Activism, Strategic Trading, and Market Liquidity

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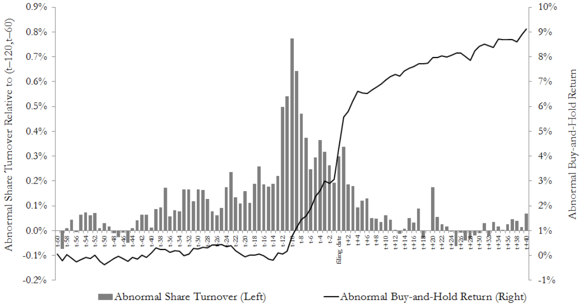
Share-holder Activism

- Activists play central role in modern corporate governance and are often successful in increasing the value of targeted companies (Icahn, Buffett, Ackman, Peltz, Loeb).

- Feb 2015 issue of The Economist called them "Capitalism's unlikely heroes."
  - Assets under management more than doubled since 2008 to close to $120 billion of capital in 2014, where it attracted a fifth of all flows into hedge funds.
  - According to the Economist: "Last year Activists launched 344 campaigns against public companies, large and small. In the past five years one company in two in the S&P 500 index of Americas most valuable listed firms has had a big activist fund on its share register, and one in seven has been on the receiving end of an activist attack."

Activism: Schedule 13D Disclosure Rules

- Activists typically accumulate shares by trading anonymously in secondary markets.
- When their stake hits 5%, SEC requires they disclose within 10 days:
  - (i) their holdings and intentions (Brav et al. 2008) (e.g., *Corporate governance action, Management shake-up, M&A transaction, Capital structure change, Cost reduction measures, Dividend payouts, Share buybacks, . . .*)
  - (ii) all their trades during prior 60 days (CD and Fos (2015)):



Activism and Shareholder Value

- Schedule 13D activists:
  - own 7.2% stake on average on the filing date
  - increase share-holder value significantly (+6% excess returns in 30 days pre-filing) and persistently
  - target more liquid stocks (and trade when liquidity is high).

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⇒ Raises questions about economic efficiency (and market liquidity).

Background

- Link between market liquidity (price efficiency), corporate governance (activism), and firm value (economic efficiency):
  - Suppose activist can create (or destroy) value at some cost (e.g., governance).
  - Profitability depends on ability to buy (or sell) shares before market reflects full value (Maug (1998)).
  - Conversely, if market reflects value of activism, market liquidity may allow activist to sell out of her stake and hurt share-holders (Coffee (1991), Bhide (1993)).

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- Kyle (1985) proposes seminal model of strategic trading by informed investor:
  - Risk-neutral trader knows exogenous firm value V
  - Market marker sets price equal to expected value given she observes only total order flow (equal to informed trading plus noise).

  $\Rightarrow$ (a) Optimal trading strategy, (b) Equilibrium price dynamics, (c) Market liquidity.

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- We endogenize the liquidation value $V(X_T)$ by modeling the effort choice of the activist as a function of the accumulated stake.

Types of activism

- Activist asks to increase payouts (larger effort leads to a larger change in firm value)
- Activist risk arbitrageur influences an M&A deal (larger effort leads to a higher probability of success)
- Activist requires to fire a CEO (binary outcome and non-binary effort)
- Activist nominates an alternative slate of board members (the outcome depends on activist's effort)
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It is an open question whether and how the relation between market liquidity and economic efficiency depends on the activism technology.

Related Literature

- The microstructure literature
  Kyle, 1985; Glosten and Milgrom, 1985; Easley and O'Hare, 1987; Back, 1992
- Take-over literature
  Grossman and Hart (1980), Shleifer and Vishny (1986) , Kyle and Vila (1991)
- Corporate governance literature
  Coffee (1991), Bhide (1993), Admati, Pfleiderer, and Zechner (1994), Maug (1998)
- Dynamic model of governance
  DeMarzo and Urosevic (2006), Back, Li, Ljungqvist (2014), CD and Fos (2014)
- Market efficiency and disclosure rules:
  Grossman and Stiglitz (1980), Fishman and Haggerty (1995)
- Insider trading:
  Glosten (1989), Fishman and Haggerty (1992)

Model Setup

- Given a price function $P(t, Y_t)$, the activist seeks to maximize

$$\max_{v,\theta} \mathrm{E}\left[v\, X_T - C(v) - \int_0^T P(t, Y_t)\theta_t \, \mathrm{d}t \mid X_0 \right]. \quad (1)$$

where

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- $X_t = X_0 + \int_0^t \theta_s ds$ is aggregate stock position of activist.

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- Market Maker has prior $X_0 \sim N(\mu_X, \sigma_X^2)$ and observes total order flow Y_t:

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- An equilibrium is a pair (P, θ) s.t. trading strategy θ maximizes (1) given P and

$$P(t, Y_t) = \mathrm{E}\left[V(X_T) \mid \mathcal{F}_t^Y \right] \tag{2}$$

  for each t, given θ and where $V(x) = \mathrm{argmax}_v \{vx - C(v)\}$

Some Examples of Cost function

- Symmetric quadratic (continuous) cost: $C(v) = (v - v_0)^2/(2\psi)$:

Linear $V(x) = v_0 + \psi x$

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- Binary (all or nothing): It costs $c > 0$ to increase stock value from v_0 to $v_0 + \Delta$.

  Digital $V(x) = v_0 + \Delta \mathbf{1}_{[c/\Delta, \infty)}(x)$

Equilibrium

Theorem

The pricing rule $P(t, Y_t) = \mathsf{E}\left[h(Y_T)\,|\mathcal{F}_t^Y\right]$ *with* $h(y) = V\left(\mu_x + \Lambda\, y\right)$ *and the trading strategy:*

$$\theta_t = \frac{1}{T-t}\,\frac{(X_t - \mu_x - \Lambda Y_t)}{\Lambda - 2}\,, \tag{3}$$

where $\Lambda = 1 + \sqrt{1 + \frac{\sigma_x^2}{\sigma^2 T}}$ *only depends on the signal to noise ratio, constitute an equilibrium such that:*

- $dP(t, Y_t) = \lambda(t, Y_t)dY_t$ *with* $\lambda(t, y) = \frac{\partial P(t,y)}{\partial y}$.
- *Price impact* $\lambda(t, Y_t)$ *is a martingale.*
- $P(T, Y_T) = V(X_T)$ *almost surely.*
- $\mathsf{E}[\theta_t \,|\, \mathcal{F}_t^Y] = 0$.
- $X_T \sim$ **Normal** $\left[\mu_x, (\sigma\sqrt{T} + \sqrt{\sigma^2 T + \sigma_x^2})^2\right]$.

Equilibrium trading strategy

- $dY_t = \theta_t dt + \sigma dZ_t$ is a Brownian Motion with volatility σ on its own (i.e., market maker's) filtration
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- Remarkably, the optimal trading strategy, $\theta_t = \frac{1}{T-t}\frac{(X_t - \mu_x - \Lambda Y_t)}{\Lambda - 2}$, is independent of the effort cost $(C(v), V(x))$ when expressed as a function of Y_t, X_t.
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  - Instead, the cost function $C(v)$ determines $V(x)$ and thus affects the price function $P(t, Y)$ and the amount of effort expended.
- Different from Kyle, the optimal trading strategy depends positively on the number of accumulated shares (X_t)
  - → Amplification effect: The informed (activist) more than offsets the cumulative noise trading demand because the value of activism increases with activist's ownership.
  - → Evidence on activists' trading strategies
  - → The endogenous value of the firm depends on the amount of realized liquidity trading.

Examples: the symmetric quadratic model

Example

In the symmetric quadratic model, $V(x) = v_0 + \psi x$, so

$$h(y) = v_0 + \psi\mu_x + \psi\Lambda\, y\,.$$

The price function at any time $t \leq T$ is given by:

$$P(y,t) = v_0 + \psi\mu_x + \psi\Lambda y \tag{4}$$

The price impact function is given by:

$$\lambda(y,t) = \psi\Lambda \tag{5}$$

This case resembles the original Kyle model:

- Price impact is constant
- However, $\lim_{\sigma\to 0}\lambda = \psi > 0$ ('endogenous uncertainty'!).

Examples: the asymmetric quadratic model

Example

In the asymmetric quadratic model, $V(x) = v_0 + \psi x^+$, so

$$\begin{aligned} h(y) &= v_0 + \psi\left(\mu_x + \Lambda y\right)^+ \\ &= \begin{cases} v_0 & \text{if } y < -\frac{\mu_x}{\Lambda} \quad , \\ v_0 + \psi\mu_x + \psi\Lambda\, y & \text{otherwise} \quad . \end{cases} \end{aligned}$$

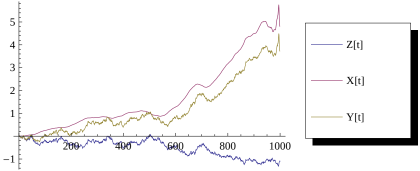
The price function at any time $t \leq T$ is given by:

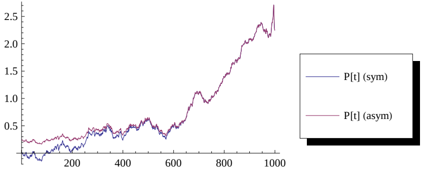
$$P(y,t) = v_0 + \psi(\mu_x + \Lambda y)\mathrm{N}\left[\frac{\mu_x + \Lambda y}{\Lambda\sigma\sqrt{T-t}}\right] + \psi\Lambda\sigma\sqrt{T-t}\mathrm{n}\left[\frac{\mu_x + \Lambda y}{\Lambda\sigma\sqrt{T-t}}\right] \tag{6}$$

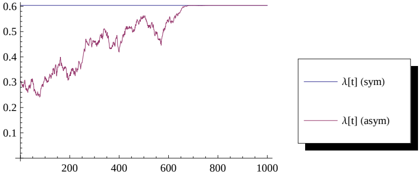
The price impact function is given by:

$$\lambda(y,t) = \psi\Lambda\mathrm{N}\left[\frac{\mu_x + \Lambda y}{\Lambda\sigma\sqrt{T-t}}\right] \tag{7}$$

Symmetric vs. asymmetric quadratic cost function







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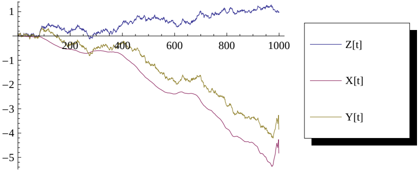

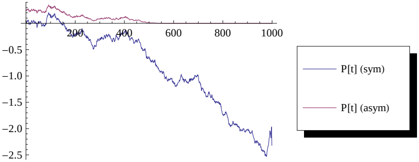

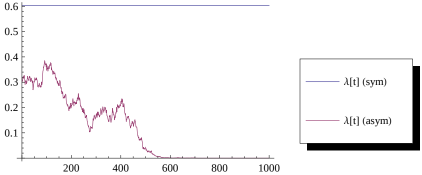

Examples: the exponential model

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$$h(y) = v_0 e^{\psi(\mu_x + \Lambda y)}$$

The price function at any time $t \leq T$ is given by:

$$P(y,t) = v_0 e^{\psi\left(\mu_x + \Lambda y + \frac{1}{2}\Lambda^2 \sigma^2 (T-t)\right)} \tag{8}$$

The price impact function is given by:

$$\lambda(y,t) = \Lambda\, P(y,t) \tag{9}$$

A Black-Scholes price process with a price-volume relationship.

Examples: the binary effort model

Example

In the binary effort model,

$$V(x) = v_0 + \Delta \mathbf{1}_{[c/\Delta,\infty)}(x)\,,$$

so

$$\begin{aligned} h(y) &= v_0 + \Delta \mathbf{1}_{[c/\Delta,\infty)}\left(\mu_x + \Lambda y\right) \\ &= \begin{cases} v_0 & \text{if } y < \frac{(c/\Delta - \mu_x)}{\Lambda}\,, \\ v_0 + \Delta & \text{otherwise}\,. \end{cases} \end{aligned}$$

It follows that the price function at any time $t \leq T$ is given by:

$$P(y,t) = v_0 + \Delta \mathrm{N}\left[\frac{\mu_x + \Lambda y - c/\Delta}{\Lambda\sigma\sqrt{T-t}}\right] \tag{10}$$

The price impact is given by: $\lambda(y,t) = \frac{\partial P(y,t)}{\partial y} = \Delta \frac{\mathrm{n}\left[\frac{\mu_x + \Lambda y - c/\Delta}{\Lambda\sigma\sqrt{T-t}}\right]}{\sigma\sqrt{T-t}}$

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- Importantly, market liquidity (λ) can be affected by different channels:
  - Noise trading volatility (σ) $\sim$ Trading tax or length of disclosure window.
  - Prior uncertainty about insider's position (σ_X) $\sim$ Disclosure rules.
  - Initial block size (μ_x).
  - Productivity of the activist (Δ, ψ) $\sim$ Legal environment.

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  - Initial block size (μ_x).
  - Productivity of the activist (Δ, ψ) $\sim$ Legal environment.
- These channels also have different implications for economic efficiency.
  - $\Rightarrow$ We consider separately the ex-ante impact at date 0 when $Y_0 = 0$ of a change in $\sigma, \mu_x, \sigma_x, \psi$ on price (economic efficiency) and price impact (market liquidity).

Productivity of the activist

Example

In all (symmetric, asymmetric quadratic, exponential, binary) models:

$$\frac{\partial P}{\partial \psi} > 0 \quad \text{and} \quad \frac{\partial \lambda}{\partial \psi} > 0$$

- Variation in activism productivity generates negative cross-sectional relation between economic efficiency and market liquidity, because uncertainty about the activist's position creates more adverse selection when she is more productive.
- The causality (activism $\rightarrow$ liquidity) is reverse of what the literature has focused on.

Prior uncertainty about activist's position

Example

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A general result obtains (since σ_x is mean-preserving spread for X_T):

Theorem

If $V(x)$ is convex then $\frac{\partial P}{\partial \sigma_x} \geq 0$ (and conversely if $V(x)$ is concave)

If $V(x)$ satisfies mild regularity conditions $\frac{\partial \lambda}{\partial \sigma_x} > 0$

- If $V(x)$ is convex then cross-sectional variation in μ_x, σ_x creates a negative relation between economic efficiency and market liquidity, because activism $\rightarrow$ liquidity.

Prior uncertainty about activist's position - cont.

Example

In the binary effort model, $\frac{\partial P}{\partial \sigma_x} \geq 0 \iff \mu_x \leq c/\Delta$ and $\frac{\partial \lambda}{\partial \sigma_x} > 0$

- Cross-sectional variation in μ_x, σ_x creates a negative relation between economic efficiency and market liquidity if only if the expected initial take is too low to justify activism on its own.
- More uncertainty about the insider's position:
  - creates more adverse selection risk and makes markets less liquid.
  - increases the likelihood that actual stake X_0 is large enough to become active if $\mu_x \leq c/\Delta$.

Noise trading volatility

Example

In the symmetric quadratic model: $\frac{\partial P}{\partial \sigma} = 0$ and $\frac{\partial \lambda}{\partial \sigma} < 0$

Example

In the asymmetric quadratic model: $\frac{\partial P}{\partial \sigma} > 0$ and $\frac{\partial \lambda}{\partial \sigma} < 0$

A general result obtains (since an increase in σ is mean-preserving spread for X_T):

Theorem

If $V(x)$ is convex then $\frac{\partial P}{\partial \sigma} \geq 0$ (and conversely if $V(x)$ is concave then $\frac{\partial P}{\partial \sigma} \leq 0$)

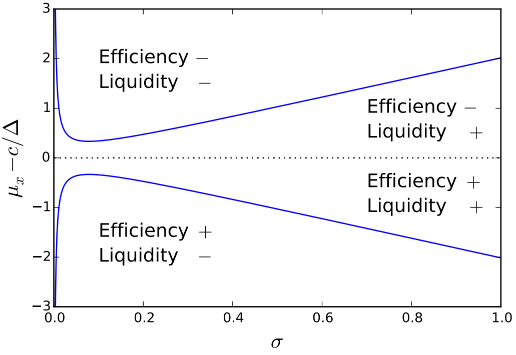
However, comparative statics for market liquidity λ are less straightforward.

Noise trading volatility - cont.

Example

In the binary effort model,

$$\left\{ \frac{\partial P}{\partial \sigma} \geq 0 \iff \mu_x \leq c/\Delta \right\} \quad \text{and} \quad \left\{ \frac{\partial \lambda}{\partial \sigma} < 0 \iff |\mu_x - c/\Delta|^2 < T\sigma^2\Lambda^2(\Lambda - 1) \right\}$$



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- Three key results:
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  - Increase in noise trading does not necessary improve market liquidity.
  - The relation between activism and liquidity depends on the source of variation in either.
- The paper informs about consequences of policy change such as trading tax, changing disclosure rules, disclosure window, legal environment.