Risk-taking, Rent-seeking, and Corporate Short-Termism when Financial Markets are Noisy

Elias Albagli – Central Bank of Chile

Christian Hellwig – Toulouse School of Economics

Aleh Tsyvinski– Yale University

Motivation

Conventional wisdom on firm investment, managerial incentives, and financial markets

1. Shareholder Value Maximization:
   - Optimal firm decisions should focus on maximizing stock market valuation
2. Efficient Markets Hypothesis:
   - Shareholder and firm's incentives aligned with social welfare when $P(z; k) = V(z; k)$
3. Pay-for-Performance Contracts:
   - Align firm and shareholder's incentives by tying compensation to share price
4. Regulation: Optimality of *Laisser Faire*
   - No need for, but possibly harm from, regulatory or market interventions

This paper: *Explore impact of Shareholder Value Maximization on firm decisions decisions, when financial markets are not efficient*

Contribution and Results

Revisit "conventional wisdom" when EMH fails

- Stage 1: firm takes an investment decision
- Stage 2: incumbent shareholders sell fraction of shares in financial market with *noisy info aggregation*

Key insights/results

1. **Market friction**: Ex ante, market returns $\neq$ fundamental returns
   - Firm's investment decisions distorted by shareholder rent-seeking
2. **Applications**
   - Excess risk-taking and leverage
   - Social value of public information
   - Sensitivity of investment to stock prices
   - Time inconsistency in firm's decisions
3. **Normative implications**
   - Managerial incentives
   - Direct regulation; tax policies; market interventions

Literature

1. **Information aggregation and real investment**
   - Leland (JPE 92); Dow and Gorton (JF 97); Subrahmanyam and Titman (JF 99); Dow and Rahi (JB 03); Chen, Goldstein and Jiang (RFS 07); Goldstein and Guembel (REStud 08); Roll, Schwartz and Subrahmanyam (JFE 09).
2. **Managerial compensation and investment efficiency**
   - Stein (QJE 89); Bebchuk and Fried (JEP 03); Bolton, Scheinkman, and Xiong (RES 06); Benmelech, Kandel and Veronesi (QJE 10).

Roadmap

1. Baseline Model
2. Investment with Market Frictions
3. Applications
4. Managerial incentives and normative implications

Baseline Model

Setup

- Three periods: $t = 1, 2, 3$.
  - $t = 1$: investment $k \geq 0$ is chosen by incumbent shareholders (or manager hired by them)
  - $t = 2$: firm shares traded in financial markets. Incumbent shareholders sell fraction α of shares
  - $t = 3$: dividend $\Pi(\theta, k) = R(\theta) \cdot k - C(k), \quad \theta \sim N(0, \lambda^{-1})$
- $t = 2$: (financial market)
  - risk neutral informed traders: observe $x_i \sim N(\theta, \beta^{-1})$; purchase $d_i(x, P) \in (0, \alpha)$
  - Noise traders: demand $\alpha\Phi(u)$; $u \sim N(0, \delta^{-1})$
  - market clears at $P = P(\theta, u)$

Equilibrium characterization

1. Demand strategy: threshold $\hat{\mathbf{x}}(\mathbf{P})$

$$\mathbf{d}(\mathbf{x},\mathbf{P}) = \begin{cases} \alpha & \text{if } \mathbf{x_i} \geq \hat{\mathbf{x}}(\mathbf{P}) \\ \mathbf{0} & \text{if } \mathbf{x_i} < \hat{\mathbf{x}}(\mathbf{P}) \end{cases}$$

2. Price = dividend expectation of *marginal* trader ($x_i = \hat{\mathbf{x}}(\mathbf{P})$)

$$\mathbf{P} \quad = \quad \mathbb{E}[\Pi(\theta, k)|x_i = \hat{\mathbf{x}}(\mathbf{P}), \mathbf{P}]$$

3. Market clearing (info aggregation):

$$\begin{aligned} \alpha &= \int \mathbf{d}(\mathbf{x_i},\mathbf{P}) d\Phi(\sqrt{\beta}(x-\theta)) + \alpha \Phi(u) \\ \Rightarrow \hat{\mathbf{x}}(\mathbf{P}) &= \theta + 1/\sqrt{\beta} \cdot u \equiv \mathbf{z} \end{aligned}$$

→ $\mathbf{P}$ *info equivalent* to $\hat{\mathbf{x}}(\mathbf{P}) = \mathbf{z}$: endogenous signal (precision $\beta\delta$)

Information Aggregation Wedge

- $\mathbf{V}(\mathbf{z}) \equiv \mathbb{E}[R(\theta)|\mathbf{z}] \cdot k - C(k)$
  - Expected dividend, conditional on **public signal** $\mathbf{z}$ only
  - Bayesian weight γ_V on signal $\mathbf{z}$

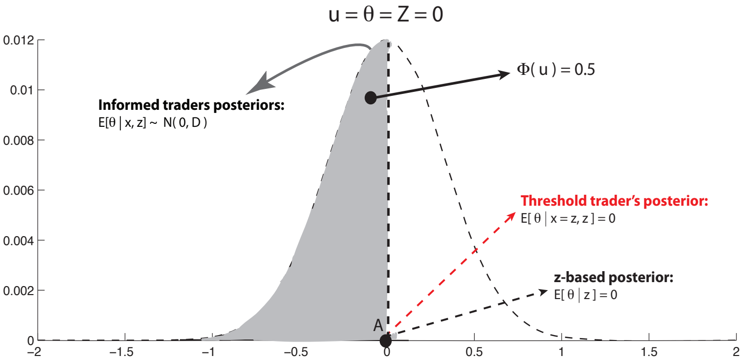
- $\mathbf{P}(\mathbf{z}) = \mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}] \cdot k - C(k)$
  - Threshold trader conditions on **public signal** $\mathbf{z}$; **private signal** $\mathbf{x_i} = \mathbf{z}$
  - Bayesian weight $\gamma_P > \gamma_V$ on signal $\mathbf{z}$
  - Price conveys information, but must also **clear the market**

- **Information aggregation wedge:**

$$\boldsymbol{\Omega}(\mathbf{z}) \equiv \mathbf{P}(\mathbf{z}) - \mathbf{V}(\mathbf{z}) = k \cdot \{\, \mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}] - \mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}] \,\}$$

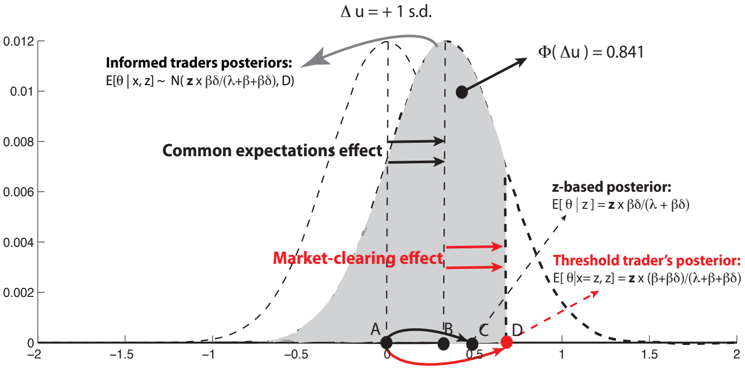
  - depends on realization of $\mathbf{z}$
  - magnitude **scales up** with manager's investment choice k

Posterior beliefs: no shocks



→ Posterior of mean and mg trader coincide

Posterior beliefs: $\Delta u = +1\ s.d.$

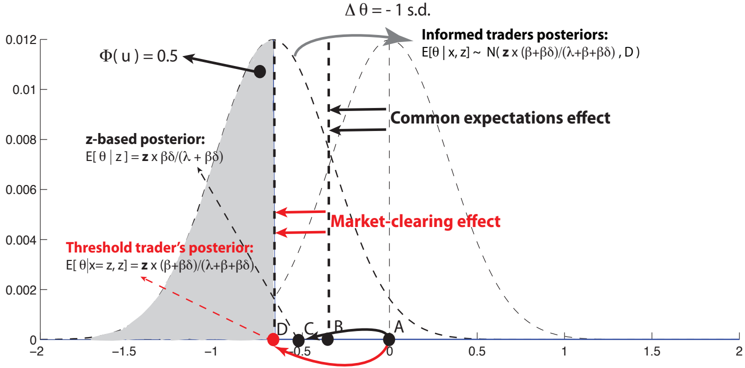


→ (+) Noisy demand shock: prices increase – higher signal z

→ All traders' posteriors increase due to higher z: **common expectations effect**

→ But to accommodate Δu, posterior of mg trader must increase more: **market clearing effect**

Posterior beliefs: $\Delta\theta = -1\ s.d.$



→ (−) Fundamentals shock: prices fall – higher signal z

→ All traders' posteriors fall due to lower z: **common expectations effect**

→ But since private signals are lower, informed traders' demands drop even more: **market clearing effect**

Unconditional Wedge

Lemma (unconditional wedge): for any $k \geq 0$, the unconditional wedge is given by

$$\mathbb{E}[\boldsymbol{\Omega}(\mathbf{z})] = k \cdot \int_0^\infty (R'(\theta) - R'(-\theta))(\Phi(\sqrt{\lambda} \cdot \theta) - \Phi(\sqrt{\lambda_P} \cdot \theta))d\theta.$$

- 1st component: **shape** of $R(\theta)$ (cash flow risks)
- 2nd component: **informational frictions** $\lambda_P^{-1} > \lambda^{-1}$
  - λ_P^{-1}: market-implied variance of fundamental
  - Increases in degree of information frictions: precision of private vs. public info
- 3rd component: endogenous investment decision, k

Theorem: unconditional wedge and cash-flow risks

(i) If $R(\cdot)$ has *symmetric risk*: $\mathbb{E}[\boldsymbol{\Omega}(\cdot)] = 0$

(ii) If $R(\cdot)$ has *upside risk*: $\mathbb{E}[\boldsymbol{\Omega}(\cdot)] > 0$

(iii) If $R(\cdot)$ has *downside risk*: $\mathbb{E}[\boldsymbol{\Omega}(\cdot)] < 0$

(iv) for given k, $|\mathbb{E}[\boldsymbol{\Omega}(\cdot)]|$ increasing in info frictions λ_P^{-1}

Investment with Market Frictions

Over- and under-investment

- Efficient investment: $C'(k^*) = \mathbb{E}[R(\theta)]$
- Investment chosen by incumbent shareholders:

$$C'(\hat{k}) = \alpha \cdot \mathbb{E}\{\mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}]\} + (1-\alpha) \cdot \mathbb{E}[R(\theta)]$$

Proposition: over- and under-investment

- (i) $\hat{k} \gtreqless k^*$ whenever $\mathbb{E}\{\mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}]\} \gtreqless \mathbb{E}[R(\theta)]$
  - Prices differ systematically from dividends, due to info frictions in financial market
  - Incumbents will over-invest if $R(\theta)$ has upside risk: $E[P] > E[\Pi(\cdot)]$
  - ...and under-invest if $R(\theta)$ has downside risk $E[P] < E[\Pi(\cdot)]$
- (ii) If $R(\cdot)$ has upside/downside risk, $|\hat{k}/k^* - 1|$ increasing in λ_P^{-1}

Efficiency losses

- Efficiency benchmark: $\Delta \equiv 1 - \hat{V}/V^*$, with

$$V^* \equiv \mathbb{E}[R(\theta)] \cdot k^* - C(k^*), \quad \text{and} \quad \hat{V} \equiv \mathbb{E}[R(\theta)] \cdot \hat{k} - C(\hat{k})$$

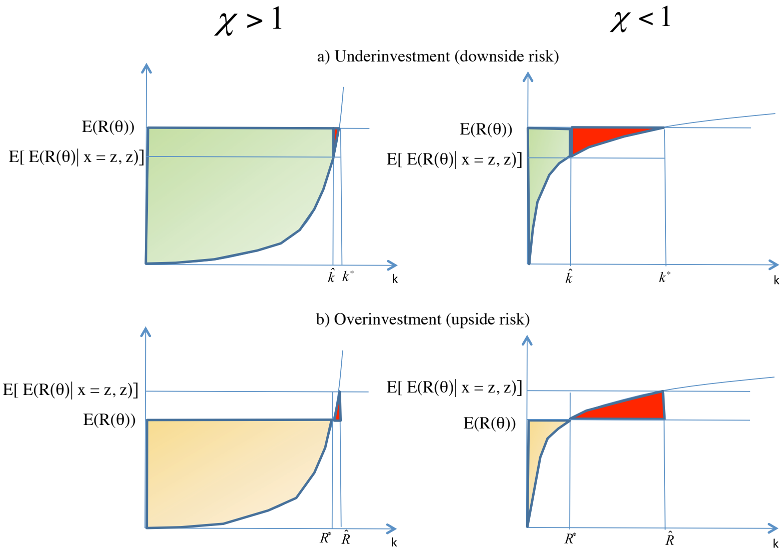
- Let $C(k) = k^{1+\chi}/(1+\chi)$

Proposition: efficiency losses

- (i) Comp statics: $\Delta = 0$ iff $\mathbb{E}\{\mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}]\} = \mathbb{E}[R(\theta)]$, or when $\chi \to \infty$
- (ii) Bounded losses on downside: if $\mathbb{E}\{\mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}]\} < \mathbb{E}[R(\theta)]$, then $\Delta < 1$
- (iii) Unbounded losses on upside: if $\mathbb{E}\{\mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}]\} > \mathbb{E}[R(\theta)]$, then $\Delta \to \infty$ if
  - $\mathbb{E}\{\mathbb{E}[R(\theta)|\mathbf{x} = \mathbf{z}, \mathbf{z}]\}/\mathbb{E}[R(\theta)] \to \infty$, or
  - $\chi \to 0$
- (iv) Negative expected dividends: implemented $\hat{k}$ leads to $\mathbb{E}(\Pi(\theta)) < 0$ whenever:

$$\alpha \left(\frac{\mathbb{E}\{\mathbb{E}(R(\theta)|x = z, z)\}}{\mathbb{E}(R(\theta))} - 1 \right) > \chi$$

Investment distortions and efficiency losses



Applications

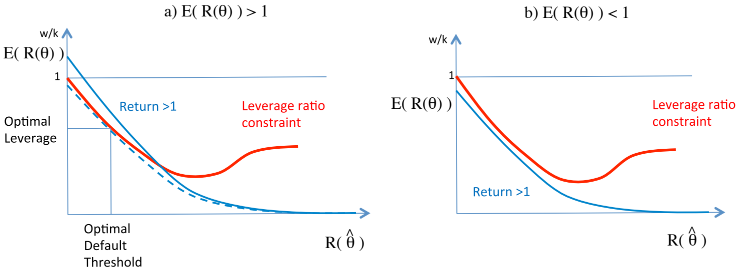
Application 1: Leverage and risk-taking

- Internal funds at $t = 1$: w. If $k > w$, must borrow $b \geq k - w$ (cost $= k$)
- Costly state verification: Lender must pay $\varepsilon R(\theta)$ to verify dividend
- Contract design
  - Firm borrows $b \geq k - w$. Promises payoff B. Lender verifies upon default.
  - Default threshold $\hat{\theta}$: $B = R(\hat{\theta})$
- Lender break-even condition: $\frac{b}{k} \leq (1-\varepsilon)\int_{-\infty}^{\hat{\theta}} R(\theta) d\Phi\left(\sqrt{\lambda}\theta\right) + R(\hat{\theta})\left(1 - \Phi\left(\sqrt{\lambda}\theta\right)\right)$

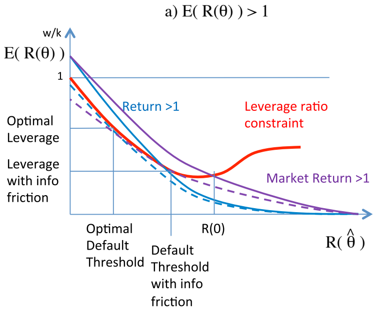
$$\frac{w}{k} \geq \underbrace{1 - \mathbb{E}[R(\theta)] + \varepsilon \int_{-\infty}^{\hat{\theta}} R(\theta) d\Phi\left(\sqrt{\lambda}\theta\right) + \int_{\hat{\theta}}^{\infty}\left(R(\theta) - R(\hat{\theta})\right) d\Phi\left(\sqrt{\lambda}\theta\right)}_{\text{leverage ratio restriction}}$$

- Incumbents' return: $\rho\left(w/k, \hat{\theta}\right) = (k/w) \cdot \int_{\hat{\theta}}^{\infty}\left(R(\theta) - R(\hat{\theta})\right) d\Phi\left(\sqrt{\lambda}\theta\right)$

Efficient leverage and investment



Leverage and investment with information frictions



Application 1: Leverage and risk-taking

Proposition: market frictions cause excessive leverage and risk-taking

(i) Excess leverage and risk-taking

- If $R(\theta)$ symmetric, or with upside risk, and $\mathbb{E}[R(\theta)] > 1$: $\Rightarrow \hat{k} > k^*, \hat{\theta} > \theta^*$

(ii) Inefficient investment

- There exists $\bar{R} < 2$, s.t. if $\lim_{\theta \to \infty} R(\theta) > \bar{R}$, and λ_P^{-1} sufficiently large, incumbent shareholders will borrow and invest $\hat{k} > w$

- Intuition
  - Bankruptcy costs limits borrowing and investment: tradeoff returns vs. increased borrowing costs
  - Market frictions: borrowing costs partially offset by upside shift of incumbents' payoffs
  - Leads to higher investment, larger borrowing
  - Might invest even if $\mathbb{E}[R(\theta)] < 1$
  - Might over invest even if $R(\cdot)$ has downside risk: leverage convexifies incumbents' payoffs

Application 2: Social Value of Public Information

- Now, a noisy public signal is observed at $t = 1$: $y \sim N(\theta, \kappa^{-1})$
  - New prior of θ: $\theta \sim N\left(\frac{\kappa}{\lambda+\kappa}y, (\lambda+\kappa)^{-1}\right)$
- Let $R(\theta) = e^{\theta}$, and $C(k) = k^{1+\chi}/(1+\chi)$

Proposition: noisy public news may reduce welfare

- If $1+\chi < e^{\frac{1}{2\delta(\beta+\beta\delta)}}$, there exists $\hat{\kappa} > 0$ s.t. $\hat{V} < 0$, and $\partial\hat{V}/\partial\kappa < 0$ for $\lambda+\kappa \leq \hat{\kappa}$.
- $\hat{\kappa} \to \infty$ as $\chi \to 0$
- Intuition
  - Public signal offers additional margin to shift rents
  - Public signal predicts future value of z, helps align k with market returns

Application 3: Stock-price Sensitivity of Investment

- Assume now investment is undertaken conditional on z
  - Incumbent shareholders choose $k(z)$ ex ante; implemented by the firm after market opens
  - (Commitment results from internal procedures/status quo bias, or managerial incentives)
- Investors can infer $k(z)$, so eq. characterization is as before
- $\hat{k}(z)$ now satisfies:

$$C'\left(\hat{k}(z)\right) = \alpha(\mathbb{E}(R(\theta)|x = z, z)) + (1-\alpha)(\mathbb{E}(R(\theta)|z))$$

- Relative to $k^*(z)$, $\hat{k}(z)$ is more aligned with market's expectations of returns

  $\rightarrow$ *Endogenous* element of upside risk!

Distorting the response to market signals

Let $\hat{z}$ be such that $\mathbb{E}(R(\theta)|x = z, z) \gtreqless \mathbb{E}(R(\theta)|z)$, for $z \gtreqless \hat{z}$.

Proposition: Endogenous Upside Risk

(i) **Increased Shareholder Rents:** $\mathbb{E}(\Omega(z, k(z))) > \mathbb{E}(\Omega(z, k(\hat{z}))$.

(ii) **Endogenous upside risk:** $\mathbb{E}(\Omega(z, k(z))) > 0$ if either $\mathbb{E}(R(\theta)|x = z, z) \geq \mathbb{E}(R(\theta)|z)$, or $\mathbb{E}(R(\theta)|x = z, z) \leq \mathbb{E}(R(\theta)|z)$ and $inf_z k'(z)/k(z)$ sufficiently large.

- (iii) **Unbounded Rents:** If $inf_z k'(z)/k(z) \to \infty$, then $\mathbb{E}(\Omega(z, k(z))) \to \infty$, for any $R(\cdot)$.

Intuition: we can write $\mathbb{E}(\Omega(z, k(z))) = \mathbb{E}(\Omega(z, \mathbb{E}(k(z)))) + Cov\{k(z); \mathbb{E}(R(\theta)|x = z, z) - \mathbb{E}(R(\theta)|z)\}$

- First term: expected wedge when $k(z)$ set at its unconditional value
- Second term: endogenous feedback from prices to investment $\to$ enhances upside risk!

Excess Sensitivity of Investment

Proposition: Market noise creates investment volatility

(i) **Excess investment sensitivity:** Investment distortion $|\hat{k}(z)/k^*(z) - 1|$ increases in z.

(ii) **Fundamentals vs. market noise:** If market noise is sufficiently important, investment volatility is high, but correlation with future returns is low.

(iii) **Unbounded rents and welfare losses:** If market friction sufficiently important, or $\chi \to 0$, $\mathbb{E}(\Omega(z, k(z)))$ is unboundedly large, but $\mathbb{E}(V(z); k(z))$ lower than with pre-determined investment $\hat{k}$.

Application 4: Time-inconsistency in firm's decisions

- Assume now technology is: $\Pi(\theta, k, \ell) = e^{\theta} k^{\sigma} \ell^{1-\sigma} - \ell - C(k)$
  - Ex-ante decision: incumbent shareholders choose k
  - Ex-post decision (after $P(k, z)$ observed): new shareholders choose ℓ
- Surplus max. choice of inputs
  - $\ell^*(z) = k^*(1-\sigma)^{\frac{1}{\sigma}} \mathbb{E}\left(e^{\theta}|z\right)^{\frac{1}{\sigma}}$,
  - $C'(k^*) = \sigma(1-\sigma)^{\frac{1-\sigma}{\sigma}} \mathbb{E}\left(\mathbb{E}\left(e^{\theta}|z\right)^{\frac{1}{\sigma}}\right)$
- Incumbent shareholders preferred choices: max. value of share price
  - $\hat{\ell}(z) = \hat{k}(1-\sigma)^{\frac{1}{\sigma}} \mathbb{E}\left(e^{\theta}|x = z, z\right)^{\frac{1}{\sigma}}$,
  - $C'(\hat{k}) = \sigma(1-\sigma)^{\frac{1-\sigma}{\sigma}} \mathbb{E}\left(\mathbb{E}\left(e^{\theta}|x = z, z\right)^{\frac{1}{\sigma}}\right)$

Application 4: Time-inconsistency in firm's decisions

- What does firm end up choosing, with sequential decision-making by different shareholders?
  - New shareholders will choose: $\tilde{\ell}(z) = \tilde{k}(1-\sigma)^{\frac{1}{\sigma}} \mathbb{E}\left(e^{\theta}|z\right)^{\frac{1}{\sigma}}$,
  - Incumbent shareholders therefore pick:
    $\tilde{k} = \sigma\,(1-\sigma)^{\frac{1-\sigma}{\sigma}}\,\mathbb{E}\left(\mathbb{E}\left(e^{\theta}|z\right)^{\frac{1}{\sigma}}\left[1+\frac{1}{\sigma}\left(\frac{\mathbb{E}\left(e^{\theta}|x=z,z\right)}{\mathbb{E}\left(e^{\theta}|z\right)}-1\right)\right]\right)$

Proposition: Market frictions cause dynamically inconsistent firm behavior

- Whenever $\tilde{k} \neq k^*$, equilibrium choices of $\tilde{k}$ and $\tilde{\ell}$ are strictly Pareto-inferior
- Intuition:
  - Incumbents choose k to "commit" future shareholders to decide upon share-price max.
  - Final shareholders pick the appropriate k/ℓ ratio; but ex-ante, incumbents over-invest ($\tilde{k} > k^*$)
  - Firm choices max. neither the initial, nor final shareholder's objectives

Managerial incentives; Regulation and intervention

Managerial Contracts: Implementing SH's desired Investment

- Now, shareholders hire a risk-neutral manager, set pay scheme $W(\Pi)$.
- Let $\underline{k} = lim_{\theta \to -\infty} k^{FB}(\theta)$, $\bar{k} = lim_{\theta \to \infty} k^{FB}(\theta)$: $(\underline{k}, \bar{k})$ contains all efficient k's (for some θ)
- Incumbents choose triplet $\{W(\Pi), \hat{k}, P(z,k)\}$ to max $\mathbb{E}\{P(\theta, u; k) - W(\Pi(\theta; k))\}$, s.t.
  - $P(\cdot)$: REE market-clearing price at the financial market stage
  - IRC: $\mathbb{E}\{W(\Pi(\theta; \hat{k}))\} \geq \bar{w}$
  - ICC: $\hat{k} \in \text{argmax}_k \mathbb{E}\{W(\Pi(\theta; \hat{k}))\}$

Proposition: (Almost) anything is implementable with equity, options, caps, and floors

(i) Efficient investment k^* obtained with $W = \omega\Pi$.

(ii) Any $k \in (k^*, \bar{k})$ can be implemented with **equity** and **floors**: $W(\Pi) = max\{\underline{W}, \omega\Pi\}$.

(iii) Any $k \in (\underline{k}, k^*)$ can be implemented with **equity** and **caps**: $W(\Pi) = min\{\bar{W}, \omega\Pi\}$.

Takeaway: pretty much any $\hat{k}$ can be implemented with simple contracts!

Managerial Contracts: Wages paid by final shareholders

- Incumbents assess wage cost through market lens
  - $\mathbb{E}\{\mathbb{E}\,(W(\Pi(\theta;k))|x=z,z)\}$ vs. $\mathbb{E}\,(W(\Pi(\theta;k)))$
  - Additional margin to shift rents by shifting upside vs. downside risk between incumbents, manager
  - Unlikely to be an important feature (wages small compared to overall dividends)

Managerial Contracts: risk aversion and hidden effort

- let $R = R(\theta, e)$, with effort $e \in \{0, 1\}$. $e = 0$ gives private benefit B
- Let manager's $U = U(W(\Pi(\theta; k)) + (1 - e)B)$
- Usual two-stage agency problem
  - Stage 1: for each choice pair (k, e), find $W(k, e)$

$$
\begin{aligned}
W(k, e) &= \min_{W(\cdot)} \mathbb{E}\{W(\Pi(\theta; k, e))\} \text{ s.t} \\
(k, e) &\in \arg\max_{(k', e')} \mathbb{E}\{U(W(\Pi(\theta; k', e')) + (1 - e')B)\} \\
\bar{U} &\leq \mathbb{E}\{U(W(\Pi(\theta; k, e)) + (1 - e)B)\}
\end{aligned}
$$

  - Stage 2: determine pair (k, e) that max's incumbents' expected payoffs

$$
\begin{aligned}
(k, e) &\in \arg\max_{(k', e')} \mathbb{E}\{\alpha P(z; k', e') + (1 - \alpha)\Pi(\theta; k', e') - W(k', e')\}, \\
\text{where } P(z; k, e) &= \mathbb{E}(\Pi(\theta; k, e) | x = z, z)
\end{aligned}
$$

Managerial Contracts: risk aversion and hidden effort

- Efficient vs. chosen levels of investment
  - Socially efficient investment: $\mathbb{E}\left(R(\theta, e)\right) = C'(k^*) + W_k(k^*, e)$
  - Chosen investment: $\mathbb{E}\{\mathbb{E}\left(R(\theta, e)|x = z, z\right)\} = C'(\hat{k}) + W_k(\hat{k}, e)$
  - Again, investment distortions due to incumbent shareholders' objectives
- Interaction between agency and market frictions
  - Key insight: increasing agency costs can be welfare improving
  - Intuition: agency friction reduces incumbent SH's scope for manipulating incentives

Normative implications 1: Direct regulation

- Direct regulatory oversight: size caps or floors
  - Direct limits to $\hat{k} = k^*$ requires knowledge of k^* by regulators
- Minimum capital requirements
  - Reduces SH's ability to shift rents through increased leverage
- Regulation of executive pay
  - Limit CEO compensation to set of a set of fixed $N + 1$ contracts
  - Each contract defines expected compensation $T_n(k)$
  - Let $T_0(k) = \mathbb{E}(R(\theta))\, k - C(k) =$ transfer associated with restricted equity claim

Proposition: It's efficient to limit incentive pay to restricted equity.

A set of contracts $\{T_n(\cdot)\}$ implements k^* if and only if $\left(\hat{k} - k^*\right) T_n'(k^*) \leq 0$ for all n.

Normative implications 2: Tax Policies

- Financial transaction tax
  - Uncontingent tax τ: shareholders maximize $\mathbb{E}\left(\left(1-\tau\right)\alpha P\left(z;k\right)+\left(1-\alpha\right)V\left(z,k\right)\right)$
    - Reduces relative weight on the share price from α to $\alpha\left(1-\tau\right)/\left(1-\alpha\tau\right)$
    - Can never fully correct externality.
- Contingent tax: $\tau\left(z\right)$
  - Modifies the incumbent objective to $\alpha\mathbb{E}\left(\left(1-\tau\left(z\right)\right)P\left(z,k\right)\right)+\left(1-\alpha\right)\mathbb{E}\left(\Pi\left(\theta,k\right)\right)$
  - Implements k^* if and only if $\mathbb{E}\left\{\left(1-\tau\left(z\right)\right)P_k\left(z,k^*\right)\right\}=0$.

Proposition: Contingent transaction taxes lean against return asymmetries.

- For $\tau\left(z\right)$, let $\hat{\tau}\left(z\right)=\left(\tau\left(z\right)-\mathbb{E}\left(\tau\left(z\right)\right)\right)/\left(1-\mathbb{E}\left(\tau\left(z\right)\right)\right)$. $\tau\left(\cdot\right)$ implements k^* *iff*

$$1-\frac{\mathbb{E}\left(R\left(\theta\right)\right)}{\mathbb{E}\left(\mathbb{E}\left(R\left(\theta\right)|x=z,z\right)\right)}=\int_{-\infty}^{\infty}\left(1-\Phi\left(\sqrt{\frac{\beta\delta}{\lambda+\beta\delta}}\lambda z\right)\right)\left\{\frac{\mathbb{E}\left(\mathbb{E}\left(R\left(\theta\right)|x=z',z'\right)|z'\geq z\right)}{\mathbb{E}\left(\mathbb{E}\left(R\left(\theta\right)|x=z,z\right)\right)}-1\right\}d\hat{\tau}\left(z\right).$$

Normative implications 3: Market Interventions

- Alternative Policy instruments: Market Interventions (TARP, OMT)
  - Focus on return $R(\theta)$ that is dominated by downside risks
  - Policy maker announces to buy shares at a pre-determined price $\bar{P}$
    - Efficient markets: policy subsidizes initial shareholders, generates upwards distortion of investment
    - With market inefficiencies, can increase investment towards k^*
    - ...but not revenue neutral: winner's curse
  - An efficient, tax-neutral intervention: price-support policy, plus transaction/dividend tax
    - Not distribution-neutral: policy shifts rents from initial to final shareholders.

Conclusions

- Proposed theory of incentive and investment distortions due to info frictions
  - Friction leads to systematic over- or under-pricing.
  - Rent-seeking motive for initial shareholders (conflict of interest w. final shareholders).
  - Initial shareholders' concern about equity value leads to systematic distortion in response to new information.
- Real investment and capital structure implications
  - Distortions, welfare losses large for investment in upside risks, near constant returns to scale.
  - Excessive leverage; risk-taking.
- Normative implications
  - Direct regulation; tax policies; market interventions
  - Restrictions on executive pay as key element for optimal regulation.