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A discussion of

Corporate Governance, Firm Dynamics and Security Design

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Similar to DeMarzo et al. (2012)

DeMarzo, P. M., Fishman, M. J., He, Z., & Wang, N. (2012). Dynamic agency and the q theory of investment. The Journal of Finance, 67(6), 2295-2340.

- Capital accumulation model with investment (convex adjustment cost), depreciation, and capital diversion (affected by governance)
- Firm's cash flow process based on capital stock, productivity, convex adjustment cost
- Productivity process depends on *unobservable* managerial efforts and luck, modeled by standard Brownian motion with constant volatility.
- Liquidation with partial capital recovery
- Agent's utility is based on compensation, cost of effort, and diverted capital (both are affected by governance)

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Dynamic optimization problem where principal sets U (contract) and agent chooses a (effort) and b (diversion) with limited information.

Firm

capital accumulation (diversion)

$$dK_t = (I_t - \delta K_t - b_t \zeta(g) K_t)\, dt$$

cash flow

$$dY_t = K_t\,(dA_t - L(i_t)dt)$$

convex adj cost

productivity

$$dA_t = a_t dt + \sigma dZ_t$$

Principal

$dY_t - U_t^g dt$ Principal sets U

Firm value

$$F(W_0, K_0) = \sup_{\{I_t, U_t^g; t\in[0,\tau]\}} \mathbb{E}\left[\int_0^\tau e^{-rt} dY_t - \int_0^\tau e^{-rt} U_t^g dt + e^{-r\tau} l K_\tau\right]$$

Agent

$U_t^g dt$ Agent chooses a, b

Utility

$$W_0 = \sup_{\{a_t, b_t; t\in[0,\tau]\}} \mathbb{E}^a\left[\int_0^\tau e^{-\gamma t}\left(U_t^g - H(a_t; g) + b_t \zeta(g) K_t\right) dt\right]$$

a: effort (higher g, higher effort cost)

b: capital diversion (higher g, lower success)

An optimal contract must be specified as a function of investment level (I), compensation (T), and the terminal date (t), conditional on governance level (g).

- A dynamic contract $\{I_t, U_t^g, \tau; g\}$ s.t.
  - Participation constraint
  - Incentive compatibility constraint
  - Revelation principle

- Optimal contract (Proposition 5)
  - Investment rate follows q-theory, which is a function of continuation value w
  - Compensation pays the agent to not steal

$$\frac{I_t^*}{K_t} = i_t^* = \frac{q_t - 1}{\theta} = \left(\frac{f(w_t) - w_t f'(w_t) - 1}{\theta}\right); \quad \forall t \in [0, \tau]$$

$$U_t^g = H(a_t; g) + \zeta(g) K_t; \quad \forall t \in [0, \tau]$$

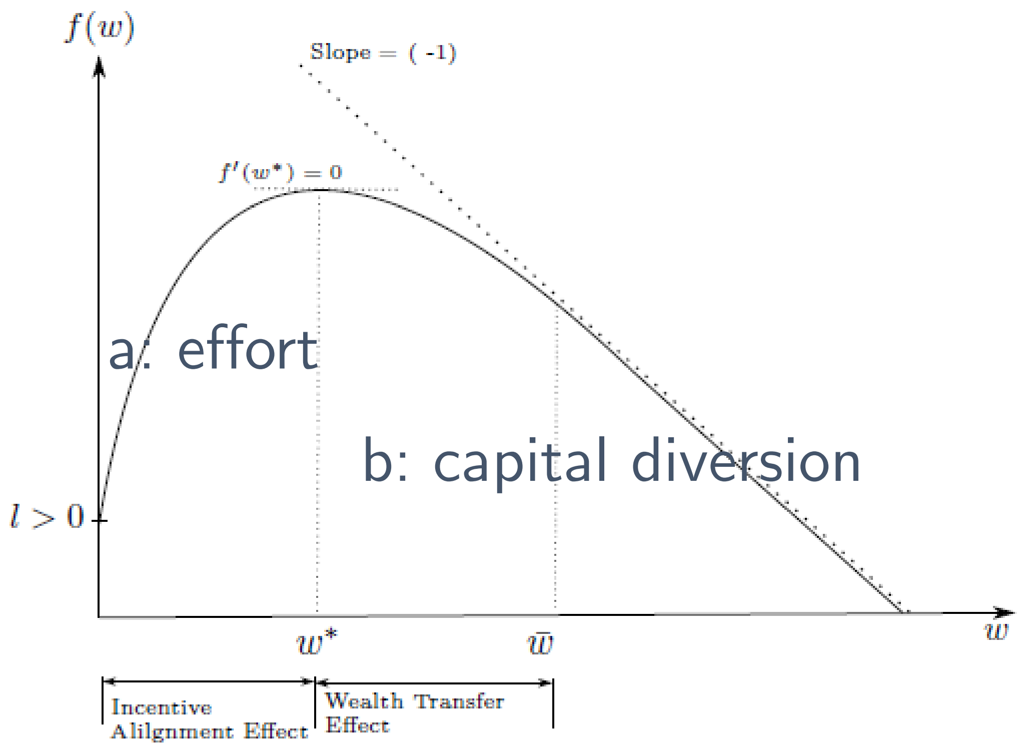

Figure 1: The shape of investor's profit function

Results, comparative statics and predictions from the model

- Security price and governance premium

$$S_t = \mathbb{E}\left[\int_t^\tau e^{-r(s-t)}(dY_s - U_s^g ds) + e^{-r(\tau-t)} l K_\tau\right]$$ + Value of firm profit

$$+ \mathbb{E}\left[\int_t^\tau e^{-r(s-t)}(rM_s ds - dM_s)\right]$$ + Excess cash

$$+ \mathbb{E}\left[\int_t^\tau e^{-r(s-t)}(-\zeta(g)K_s)ds\right].$$ - Less diverted capital

$$\zeta(g) = \Omega - \psi(g)$$

- country specific
- firm specific

- The value of governance for firms at different stages
- Interesting testable predictions

Some comments

- The optimal contract requires knowledge of $\mathrm{H}(\mathrm{a},\mathrm{g})$ and $\zeta(g)$, which is unclear whether they are observable to the principal.

- A lot of notations, some are not clearly explained.

- λ seems to be very important but has many definitions. First introduced as a progressively measurable stochastic process (page 15), then presented as multiplier of cash flow volatility (page 17), as a unit of risk (page 26), and as multiplication process (page 31).

- Is this supposed to be another source of risk beyond the Brownian motion in the productivity process? λ represents the severity of agency problem in DeMarzo et al. (2012) but the mathematical conditions seem to be very similar.

The security price equation seems to double count diverted capital

- Security price and governance premium

$$S_t = \mathbb{E}\left[\int_t^\tau e^{-r(s-t)}(dY_s - U_s^g ds) + e^{-r(\tau-t)} l K_\tau\right]$$
$$+ \mathbb{E}\left[\int_t^\tau e^{-r(s-t)}(rM_s ds - dM_s)\right]$$
$$+ \mathbb{E}\left[\int_t^\tau e^{-r(s-t)}(-\zeta(g)K_s)ds\right].$$

+ Value of firm profit $F(W_t, K_t)$, **where compensation U already includes diverted capital**

+ Excess cash M_t

- Diverted capital (one more time…)

$$S_t = E_t\left[\int_t^\tau e^{-r(s-t)} dD_s + e^{-r(\tau-t)} l K_\tau\right] \quad \text{Eq. 24}$$

Law of Motion

$$dM_t = rM_t dt + dY_t - dD_t - U_t^g dt \quad \text{Eq. 23}$$

$$\Rightarrow \quad dD_t = \underbrace{(dY_t - U_t^g dt)}_{\text{Eq. 5}} + \underbrace{rM_t dt - dM_t}_{\Delta \text{ excess cash}}$$

principal's cash flow

$$\Rightarrow \quad S_t = \underbrace{E_t\left[\int_s^\tau e^{-r(s-t)}(dY_s - U_s^g ds) + e^{-r(s-t)} l K_\tau\right]}_{F(W_t, K_t) \quad \text{Eq. 7}}$$

$$+ \underbrace{E_t\left[\int_s^\tau e^{-r(s-t)}(rM_s ds - dM_s)\right]}_{M_t}$$

Summary

- Important issue and important dynamics.
- The model can generate interesting testable hypotheses
- Is it possible to simplify the model?
- The security pricing result may need reexamination.