Discretionary Disclosure

Verrecchia (1983)

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Discretion in Disclosing Information

- Manager decides to release or withhold information (signal about true liquidating value of asset) based on the information's effect on the asset's market price
- Discretion is in the threshold of information quality above which he discloses what he observes, below which he withholds the information
- Rational expectations model
- Result comes from the cost of disclosure

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Delays in Reporting Accounting Numbers

- Dyer and McHugh (1975), Patell and Wolfson (1982)
- Proprietary cost could decrease over time. As cost decreases, threshold of disclosure decreases. This could link the results of this paper to empirical findings.
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Theoretical Work on Disclosure

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What is Disclosure Cost?

- Cost associated with disclosing information that may be proprietary in nature. Information could be useful to competitors, shareholders, employees, etc. in a way that may be harmful to a firm's prospects
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Cost Introduces Noise into the Model

- If information is withheld, traders are unsure if it was withheld because:
  - the information represents bad news
  - the information represents good news, but not sufficiently good news to warrant incurring the cost

Description of the Market and Timeline

- Two principal actors: manager of a risky asset and traders, whose expectations determine a price for the risky asset

1. Manager is endowed with a signal about the true liquidating value of the risky asset
2. Manager makes disclosure decision based on the information's effect on the price of the risky asset
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- Traders' prior beliefs about liquidating value $\tilde{u}$: $\tilde{u} \sim N(y_0, \frac{1}{h_0})$
  - Manager's signal $\tilde{y} = \tilde{u} + \tilde{\varepsilon}$
    - $\tilde{\varepsilon} \sim N(0, \frac{1}{s})$ is noise
- $P(\Omega) = \frac{E[\tilde{u}|\Omega] - \beta(var[\tilde{u}|\Omega])}{1+r_F}$
- β is a continuous, non-negative, non-decreasing function
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- If the manager discloses information, the liquidating value of the risky asset is reduced by the proprietary cost c
- When a manager discloses what he observes:
  - $P(\tilde{y} = y) = E[(\tilde{u} - c)|\tilde{y} = y] - \beta(var[\tilde{u}|\tilde{y} = y])$
- When a manager withholds information, the realization $y = \tilde{y}$ is below some point x:
  - $P(\tilde{y} = y \leq x) = E[\tilde{u}|\tilde{y} = y \leq x] - \beta(var[\tilde{u}|\tilde{y} = y \leq x])$

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- Threshold level of disclosure is a point $x \in \mathbb{R}$ such that the manager withholds $\tilde{y} = y$ whenever $y \leq x$ and discloses it otherwise
- Disclosure equilibrium is a threshold level of disclosure $\hat{x} \in \mathbb{R}$ satisfying:
  1. Choice of $\hat{x}$ maximizes the price of the risky asset for every observation $\tilde{y} = y$
  2. When a manager withholds information, traders conjecture that the manager's observation $\tilde{y} = y$ has the property $y \leq \hat{x}$

Preliminaries

- $P(\tilde{y} = y) = y_0 - c + \frac{s}{h_0+s}(y - y_0) - \beta(\frac{1}{h_0+s})$
- $P(\tilde{y} = y \leq x) = y_0 - \frac{h_0^{-1} g(x)}{G(x)} - \beta(k(x))$
  - $g(x) = \frac{1}{\sqrt{2\pi}} \sqrt{\frac{sh_0}{h_0+s}} exp\left(-\frac{1}{2}\frac{sh_0}{h_0+s}(x - y_0)^2\right)$
  - $G(x) = \int_{-\infty}^{x} g(t)dt$
  - $k(x) = h_0^{-1} - \frac{s}{h_0+s}(x - y_0)\frac{h_0^{-1} g(x)}{G(x)} - \left[\frac{h_0^{-1} g(x)}{G(x)}\right]^2$

When Information is Withheld

- $E(\tilde{u}|\tilde{y} = y \leq x) = y_0 - \frac{h_0^{-1} g(x)}{G(x)}$
  - $-\frac{h_0^{-1} g(x)}{G(x)}$ is an increasing function of x
  - $-\frac{h_0^{-1} g(x)}{G(x)}$ approaches $-\infty$ as x approaches $-\infty$ and 0 and as x approaches ∞
- $lim_{x \to -\infty} E(\tilde{u}|\tilde{y} = y \leq x) = -\infty$
- $lim_{x \to \infty} E(\tilde{u}|\tilde{y} = y \leq x) = y_0$

When Information is Withheld (cont'd)

- $var(\tilde{u}|\tilde{y} = y \leq x) = k(x) =$
  $h_0^{-1} - \frac{s}{h_0+s}(x - y_0)\frac{h_0^{-1}g(x)}{G(x)} - \left[\frac{h_0^{-1}g(x)}{G(x)}\right]^2$
  - increasing function of x
  - approaches $\frac{1}{h_0+s}$ as x approaches $-\infty$ and $\frac{1}{h_0}$ and as x approaches ∞
- When information is withheld, the conditional variance of $\tilde{u}$ increases as the threshold level x increases

Lemma

- $\frac{1}{h_0+s} \leq k(x) \leq \frac{1}{h_0}$
- $k'(x) > 0$
- $lim_{x \to -\infty} k(x) = \frac{1}{h_0+s}$
- $lim_{x \to -\infty} k(x) = \frac{1}{h_0}$
- $\frac{d}{dx}\left\{\frac{h_0^{-1} g(x)}{G(x)}\right\} = h_0(k(x) - \frac{1}{h_0})$

Equilibrium

- Disclosure equilibrium is a threshold level of disclosure $\hat{x} \in \mathbb{R}$ satisfying:
  1. Choice of $\hat{x}$ maximizes the price of the risky asset for every observation $\tilde{y} = y$
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Determining the Threshold

- Manager withholds information whenever $P(\tilde{y} = y) \leq P(\tilde{y} = y \leq x)$
- $y \leq y_0 + \left[\frac{h_0+s}{s}\right]\left[c - \frac{h_0^{-1}g(x)}{G(x)} + \beta(\frac{1}{h_0+s}) - \beta(k(x))\right]$
- Traders infer that $y \leq x$ when the manager withholds information
- $\hat{x} = y_0 + \left[\frac{h_0+s}{s}\right]\left[c - \frac{h_0^{-1}g(x)}{G(x)} + \beta(\frac{1}{h_0+s}) - \beta(k(x))\right]$

Theorem

There exists a unique discretionary disclosure equilibrium whenever the proprietary cost is positive

Proof of Theorem

- Prove existence of $\hat{x} \in \mathbb{R}$ such that $F(\hat{x}) = c$
- $F(x) = \frac{s}{h_0+s}(x - y_0) + \frac{h_0^{-1} g(x)}{G(x)} + \beta(k(x)) - \beta(\frac{1}{h_0+s})$
  1. $F(x)$ is non-negative
  2. $F(x)$ is increasing
  3. $lim_{x \to -\infty} F(x) = 0$
  4. $lim_{x \to \infty} F(x) = \infty$
- There exists a unique, finite, real-valued $\hat{x}$ such that $F(\hat{x}) = c$

Examples

- When $c = 0$, the threshold x is $-\infty$ (manager always discloses what he observes)
- Proprietary costs that are not constant: $c(y) = \alpha|y - y_0| + c_0$

Corollary

The threshold level is an increasing function of the proprietary cost