (l, θ_S) regulator chooses t , (h, θ_S) chooses g , and:

- (i) if the prior on low cost satisfies $1 - \theta_S < \gamma < 1 - \theta_D$, (h, θ_D) chooses g and
 - (a) if reputation is of low importance, $\delta \leq \delta_g^{p'}$, (l, θ_D) chooses g
 - (b) if reputation is of high importance, $\delta > \delta_g^{p'}$, there is tough bias: (l, θ_D) plays t with probability $p(d = g, \delta, \gamma, \mathbf{z}) > p(d = \emptyset, \delta, \gamma, \mathbf{z}) \in (0, 1)$;
- (ii) if the prior on low cost satisfies $\theta_D < \gamma < \theta_S$, (l, θ_D) chooses t and
 - (a) if reputation is of low importance, $\delta \leq \delta_{\emptyset}^{q'}$, (h, θ_D) chooses t
 - (b) if reputation is of high importance, $\delta > \delta_{\emptyset}^{q'}$, there is generous bias: (h, θ_D) plays t with prob $q(d = g, \delta, \gamma, \mathbf{z}) > q(d = \emptyset, \delta, \gamma, \mathbf{z}) \in (0, 1]$.

Proof. The (s, θ) regulator's expected net payoff from choosing t rather than g is

$$[\Pr(\omega = l \mid s, \theta) - \Pr(\omega = h \mid s, \theta)] W + \delta \{ \mu(a = t, \tilde{\sigma}) - \Pr(\omega = l \mid s, \theta) \cdot \mu(\omega = l, a = g, \tilde{\sigma}) - [1 - \Pr(\omega = l \mid s, \theta)] \cdot \mu(\omega = h, a = g, \tilde{\sigma}) \}.$$

Let $\Delta_g(s, \theta, \tilde{\sigma}, \gamma)$ denote the term in curly brackets and define

$$\delta_g^{p'}(\gamma, \mathbf{z}) = \frac{\Pi(l, \theta_D, \gamma) W}{-\Delta_g(l, \theta_D, \tilde{\sigma} = (1, 0, 0, 0), \gamma)}$$

The proof then proceeds analogously to Lemma 2. ■

Lemma 4. The subgame following full disclosure ($d = f$) has a unique equilibrium. The (l, θ_S) regulator chooses t , (h, θ_S) chooses g , and:

- (i) if the prior on low cost satisfies $1 - \theta_S < \gamma < 1 - \theta_D$, (h, θ_D) chooses g and
 - (a) if the importance of reputation satisfies $\delta \leq \delta_g^{p'}$, (l, θ_D) chooses g
 - (b) if the importance of reputation satisfies $\delta > \delta_g^{p'}$, there is tough bias: (l, θ_D) plays t with probability $p(d = f, \delta, \gamma, \mathbf{z}) > p(d = \emptyset, \delta, \gamma, \mathbf{z}) \in [0, 1)$;
- (ii) if the prior on low cost satisfies $\theta_D < \gamma < \theta_S$, (l, θ_D) chooses t and
 - (a) if the importance of reputation satisfies $\delta \leq \delta_t^{q'}$, (h, θ_D) chooses t
 - (b) if the importance of reputation satisfies $\delta > \delta_t^{q'}$, there is generous bias: (h, θ_D) plays t with probability $q(d = f, \delta, \gamma, \mathbf{z}) > q(\delta, \mathbf{z}, d = \emptyset) \in (0, 1)$.

Proof. Under full disclosure, the (s, θ) regulator's expected net payoff from choosing t is

$$\begin{aligned} & [\Pr(\omega = l | s, \theta) - \Pr(\omega = h | s, \theta)] W + \\ & \delta \{ \Pr(\omega = l | s, \theta) \cdot \mu(\omega = l, a = t, \tilde{\sigma}) + [1 - \Pr(\omega = l | s, \theta)] \cdot \mu(\omega = h, a = t, \tilde{\sigma}) - \\ & \Pr(\omega = l | s, \theta) \cdot \mu(\omega = l, a = g, \tilde{\sigma}) - [1 - \Pr(\omega = l | s, \theta)] \cdot \mu(\omega = h, a = g, \tilde{\sigma}) \}. \end{aligned} \quad (\text{SA.1})$$

Let $\Delta_f(s, \theta, \tilde{\sigma}, \gamma)$ denote the term in curly brackets. Subtracting the (h, θ) regulator's net payoff from that of (l, θ) gives

$$\begin{aligned} & (\Pr(\omega = s | s, \theta) - \Pr(\omega \neq s | s, \theta)) \cdot \\ & (2W + \delta \{ \mu(\omega = l, a = t, \tilde{\sigma}) - \mu(\omega = h, a = t, \tilde{\sigma}) + \mu(\omega = h, a = g, \tilde{\sigma}) - \mu(\omega = l, a = g, \tilde{\sigma}) \}) > 0, \end{aligned} \quad (\text{SA.2})$$

where the inequality holds for any $\tilde{\sigma}(1, 0, \tilde{p}, \tilde{q})$ since this ensures that the term in curly brackets is weakly positive. Subtracting the (l, θ_D) regulator's net payoff from that of (l, θ_S) gives

$$\begin{aligned} & (\Pr(\omega = l | s = l, \theta = \theta_S) - \Pr(\omega = l | s = l, \theta = \theta_D)) \cdot \\ & (2W + \delta \{ \mu(\omega = l, a = t, \tilde{\sigma}) - \mu(\omega = h, a = t, \tilde{\sigma}) + \mu(\omega = h, a = g, \tilde{\sigma}) - \mu(\omega = l, a = g, \tilde{\sigma}) \}) > 0. \end{aligned} \quad (\text{SA.3})$$

Finally, subtracting the (h, θ_S) regulator's net payoff from that of (h, θ_D) gives

$$\begin{aligned} & (\Pr(\omega = h | s = h, \theta = \theta_S) - \Pr(\omega = h | s = h, \theta = \theta_D)) \cdot \\ & (2W + \delta \{ \mu(\omega = l, a = t, \tilde{\sigma}) - \mu(\omega = h, a = t, \tilde{\sigma}) + \mu(\omega = h, a = g, \tilde{\sigma}) - \mu(\omega = l, a = g, \tilde{\sigma}) \}) > 0. \end{aligned} \quad (\text{SA.4})$$

The same logic as (5)-(7) establishes

$$\begin{aligned} & \Pr(\omega = l | s, \theta = \theta_D) \cdot \mu(\omega = l, a = g, \tilde{\sigma}) + \\ & [1 - \Pr(\omega = l | s, \theta = \theta_D)] \cdot \mu(\omega = h, a = g, \tilde{\sigma}) - \mu(a = g, \tilde{\sigma}) < 0 \quad \forall s = l, h. \end{aligned} \quad (\text{SA.5})$$

Pure Strategy Equilibrium, Part (i) (a). The regulator's equilibrium strategy is $\sigma = (1, 0, 0, 0)$. The task is show that, when $1 - \theta_S < \gamma < 1 - \theta_D$ and the evaluator expects $\tilde{\sigma} = (1, 0, 0, 0)$, (SA.1) is positive for (l, θ_S) and negative for (h, θ) and (l, θ_D) if $\delta \leq \delta_g^{p'}$. Given this conjecture, $\mu(\omega = h, a = t, \tilde{\sigma}) = \mu(\omega = l, a = t, \tilde{\sigma}) = 1$ implying that $\Delta_f(s, \theta, \tilde{\sigma} = (1, 0, 0, 0), \gamma) > 0$ for all γ . Equation (SA.5) establishes that $\Delta_f(s, \theta, \tilde{\sigma} = (1, 0, 0, 0), \gamma) > \Delta_\emptyset(\tilde{\sigma} = (1, 0, 0, 0), \gamma)$. *Step 1:* (SA.1) is negative for (l, θ_D) because $\Pi(l, \theta_D, \gamma) < 0$ and $\delta < \delta_g^{p'}$. *Step 2:* (SA.1) is positive for (l, θ_S) because $\Pi(l, \theta_D, \gamma) < 0$ and $\Delta_f > 0$. *Step 3:* It follows from Step 1 and (SA.2) that (SA.1) is negative for (h, θ_D) . This, together with (SA.4) implies that (SA.1) is negative for (h, θ_S) .

Tough Hybrid Equilibrium, Part (i) (b). The regulator's equilibrium strategy is $\sigma = (1, 0, p, 0)$, with $p \in (0, 1)$. The task is to show that, when the evaluator expects $\tilde{\sigma} = (1, 0, \tilde{p}, 0)$, we can find a value of $\delta > \delta_g^{p'}$ such that (SA.1) is equal to zero for (l, θ_D) , positive for (l, θ_S) and negative for (h, θ) . *Step 1:* With $\Pi(l, \theta_D, \gamma) < 0$, $\tilde{p}$ must ensure that $\Delta_f(l, \theta_D, \tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma) > 0$. Indeed, the smaller δ the more positive this term must be. Suppose $\delta < \delta_g^{p'}$. We saw above that, with $\tilde{p} = 0$, such a value of δ ensures that (SA.1) is negative for (l, θ_D) . With $\Delta_f(l, \theta_D, \tilde{\sigma} = (1, 0, \tilde{p}, 0), \gamma)$ decreasing in $\tilde{p}$ it follows that there cannot be a value of $\tilde{p}$ such that (SA.1) is equal to zero. Alternatively, suppose that $\delta = \delta_g^{p'}$. A value of $\tilde{p} = 0$ will ensure that (SA.1) is equal to zero for (l, θ_D) . Now increase δ slightly. To keep (SA.1) equal to zero, we simply require a larger value of $\tilde{p}$. Since $\Delta_f(s, \theta, \tilde{\sigma} = (1, 0, 1, 1), \gamma) < 0$ for all γ , $p(d = f, \delta, \gamma, \mathbf{z})$ is bounded away from one. From (SA.5), $\Delta_f(l, \theta_D, \tilde{\sigma} = (1, 0, 1, \tilde{p}), \gamma) > \Delta_t(\tilde{\sigma} = (l, \theta_D, 1, 0, 1, \tilde{p}), \gamma)$. This fact ensures that $p(d = f, \delta, \gamma, \mathbf{z}) < p(d = t, \delta, \gamma, \mathbf{z})$. *Step 2:* It follows from Step 1 and (SA.2) that (SA.1) is negative for (h, θ_D) . *Step 3:* It follows from Step 1 and (SA.3) that (SA.1) is positive for (l, θ_S) . Likewise, it follows from Step 2 and (SA.4) that (SA.1) is negative for (h, θ_S) .

Pure Strategy Equilibrium, Part (ii) (a). The regulator's equilibrium strategy is $\sigma = (1, 0, 1, 1)$. The task is show that, when $\theta_D < \gamma < \theta_S$ and the evaluator expects $\tilde{\sigma} = (1, 0, 1, 1)$, (SA.1) is positive for (l, θ) and (h, θ_D) and negative for (h, θ_S) if $\delta \leq \delta_t^{q'}$. Given this conjecture, $\mu(\omega = h, a = g, \tilde{\sigma}) = \mu(\omega = l, a = g, \tilde{\sigma}) = 1$ implying that $\Delta_f(s, \theta, \tilde{\sigma} = (1, 0, 1, 1), \gamma) < 0$ for all γ . Equation (8) establishes that $\Delta_f(h, \theta_D, \tilde{\sigma} = (1, 0, 1, 1), \gamma) = \Delta_t(h, \theta_D, \tilde{\sigma} = (1, 0, 1, 1), \gamma) < \Delta_\emptyset(\tilde{\sigma} = (1, 0, 1, 1), \gamma)$. *Step 1:* (SA.1) is positive for (h, θ_D) because $\Pi(h, \theta_D, \gamma) > 0$ and $\delta < \delta_t^{q'}$. *Step 2:* (SA.1) is negative for (h, θ_S) because $\Pi(h, \theta_S, \gamma) < 0$ and $\Delta_f < 0$. *Step 3:* It follows from Step 1 and (SA.2) that (SA.1) is positive for (l, θ_D) . This, together with (SA.3) implies that (SA.1) is positive for (l, θ_S) .

Generous Hybrid Equilibrium, Part (ii) (b). The regulator's equilibrium strategy is $\sigma = (1, 0, 1, q)$, with $q \in (0, 1)$. The task is to show that, when the evaluator expects $\tilde{\sigma} = (1, 0, 1, \tilde{q})$, we can find a value of $\delta > \delta_t^{q'}$ such that (SA.1) is equal to zero for (h, θ_D) , positive for (l, θ) and negative for (h, θ_S) . *Step 1:* With $\Pi(h, \theta_D, \gamma) > 0$, $\tilde{q}$ must ensure that $\Delta_f(h, \theta_D, \tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma) < 0$. Indeed, the smaller δ the more negative this term must be. Suppose $\delta < \delta_t^{q'}$. We saw above that, with $\tilde{q} = 1$, such a value of δ ensures that (SA.1) is positive for (h, θ_D) . With $\Delta_f(h, \theta_D, \tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma)$ decreasing in $\tilde{q}$ it follows that there cannot be a value of $\tilde{q}$ such that (SA.1) is equal to zero. Alternatively, suppose that $\delta = \delta_t^{q'}$. A value of $\tilde{q} = 1$ will ensure that (SA.1) is equal to zero for (h, θ_D) . Now increase δ slightly. To keep (SA.1) equal to zero, we simply require a smaller value of $\tilde{q}$. Using (11) $\Delta_t(h, \theta_D, \tilde{\sigma} = (1, 0, 1, 0), \gamma) > 0$ for all $\gamma > \theta_D$. This ensures that $q(d = f, \delta, \gamma, \mathbf{z})$ is bounded away from zero. From (SA.5), $\Delta_f(h, \theta_D, \tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma) > \Delta_f(h, \theta_D, \tilde{\sigma} = (1, 0, 1, \tilde{q}), \gamma)$. This fact ensures that $q(d = f, \delta, \gamma, \mathbf{z}) > q(d = t, \delta, \gamma, \mathbf{z})$. *Step 2:* It follows from Step 1 and (SA.2) that (SA.1) is positive for (l, θ_D) . *Step 3:* It follows from Step 2 and (SA.3) that (SA.1) is positive for (l, θ_S) .

Likewise, it follows from Step 1 and (SA.4) that (SA.1) is negative for (h, θ_S) . ■

Proposition 1. *The firm squawks on tough. The regulator's equilibrium strategy in the continuation subgame is characterised in Lemma 2.*

Proof. Immediate from Lemmas 1-4. ■

The firm therefore squawks on tough for ‘extreme’ values of γ since this (still) ensures that the regulator is generous with a weakly higher probability. Turning to comparative statics, in keeping with the analysis above, assume $\underline{\gamma}(\mathbf{z}) > 1 - \theta_D$ and $\bar{\gamma}(\mathbf{z}) < \theta_D$.

Proposition 2 (Minimal Squawk Hypothesis). *The probability of a tough decision conditional on a high cost signal is $\Pr(a = t|s = h, \delta, \gamma, \mathbf{z}) = \frac{1}{2}q(d = t, \delta, \gamma, \mathbf{z})$. The probability of a tough decision conditional on a low cost signal is $\Pr(a = t|s = l, \delta, \gamma, \mathbf{z}) = \frac{1}{2}(1 + p(d = t, \delta, \gamma, \mathbf{z}))$.*

(i) *If $\gamma \in (1 - \theta_S, 1 - \theta_D)$, then*

$$\frac{\partial \Pr(a = t|s = h, \delta, \gamma, \mathbf{z})}{\partial \delta} = 0 \text{ and } \frac{\partial \Pr(a = t|s = l, \delta, \gamma, \mathbf{z})}{\partial \delta} \geq 0;$$

(ii) *If $\gamma \in (\theta_D, \theta_S)$, then*

$$\frac{\partial \Pr(a = t|s = h, \delta, \gamma, \mathbf{z})}{\partial \delta} \leq 0 \text{ and } \frac{\partial \Pr(a = t|s = l, \delta, \gamma, \mathbf{z})}{\partial \delta} = 0.$$

Proof.

Part (i). The partial effect of δ when $s = l$ follows from the proof of the Tough Hybrid equilibrium, Part (i) (b), in Lemma 2.

Part (ii). The partial effect of δ when $s = h$ follows from the proof of the Generous Hybrid equilibrium, Part (ii) (b), in Lemma 2. ■

Proposition 3 (Capture Hypothesis). *If $\gamma < 1 - \theta$, then the probability of a tough decision conditional on either cost signal is $\Pr(a = t|s, \lambda, \gamma, \mathbf{z}) = 0$. If $\gamma > \theta$, then the probability of a tough decision conditional a low cost signal is $\Pr(a = t|s = l, \lambda, \gamma, \mathbf{z}) = \max\{0, \{\min\{1, 1 - \frac{\theta\gamma}{\gamma - (1 - \theta)}B^*(\lambda)\}\}\}$, while the probability of a tough decision conditional a high cost signal is $\Pr(a = t|s = h, \lambda, \gamma, \mathbf{z}) = \max\{0, \{\min\{1, 1 - \frac{(1 - \theta)\gamma}{\gamma - \theta}B^*(\lambda)\}\}\}$, where*

$$\frac{\partial \Pr(a = t|s, \lambda, \gamma, \mathbf{z})}{\partial \delta} \geq 0 \text{ for all } \lambda \text{ and } s \in \{l, h\}.$$

Proof. Proceeds in the same fashion as the Proof of Proposition 3 in the paper. ■