NOTES ON CAPITAL STRUCTURE: SIGNALING: RISK-BEARING AND LEVERAGE

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SESSION 3A

Contents

- Insider, i.e. issuer of claim, may have private information about
  - Prospects of new investment
  - (Intrinsic) value of assets in place
  - Value of pledged collateral
- Conceptual difference between type of (private) information:
  - Hard information: entrepreneur knows project type and can choose whether or not to prove it. That is, entrepreneur can reveal hard information and investors just verify. Hence, no incentives to lie when verification is costless
  - Soft information: entrepreneur knows project type but cannot prove it.

    $\longrightarrow$ Soft information poses problems

Two common information structures:

(1) Two parties: Issuer and market, where issuer is better informed than the market

- Fits situation where the issuer is an entrepreneur who has not yet issued claims (IPO)
- What if company is publicly traded and is raising new funds (SEO)? Perhaps more natural to assume the following:
  - (i) Symmetric information among management and existing claimholders, inferior information of new outside investors
  - (ii) Hidden sidepayments between management and existing claimholders feasible (open transfers would convey private information)
  - (iii) Existing claimholders unable to provide additional funds (otherwise, existing claimholders refraining from subscribing to new issue conveys information)

(2) Well-informed management and poorly-informed existing claimholders. Management effectively in charge of the financing decisions

- In practice, issue decision formally rests with the board, but management does have considerable influence through expertise and superior information.

- Partial managerial control over financing decisions implicit in assumption that management to some extent cares about shareholder welfare. For example, in Ross (1977) managers benefit directly from a high stock market valuation, while in Myers and Majluf (1984), managers are assumed to maximize existing shareholder wealth. This may be viewed as reduced form examples of the more complex situation of partial managerial control

Main Ideas

- Potential for market breakdown in markets with asymmetric information. As in Akerlof (1970)'s "lemon's" problem: Gains from trade may not materialize in markets plagued by adverse selection
- Equilibrium with asymmetric information is necessarily pooling if bad projects have NPV <0. Either good types subsidize bad types and all projects are funded or neither type gets financing. The outcome depends on fraction of good types in the market
- Given that asymmetric information is costly for good types–either they subsidize bad types or they cannot get funding–they are willing to accept distortions in contract in order to signal their type, i.e. engage in costly signaling. The level of distortion must be such that bad types are not willing or able to mimic this behavior

Alternatives to Signaling:

- *Issuing claims with low information sensitivity*:
  Some claims are less under-priced than others because their value is less sensitive to information. For instance, no info asymmetry w.r.t. value of risk-free debt (though may be on whether debt is indeed risk-free). Thus, costly signaling tends to create a hierarchy of financing sources. Will discuss implications of this in connection with the Pecking Order Theory of Myers (1984)

- *Monitoring*:
  Information symmetry can be restored at a cost. Some claims minimize the cost.

Main idea:
Information asymmetries between insiders and potential investors about the value of claims can lead to inefficiencies in the form of either underinvestment or overinvestment
Model: Same basic set-up as in discussion of agency costs of effort and of Myers (1977):

- Two dates ($t = 0, 1$), no discounting
- An entrepreneur owns the following project
  - at $t = 0$, investment F
  - at $t = 1$, cash flow $X \in \{\underline{X}, \overline{X}\}$ with $\underline{X} < \overline{X}$
  - for simplicity, assume $\underline{X} = 0$.
    Recall: Binary outcome, $X \in \{0, \overline{X}\}$ allows to abstract from debt vs. equity (all contracts are linear)
  - $p = Pr(X = \overline{X})$

First Best:

1. Entrepreneur has sufficient funds and self-finances:
   The project's NPV is
   $$NPV = p\overline{X} - F$$
   If the $NPV > 0$, project is undertaken

2. Entrepreneur does not have sufficient funds and raises outside capital in return for promised repayment R. If competitive capital market (given limited liability):
   $$\underline{R} = 0 \ \text{ and } \ \overline{\mathrm{R}} \leq \overline{\mathrm{X}}$$
   $$\text{suchthat} \quad \mathrm{F} \leq \mathrm{p}\overline{\mathrm{R}}$$
   Entrepreneur realizes full NPV if
   $$\underline{R} = 0 \ \text{ and } \ \overline{\mathrm{R}} = \mathrm{F/p}$$

Information Asymmetry:

- Suppose $p \in \{p_G, p_B\}$ with $p_G > p_B$
- The entrepreneur knows true p, investors know $q = Pr(p = p_G)$
- Investors' expected payment:

$$[qp_G + (1-q)p_B]\overline{R} - F$$

Hence, outside funding requires

$$\overline{R} = \frac{F}{qp_G + (1-q)p_B}$$

in order to fund an investment

- Entrepreneur invests in bad projects since

$$p_B(\overline{X} - \overline{R}) > 0$$

Thus, investors would (on average):

  - make money on the "good" firms (good firms would sell underpriced claims)
  - lose money on the "bad" firms (bad firms would sell overpriced claims)

  $\Rightarrow$ good firms subsidize bad firms.

Why is this undesirable?

(1) *Some NPV < 0 projects are financed*

Suppose that

$$p_B \overline{X} - F < 0$$

but

$$\overline{R} = \frac{F}{qp_G + (1-q)p_B} < \overline{X}$$

Then both projects would be undertaken and financed:

– *Bad project*: Despite NPV < 0, entrepreneur makes positive expected profit:

$$p_B(\overline{X} - \overline{R}) > 0 \;\text{ as }\; \overline{\mathrm{X}} > \overline{\mathrm{R}}$$

– *Good project*: Despite discount on issued claims, entrepreneur makes profit:

$$p_G(\overline{X} - \overline{R}) > 0 \;\text{ as }\; \overline{\mathrm{X}} > \overline{\mathrm{R}}$$

$\Longrightarrow$ bad firms "pool" with good firms and get financed.

(2) *Some NPV > 0 projects are <u>not</u> financed*

Suppose that

$$\overline{R} = \frac{F}{qp_G + (1-q)p_B} > \overline{X} > \frac{F}{p_G}$$

Then, neither project is undertaken, since $\overline{X} < \overline{R}$. In particular, good type cannot make repayment promise to compensate investors for:

- his investment risk and
- the risk of investing in a bad project

$\Longrightarrow$ subsidy to bad project is too high for good project to remain viable. Hence, the loan market breaks down

<u>Remark</u>: Necessary condition for market breakdown is that bad projects have $NPV < 0$

$$\begin{aligned} F &> [qp_G + (1-q)p_B]\overline{X} \\ &> qF + (1-q)p_B\overline{X} \;\; \text{as } \mathrm{p_G} \leq 1 \\ &> p_B\overline{X} \end{aligned}$$

3 RISK-BEARING AS SIGNAL

Standard investment theory suggests that investors should hold market portfolio. So why do we observe high level of inside equity?

- Leland and Pyle (1977): *By bearing the under-diversification cost of a large holding, good entrepreneurs reveal their type to investors. Large holding constitute a signal because;*
  (1) it is costly (under-diversification)
  (2) more costly for worse entrepreneurs (because their projects are more likely to fail)

- Consider a risk-averse "good" entrepreneur who fully owns his firm. He is exposed to too much risk and wants to sell of part of the firm. (Note: extends to initial stake $< 100\%$)

- <u>Remark</u>: Either wealth constraint or risk-aversion are required to motivate outside financing. Otherwise self-financing is always at least as preferable to entrepreneur

- Assume entrepreneur owns fully firm with cash flows

$$X \in \{0, \overline{X}\} \text{ at t} = 1, \text{ and } \text{p} = \Pr(\text{X} = \overline{\text{X}})$$

- He has vNM utility function $U(X)$:

$$U' > 0 \text{ and } \text{U}'' < 0$$

Normalization: $U(0) = 0$

- Suppose outside investors are risk neutral vis-a-vis the firm's risk (e.g. fully diversifiable risk)

<u>First Best</u>:

- Entreprneur's expected utility from 100% ownership:

$$pU(\overline{X}) + (1-p)U(0) = pU(\overline{X})$$

- Selling entire firm, he raises $p\overline{X}$
- Thus, his expected utility is

$$pU(p\overline{X}) + (1-p)U(p\overline{X}) = U(p\overline{X}) > pU(\overline{X})$$

- So, he sells

- First best entails selling *entire* firm:
- Suppose he retains a fraction α of cash flow claims. His expected utility is

$$\begin{aligned} U(\alpha) =\ & pU(\alpha\overline{X} + (1-\alpha)p\overline{X}) \\ & +(1-p)U((1-\alpha)p\overline{X}) \end{aligned}$$

- Derivative of $U(\alpha)$ with respect to α is

$$\begin{aligned} =\ & p(\overline{X} - p\overline{X})U'(\alpha\overline{X} + (1-\alpha)p\overline{X}) \\ & +(1-p)(-p\overline{X})U'((1-\alpha)p\overline{X}) \end{aligned}$$

$$\begin{aligned} =\ & p(1-p)\overline{X}U'(\alpha\overline{X} + (1-\alpha)p\overline{X}) \\ & -p(1-p)\overline{X}U'((1-\alpha)p\overline{X}) \end{aligned}$$

$$< 0 \ \text{ because } \ \mathrm{U}'' < 0$$

- Hence, $\alpha = 0$ is optimal. That is, in the first best:
  - entrepreneur sells his entire stake
  - outside investors bear all risk
  - entrepreneur is fully insured

Asymmetric Information:

- Suppose that $p \in \{p_B, p_G\}$

- Recall: For investors, $q = Pr(p = p_G)$ and they expect returns to be
$$(qp_G + (1-q)p_B)\overline{R} - F$$

- Thus, expected utility of "good" entrepreneur when selling is
$$U((qp_G + (1-q)p_B)\overline{X}) < U(p_G\overline{X})$$

- Suppose that (q low enough so that)
$$U((qp_G + (1-q)p_B)\overline{X}) < p_G U(\overline{X})$$
$\Rightarrow$ good types prefers not to sell

- I.e., good type prefers to be exposed to (excessive) risk rather than subsidizing bad types by selling underpriced claims

Immediate consequences:

- Given initial investor expectations, bad types want to sell entire firm:

$$U((qp_G + (1-q)p_B)\overline{X}) > p_B U(\overline{X})$$

- Investors update their expectations, i.e. infer that good types are not selling their firms

- Bad types want to sell entire firm even with updated expectations:

$$U(p_B \overline{X}) > p_B U(\overline{X})$$

- *Investors would be willing to pay a higher price for shares in firms that are not entirely for sale*

- Suppose investors were to pay more for shares of firms that are only partially sold. What would prevent bad types from imitating?

$\Rightarrow$ need equilibrium analysis

Equilibrium where good types sell entire firm?
$\rightarrow$ NO

- Expected utility from retaining: $p_G U(\overline{X})$
- To sell, good type requires a price ($p\overline{X}$) so that
$$U(p\overline{X}) \geq p_G U(\overline{X})$$
- Suppose such a price were offered by market. Then bad types also sell at that price, i.e. mimic good types
$\Rightarrow$ bad types sell overpriced claims
- Given assumption
$$U((qp_G + (1-q)p_B)\overline{X}) < p_G U(\overline{X})$$
investors do not break even when lending to both types at a price where good types are induced to sell entire firm
- Hence, at that price market breaks down, i.e. investors prefer not to buy

What about selling only part of the firm?

- Suppose good type sells infinitesimal fraction $1-\alpha$ (i.e. $\alpha \approx 1$) and gets fair price. Her gain is

$$(1-\alpha)\left(-\frac{\partial U(\alpha)}{\partial \alpha}\right) > 0$$

- *Would bad entrepreneur mimic this? NO* As $(1-\alpha)$ is infinitesimal, when mimicking good type, bad type gets expected utility that would be close to $p_B U(\overline{X})$

- Hence, bad type is still better off selling entire firm which yields

$$U(p_B\overline{X}) > p_B U(\overline{X})$$

- Cost of mimicking = under-diversification cost is basically unchanged

- Gain from mimicking = premium on $1-\alpha$ is infinitesimal

  $\Rightarrow$ mimicking is not worthwhile

- Suppose investors interpret action of "selling only tiny fraction" as a signal of good quality. Then good types will do so, while bad types will not $\Rightarrow$ outcome is an equilibrium
- *How large can* $(1-\alpha)$ *be?*
  Given risk aversion, good types interested in selling as much as possible, while preventing bad types from mimicking
- **Incentive compatibility constraint**:
  - Cost of mimicking (risk exposure) must exceeds the gains from selling the over-priced fraction $\alpha < 1$
  - Bad types must prefer to sell entire firm

$$\begin{aligned} U(p_B\overline{X}) \geq\; & p_B U(\alpha\overline{X} + (1-\alpha)p_G\overline{X}) \\ & + (1-p_B)U((1-\alpha)p_G\overline{X}) \end{aligned}$$

RHS is strictly decreasing in α. Moreover, the inequality satisfied for $\alpha = 1$ and violated for $\alpha = 0 \Rightarrow$ there exists an $\alpha^* \in (0,1)$ such that LHS=RHS

- Perfect Bayesian Equilibria (PBE)
  - Strategy for good type, α_G, is optimal, given investors' beliefs
  - Strategy for bad type, α_B, is optimal, given investors' beliefs
  - Investors' beliefs are obtained from a priori distributions and observed actions using Bayes' rule.

$$\mu(\alpha) = Pr(good|\alpha) = \frac{Pr(good \cap \alpha)}{Pr(\alpha)}$$

  - Hence, investors' beliefs are

$$\mu(\alpha_G) = 1 \quad \text{and} \quad \mu(\alpha_\mathrm{B}) = 0 \quad \text{if} \quad \alpha_\mathrm{G} \neq \alpha_\mathrm{B}$$

and

$$\mu(\alpha_G) = q \quad \text{if} \quad \alpha_\mathrm{G} = \alpha_\mathrm{B}$$

- $\mu(\alpha)$ is defined $\forall \alpha$ (i.e. not only α_G and α_B)

- Note: There is no restriction on the beliefs following an off-equilibrium move, i.e. $\alpha \notin \{\alpha_B, \alpha_G\}$. Observing this is a probability-0 event, and hence Bayes Rule does not pin down the investors' beliefs. However, those off-equilibrium beliefs must be consistent with the equilibrium outcome

What have we shown?

Given $\mathrm{U}((\mathrm{q}\mathrm{p}_\mathrm{G} + (1-\mathrm{q})\mathrm{p}_\mathrm{B})\overline{\mathrm{X}}) < \mathrm{p}_\mathrm{G}\mathrm{U}(\overline{\mathrm{X}})$

- *no pooling equilibrium*: $\alpha_G \neq \alpha_B$
- *separating PBE*: $\alpha_G \geq \alpha^*$ and $\alpha_\mathrm{B} = 0$ where α^* is defined by IC-constraint:

$$\begin{aligned} U(p_B\overline{X}) = \; & p_B U(\alpha^*\overline{X} + (1-\alpha^*)p_G\overline{X}) \\ & +(1-p_B)U((1-\alpha^*)p_G\overline{X}) \end{aligned}$$

- *no separating PBE with* $\alpha < \alpha^*$
- $\forall \alpha \geq \alpha^*, \exists$ *separating equilibria with* $\alpha_G = \alpha$

What are the equilibria?

- A continuum of PBE, i.e. $\forall \alpha_G \geq \alpha^*$.
- Take any $\hat{\alpha} > \alpha^*$ and suppose that if observing $\alpha \neq \hat{\alpha}$, investors believe type is bad
- This is an equilibrium: given these beliefs, good firms do not pick $\alpha \neq \hat{\alpha}$ and bad firms do not want to pick $\alpha = \hat{\alpha}$ because $\hat{\alpha} \geq \alpha^*$.
- <u>Selection</u>: Multiplicity of equilibria due to the fat that there are no constraints on beliefs regarding off-equilibrium behavior, except they must sustain chosen equilibrium. By constraining off-equilibrium beliefs to "reasonable" beliefs, one can reduce number of equilibria

- Cho and Kreps (1987) *intuitive criterion*: A given PBE does not satisfy the intuitive criterion, if there is signal m not sent in that equilibrium and if there are two pure subsets of types J and T, such that

  (i) type $\theta \in T$ does not prefer to deviate and send m (relative to signal sent in given equilibrium), irrespective of the inference made by other parties.

  (ii) type $\theta \in T$ prefers to deviate and send signal m provided other parties infer that θ is not from subset J.

- Perfect Sequential Equilibrium:
  Grossman and Perry (1986): Their criterion is stronger and imposes credible beliefs on PBE.

  (i) Type $\theta \in J$ does not prefer to send m (relative to signal sent in given equilibrium), given other parties infer θ is from subset T

  (ii) Type $\theta \in T$ prefers to deviate from given equilibrium and send signal m provided other parties infer that θ is from subset T

- In the present signaling game, there is a single PBE (outcome) that satisfies either refinement criterion. (Within this simple game with only two types, there is no difference between the two refinement concepts.):
  - $\alpha_G = \alpha^*$ (partial insurance)
  - $\alpha_B = 0$ (full insurance)

Intuition:

Criterion puts some constraints on possible beliefs following an off-equilibrium move

- Consider a PBE with $\alpha_G > \alpha^*$
- Suppose investors observe off-equilibrium move $\alpha = \alpha^*$. Can they "reasonably" believe the firm is bad?
- Intuitive criterion imposes posterior probability 0 for types which would never be strictly better off deviating, irrespective of the beliefs.
- $\alpha \geq \alpha^*$ violates the IC-constraint, and hence bad types is always better-off with $\alpha_B = 0$ rather than $\alpha_B = \alpha^*$
- $\Rightarrow$ criterion imposes $\forall \alpha \geq \alpha^*, \mu(\alpha) = 1$
  But then, $\alpha_G = \alpha^*$ is optimal

Bottom line:

- We have selected a single equilibrium (outcome):
  - Entrepreneur of bad firm sells the entire cash flows and gets full insurance
  - Entrepreneur of a good firm retains α^* and gets partial insurance
  - α^* satisfies:

$$U(p_B\overline{X}) = p_B U(\alpha^*\overline{X} + (1-\alpha^*)p_B\overline{X}) + (1-p_B)U((1-\alpha^*)p_B\overline{X})$$

  - Retaining a fraction of shares acts as a signal about the likelihood of a high outcome

- Key: Bad types prefer to insure fully, rather than mimicking good types. Due to lower risk ($p_G > p_B$), good type prefer some risk-exposure and to receive fair price for fraction $(1-\alpha^*)$ of shares

Comments:

- In equilibrium, good entrepreneurs leave personal wealth in the firm. This is inefficient as it leaves insider with exposure to diversifiable risk
  $\rightarrow$ alternatives to signal type which are less costly?
- Retaining a fraction of α^* is a signal only if entrepreneur is assumed to keep it
  $\rightarrow$ what if entrepreneur trades shortly after the issue?
- Model describes venture capital rounds or IPO. Less applicable to subsequent (seasoned) financing rounds
- (Seasoned) block sales may have quite different motivation and hence informational content

5 DEBT AS SIGNAL

- Ross (1977):
  Financial distress impose personal costs on managers. For a given debt level, better firms are less likely to enter financial distress. Hence, debt is less costly for managers of better firms who can thus use high levels of debt as signals

<u>Model</u>:
Same model as before with the following modifications:

- existing shareholders are risk-neutral
- firm run by a risk-neutral manager
- only manager knows the project's quality
- at $t = 0$, manager chooses face value of debt K
- at $t = 1$, cash flow $X \in \{\underline{X}, \overline{X}\}$, where $\underline{X} > 0$

- Manager's objective function is known and assumed to be a linear function of current stock price and realized cash flow plus penalty for low outcomes:

$$\gamma_0 V_0 + \gamma_1 \begin{cases} V_1 & \text{if } X > K \\ V_1 - L & \text{if } X \leq K \end{cases}$$

where
- γ_0 and γ_1 are two positive parameters
- V_t: firm's market value at t
- L: cost incurred by the manager in financial distress

- Note: no uncertainty after $t = 1 \Rightarrow V_1 = X$

- *Can we support a separating equilibrium in the choice of K?*

- Given incentive scheme (debt with $K > \underline{X}$ involves a cost), manager of a good firm wants, to a certain extent measured by γ_0, to convey her type to the market

- For manager of a good firm, cost of $K > \underline{X}$ is

$$\gamma_1(1 - p_G)L$$

- The gains from separating are

$$\gamma_0[p_G\overline{X} - (1 - p_G)\underline{X}])$$
$$-\gamma_0 q[p_G\overline{X} - (1 - p_G)\underline{X}]$$
$$-\gamma_0(1 - q)[p_B\overline{X} - (1 - p_B)\underline{X}]$$

$$= \gamma_0 p_G(\overline{X} - \underline{X}) + \gamma_0\underline{X} - \gamma_0 q p_G(\overline{X} - \underline{X}) - \gamma_0 q\underline{X}$$
$$-\gamma_0(1 - q)p_B(\overline{X} - \underline{X}) - \gamma_0(1 - q)\overline{X}$$
$$\Rightarrow \gamma_0(1 - q)(p_G - p_B)(\overline{X} - \underline{X})$$

- For manager of a bad firm, cost of $K > \underline{X}$ is

$$\gamma_1(1 - p_B)L > \gamma_1(1 - p_G)L$$

- The gains from pooling (mimicking) is

$$+\gamma_0(1 - q)[p_B\overline{X} - (1 - p_B)\underline{X}]$$
$$-\gamma_0[p_B\overline{X} - (1 - p_B)\underline{X}])$$

$$\Rightarrow \gamma_0 q(p_G - p_B)(\overline{X} - \underline{X})$$

- Separating requires that
  (i) good types prefer to be exposed to L,

$$\frac{\gamma_0(p_G - p_B)(\overline{X} - \underline{X})}{\gamma_1 L} > \frac{1 - p_G}{1 - q}$$

  (ii) bad types refrain from mimicking:

$$\frac{1 - p_B}{q} > \frac{\gamma_0(p_G - p_B)(\overline{X} - \underline{X})}{\gamma_1 L}$$

- Given

$$\frac{1 - p_B}{q} > \frac{\gamma_0(p_G - p_B)(\overline{X} - \underline{X})}{\gamma_1 L} > \frac{1 - p_G}{1 - q}$$

  is satisfied, there is a separating equilibrium outcome, i.e. good types signal their types by choosing $K > \underline{X}$ (risky debt), while bad types issue only risk-less debt $K < \underline{X}$.

- Otherwise, pooling equilibrium:

  (i) both types get financed and issue no or little debt (i.e. $K < \underline{X}$)

  (ii) neither type gets financed

- (i) or (ii) occurs depending on parameters
  - If both types are NPV>0, then (i)
  - If bad type is $NPV < 0$, then (i) if fraction of bad types sufficiently small then (ii) if fraction of good types sufficiently large

Multiple separating equilibria:

- Given

$$\frac{1-p_B}{q} > \frac{\gamma_0(p_G - p_B)(\overline{X} - \underline{X})}{\gamma_1 L} > \frac{1-p_G}{1-q}$$

there are separating Perfect Bayesian Equilibria:

  – strategy for good type K_G is optimal, given investor's beliefs

  – strategy for bad type K_B is optimal, given investor's beliefs

  – investors' beliefs are obtained from a prior distributions and observed actions using Bayes' rule:

$$\mu(K_G) = Pr(good|K) = \frac{Pr(good \cap K)}{Pr(K)}$$

- Hence, investors' beliefs are

$$\mu(K_G) = 1 \;\; \text{and} \;\; \mu(\mathrm{K_B}) = 0 \;\; \text{if} \;\; \mathrm{K_G} \neq \mathrm{K_B}$$

and

$$\mu(K_G) = q \;\; \text{if} \;\; \mathrm{K_G} = \mathrm{K_B}$$

- Any outcome with $\overline{X} > K_G > \underline{X}$ and $K_B \leq \underline{X}$ can be sustained as separating PBE
- Take any $\tilde{K} > \underline{X}$ and suppose that if observing $K \neq \tilde{K}$, investors believe type is bad type
- This is an equilibrium: given these beliefs, good types do not pick $K \neq \tilde{K}$ and bad types pick any $K_B \leq \underline{X}$

<u>Selection</u>?

- In this simple framework, all PBE satisfy Intuitive Criterion and/or Grossman-Perry
- Problem denying selection of equilibrium outcomes:
  Good type is entirely indifferent about level of debt, given $\overline{X} > K > \underline{X}$
  For unique equilibrium, need to modify manager's payoff function, e.g. make L a function of $X - K$. For instance, if L increasing in $K - X$ for $K > X$, good types strictly prefer minimum debt level sustaining separation

Comments:

- Unlike Leland and Pyle (1977), Ross (1977) applies to large (not closely held) firms
- To sustain separating equilibrium, manager must have interest in both, current (stock market) value and actual firm performance
  - if $\gamma_1 = 0$, there is no separating equilibrium, since costs of signaling for both types the same and equal to zero
  - if $\gamma_0 = 0$, neither manager cares about current (stock market) valuation. In particular, good type has no interest in separating himself

$\Longrightarrow$ desired outcome requires that mangers have short-term interest, i.e. $\gamma_0 > 0$, and long-term interest in firm performance, i.e. $\gamma_1 > 0$. The former is required for separation having any benefits, the latter for signaling being costly

- Implicit assumption: Managers cannot refrain fromn signaling and trade on their private information
- Unclear, why capital structure is needed to signal type. Alternatively, mangers could promise pay cut if performance is poor
- In separating equilibrium, profitability and debt-equity ratio are positively related $\rightarrow$ refuted by empirical evidence.
- L? It may be a loss in reputation for the manager.
- If γ_0 is interpreted as the intensity of the take over threat, then more takeover pressure $\Longrightarrow$ more leverage

Summary

- *Financing decisions are not irrelevant due to conflicts of interest:*
  - Moral hazard: entrepreneurs (managers) may distort use of firm's assets
  - Asymmetric information: entrepreneurs (managers) may hide true characteristics (level, riskiness) of cash flows associated with outside claims
  - $\Rightarrow$ Outside finance involves costs absent in a firm fully owned by its owner-manager
  - Different forms of outside finance involve different types of moral hazard and asymmetric information. Hence, they involve different costs.
  - $\Rightarrow$ Optimal financial decisions minimize the sum of all costs

- *MM applies to outside claims: structure of outside claims is irrelevant*
- Conflicts between insiders and outsiders generate optimal split of cash flows between insiders and outsiders (e.g. inside equity and outside), but not among outsiders
- $\longrightarrow$ diversity of outside claims cannot be explained: a mix of diverse outside claims could be merged and repackaged into identical claims
- To obtain a theory of the structure of outside claims, we have to consider incentive problems of outside investors (e.g. incentives to monitor)

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