Additional Notes for “Trends in Corporate Governance”

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Proof of Claim in Footnote 34

While it is true that a consequence of flatter hierarchies is more monitoring, this does not necessarily translate into a demand for tougher monitors (i.e., greater \( \delta \)). Regardless of \( \delta \), all boards monitor more in response to a flatter hierarchy. Shareholders will only demand tougher monitors if the consequence of a flatter hierarchy is to increase the marginal benefit of tougher monitors. How a flatter hierarchy affects this marginal benefit is potentially indeterminant. To see this, suppose that shareholders’ preferences are captured by

\[
\lambda \left( P^*V + (1 - P^*)\mu \right) - K(\delta),
\]

(1)

where \( \lambda \in (0, 1] \) is the portion of expected firm value captured by the shareholders and \( K(\cdot) \) is the cost of imposing and maintaining a board whose diligence level is \( \delta \).\(^1\) The marginal benefit to increased diligence is, thus,

\[
\lambda \frac{\partial P^*}{\partial \delta} (V - \mu).
\]

(2)

If (2) is decreasing in \( \mu \), then a consequence of flatter hierarchies will be to raise the demand for greater board diligence. Differentiating (2) with respect to \( \mu \) yields:

\[
\lambda \times \left( \frac{\partial P^*}{\partial \delta} (\Phi - 1) + \frac{\partial^2 P^*}{\partial \mu \partial \delta} (V - \mu) \right); \quad (3)
\]

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\(^1\)It seems reasonable to suppose that enhancing the diligence of the board is not without cost to the shareholders because otherwise why isn’t every board maximally diligent?

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hence, a sufficient condition for (2) to be decreasing in $\mu$ is that
\[
\frac{\partial^2 P^*}{\partial \mu \partial \delta} \leq 0;
\]
which holds, for example, if the directors’ cost function, $c(\cdot)$, is $p^2/2$, for then $P^* = \delta(V - \mu)$, the cross-partial derivative of which is $\Phi - 1 < 0$.

**Derivation of Expression 17**

The CEO loses his job if
\[
\hat{\mu} = \frac{\tau \mu + sy}{\tau + s} < -\Delta.
\]
Hence, the cutoff condition (the analog of expression (2)) becomes
\[
y < -\frac{\tau + s}{s} \Delta - \frac{\tau}{s} \mu \equiv \hat{Y}.
\] (4)

The firm’s expected earnings if the board will receive the signal $y$ are
\[
\hat{V} = \int_{-\infty}^{\infty} \max \left\{ -\Delta, \frac{\tau \mu + sy}{\tau + s} \right\} \sqrt{\frac{H}{2\pi}} e^{-\frac{y^2}{2}} dy,
\]
which, making the change of variables $z = \sqrt{H}(y - \mu)$, can be written
\[
\hat{V} = \int_{-\infty}^{\sqrt{H}(\hat{Y} - \mu)} -\Delta \phi(z) dz + \int_{\sqrt{H}(\hat{Y} - \mu)}^{\infty} \frac{\tau \mu + s}{\tau + s} \phi(z) dz
\]
\[
= -\Delta \Phi(\sqrt{H}(\hat{Y} - \mu)) + \mu \left[ 1 - \Phi(\sqrt{H}(\hat{Y} - \mu)) \right] + \int_{\sqrt{H}(\hat{Y} - \mu)}^{\infty} \frac{\sqrt{H}}{\tau} z \phi(z) dz,
\] (5)
where (5) uses the definition of $H$ to simplify from the previous line. Hence,
\[
\hat{V} = -\Delta \Phi(\sqrt{H}(\hat{Y} - \mu)) + \mu \left[ 1 - \Phi(\sqrt{H}(\hat{Y} - \mu)) \right] + \frac{\sqrt{H}}{\tau} \phi(\sqrt{H}(\hat{Y} - \mu)),
\]
which, using the symmetry of the standard normal about 0, can be written as
\[
(\mu + \Delta) \Phi(-\sqrt{H}(\hat{Y} - \mu)) + \frac{\sqrt{H}}{\tau} \phi(\sqrt{H}(\hat{Y} - \mu)) - \Delta.
\] (6)
From (4),
\[
\hat{Y} - \mu = -\frac{\tau + s}{s} (\mu + \Delta).
\]
Using the definition of $H$, this yields
\[
-\sqrt{H}(\hat{Y} - \mu) = \frac{\tau}{\sqrt{H}} (\mu + \Delta).
\]
Substituting the last expression into (6) yields expression (17) in the paper.