Solvay Brussels School
Economics & Management

Corporate Valuation and Financing

Optimal Capital Structure

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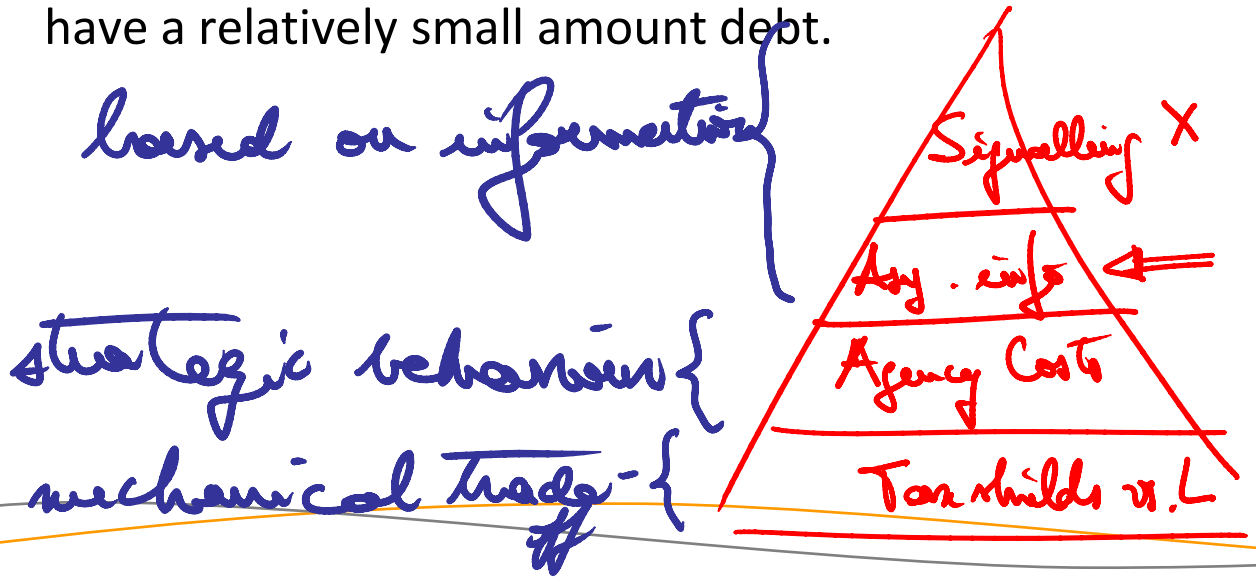
Why not 100% debt?

- Increasing debt → increasing risk and increasing likelihood of distress, which has costs associated with it – e.g.,
  1. Costs of potential bankruptcy

  The desire to understand what could be behind the idea of costs of financial distress has led academicians to study other impacts like:

  2. Costs associated with inability to operate optimally / efficiently
  3. Costs associated with bond provisions / compliance
  4. Costs of shareholder – bondholder conflicts

  …because pure costs of potential bankruptcy cannot explain why some firms have a relatively small amount debt.

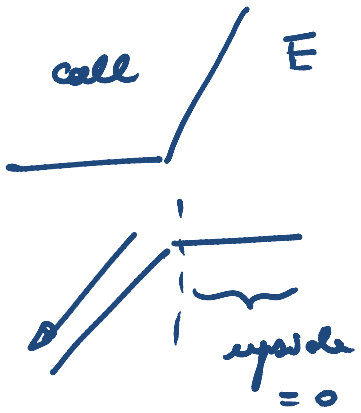


Agency costs

- Some prior notions:
  - **Agency relationship:** 'contract' whereby the principal engage the agent to carry out work on behalf of him ⇒ delegation of decision-making powers to the agent [Jensen and Meckling (1976)].
  - **Moral hazard:** the parties to the agreement engages in actions that the other party cannot observe, even though these actions influence the benefits accrued to both parties.
  - Thus conflicts of interests may arise, leading to a poor allocation of resources. This inefficiency is subsumed under the concept of **'agency costs'**.
- Jensen & Meckling [1976] identify two types of agency problems
  - Debtholders ←→ Shareholders (+ managers)
    - ✓ "The debt contract gives an incentive to invest suboptimally."
  - Managers ←→ Shareholders
    - ✓ "Managers hold less than 100% of the residual claim but they bear the entire cost of these activities."
  - The optimal level of debt is obtained by trading-off these 2 agency problems.

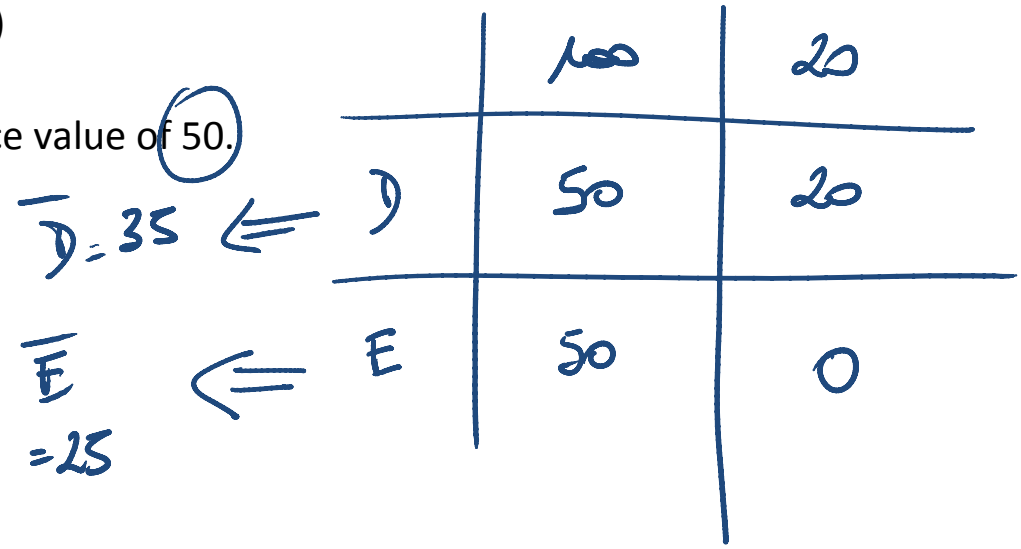
Agency costs of debt

- **Increasing business risk** : Black & Scholes, Jensen [1973], Green [1984]
  - Managers (willing to maximise shareholder value) may undertake too risky projects.
- Example:
  - Equity value close to 0.
  - Project: I = 100
  - NPV(earnings) = 200 with probability = 0.4
    = 0 otherwise
  - NPV(for the firm) = -100 + 0.4*200 = -20
  - NPV(for the shareholders) = (-100+200)*0.4 + 0.6*0 = 40



Agency costs of debt

- **Debt overhang**: Myers [1977] "Determinants of corporate borrowing"
  - » An NPV positive project will benefit to debtholders (debt becomes less risky). But managers maximise shareholder value. They may pass some projects.
  - » Example: Firm with assets in place that generate:
    - ✓ 100 in good state G (p=50%)
      20 in bad state B
    - ✓ Outstanding debt D with face value of 50.
    - ✓ Payoff to debt and equity?



    - ✓ Imagine then that the firm has an investment project
      - Investment outlay = 10
      - Safe cashflow = 15

      } NPV=5

      Can we raise 10 to finance this project? (Debt vs. Equity)

- 10 financed by equity

	115 = 100 + 15	35 = 20 + 15
D	50	35
E	65	0

$\Rightarrow \overline{D} = 85/2 = 42,5$

$\Rightarrow \overline{E} = 65/2 = 32,5$

$32,5 - 25 = 7,5$ for 20 invested $\Rightarrow$ shareholders refuse to invest.

- 10 financed by new debt paripassu

	G: 115	B: 35
D	50	$\frac{50}{60} \times 35$
ND	10	$\frac{10}{60} \times 35$
E	55	0

in this case, former (old) debtholders won't accept the fresh money of debtr.

Agency costs of debt

- **Milking the property**
  - » Last minute dividend payouts during financial distress
  - » Increasing debt of higher seniority

- What should we observe if this (could) happen(s)?

Costs of debt would increase

- What would like shareholders to do?

- How?

Main rule: APR
Absolute priority rule

by these actions, we deviate from the APR or bypass

Ways to mitigate agency costs

- Covenants: Clauses obligatoires
  - » Negative covenants prohibiting actions that the company may take
    - ✓ Limitation of payout
    - ✓ Firm may not pledge any of its assets to othe lender
    - ✓ No sell or lease its major assets without approval
    - ✓ No issue of additional debt
  - » Positive covenants specifies an action that a company agrees
    - ✓ Maintain working capital at a minimum level
    - ✓ Periodical reporting

restrictions

levels to be maintained / more reporting.

Remarks from practice

Agency costs of Equity

- Jensen & Meckling [1976], Jensen [1986]
- Debt can reduce the agency cost of equity (various reasons):
  1. Jensen & Meckling [1976]
     - » Conflict: Managers may be willing to consume perks
     - » Benefit of debt: If manager has limited wealth W to invest in stock, it will represent a larger portion of the equity of the firm if the form is levered up. Aligns incentive of managers and equity, though it may lead to excessive risk taking.
     - » Cost of debt: Asset substitution
  2. Jensen [1986]
     - » Disgorge excess cash flows (Free cash flow theory)
       Managers like to invest, build empires. Forcing them to pay out cash (through debt) limits their ability to finance bad investment with internally generated funds. Forced to go to the capital market to raise funds.
  3. Grossman & Hart [1982]
     - » Threat of bankruptcy disciplines managers, makes them work harder, not consume as many perks. → could it lead to too little risk taking?
  4. …Harris & Raviv [1990], Stulz [1991].
- Incentive scheme enough? (Hart [1991], Hart and Moore [1991])

Perks (1)

- **FT WEEKEND MAGAZINE - DEFINING MOMENT: Jack Welch and the problem with perks**
  By Andrew Hill, Financial Times
  Published: Jul 28, 2007

  - In 2002, the year after Enron went bankrupt, Americans were spoilt for choice of symbols of corporate excess: the $15,000 dog-shaped umbrella stand bought for Tyco's boss, Dennis Kozlowski, was perhaps the most bizarre. More significant, however, was the revelation in September of that year of the generous retirement perks that had been awarded to Jack Welch, former chief executive of General Electric.
  - His estranged second wife publicised details of the benefits - which included access to the GE box at Fenway Park, where Welch's beloved Boston Red Sox play baseball, use of chauffeured cars, company jets and an $11m Manhattan apartment - during bitter divorce proceedings, following Welch's affair with the editor of the Harvard Business Review (now Mrs Welch III). That added spice. But what gave the news weight was that, unlike Kozlowski and the fraudsters at Enron, WorldCom and other scandal-hit US companies, Welch had done nothing wrong. As the most widely feted corporate leader of his generation, he was richly rewarded by GE shareholders, who gave him a standing ovation at his last annual meeting in 2000.
  - But after the detailed filing in the divorce court, Welch found himself in an unaccustomed posture: on the back foot. He consulted friends and former colleagues and, on September 16 - the day before the Kozlowski umbrella-stand revelations - he used the opinion page of The Wall Street Journal to announce he was giving up most of the perks. Typically, he continued to deny that the package was improper.
  - Much later, the conglomerate was rapped on the knuckles for failing to disclose details of the retirement deal "fully and accurately" when it was struck in 1996. But at that time, with Welch and other corporate titans in their pomp, few investors would have said that GE crossed the line. The events of September 2002 showed that when companies are in crisis and markets in turmoil, the line can move - stranding even once-respected company chieftains on the wrong side.

Perks (2)

- **Jet use a popular perk for US CEOs – study**

  Tue Sep 4, 2007 3:13pm ET

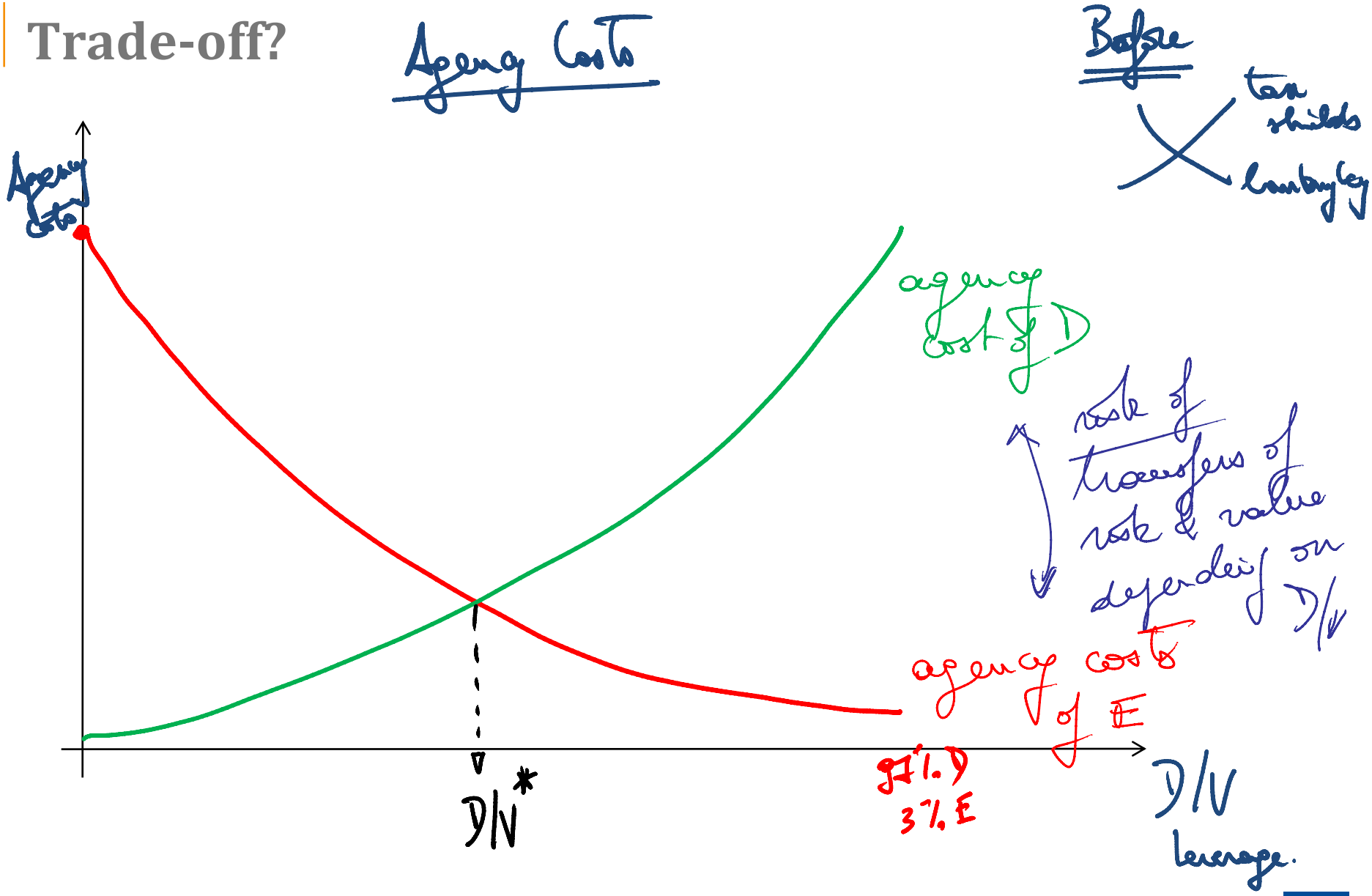
  By Martha Graybow

  - NEW YORK, Sept 4 (Reuters) - Many companies allow their chief executives to use the corporate jet for personal travel, according to a new study released on Tuesday based on pay disclosures in new corporate proxy statements.
  - The study by the Corporate Library, a governance research group, looked at a sample of 215 CEOs whose companies reported perk packages of more than $500,000 in annual proxy statements filed between March and July. It found that 54 percent of the CEOs had access to corporate aircraft last year for nonbusiness use.
  - Revised disclosure rules have forced corporate America to provide investors with more details about top executives' pay and perks, including personal flights on the company plane.
  - Some companies, citing security concerns, want their executives to take the company plane whenever they fly. But the Corporate Library says that shareholders should not have to pay for an executive's personal trips.
  - "Use of the corporate aircraft, indeed any corporate transportation, for personal and leisure uses is, of necessity, a benefit to the executive," said study author Paul Hodgson, a senior research associate at the Corporate Library in Portland, Maine.
  - He said that while "a few companies require some level of reimbursement from executives for this benefit, most do not."

Perks (3)

- Some additional reviews
  - http://www.footnoted.org/perk-city/accuracy-in-perks/
  - CEOs' free ride ... to Perksville http://money.cnn.com/2006/09/08/commentary/sahadi/index.htm
  - The Big Reveal: SEC rules unmask CEO perks http://money.cnn.com/2007/03/16/news/companies/perks_disclosure_report/index.htm

Trade-off?


Agency Costs
Agency Costs
agency cost of D
risk of transfers of risk & value depending on D/V
agency costs of E
D/V*
D/V
leverage.
Before
tax shields
bankruptcy

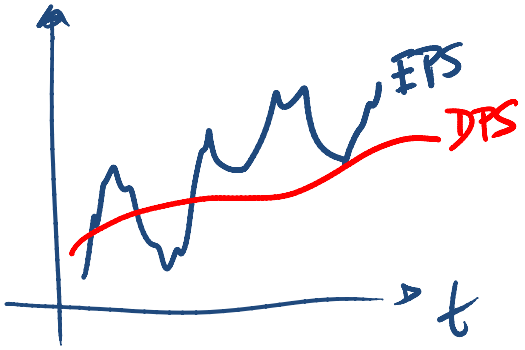
But

- Not clear that we need the capital structure to limit perk consumption and elicit effort.
- Are incentive schemes not enough?
  - Hart (1991)
  - Hart & Moore (1991)

Imperfect information: 2 branches of research

- Managers or insiders are assumed to possess private information about the real portfolio of investment opportunities of the firm.
- Two sets of approaches:
  - » Asymmetric information
    - ✓ The capital structure is used in order to reduce inefficiencies caused by this information asymmetry.
    - ✓ Asymmetries
      - Debtholders ←→ Shareholders
      - Managers ←→ (Potential) Investors
  - » Signalling
    - ✓ the capital structure signals or helps in revealing the true value of the firm

(it is not clear that this would work for D/V as for the dividend policy)

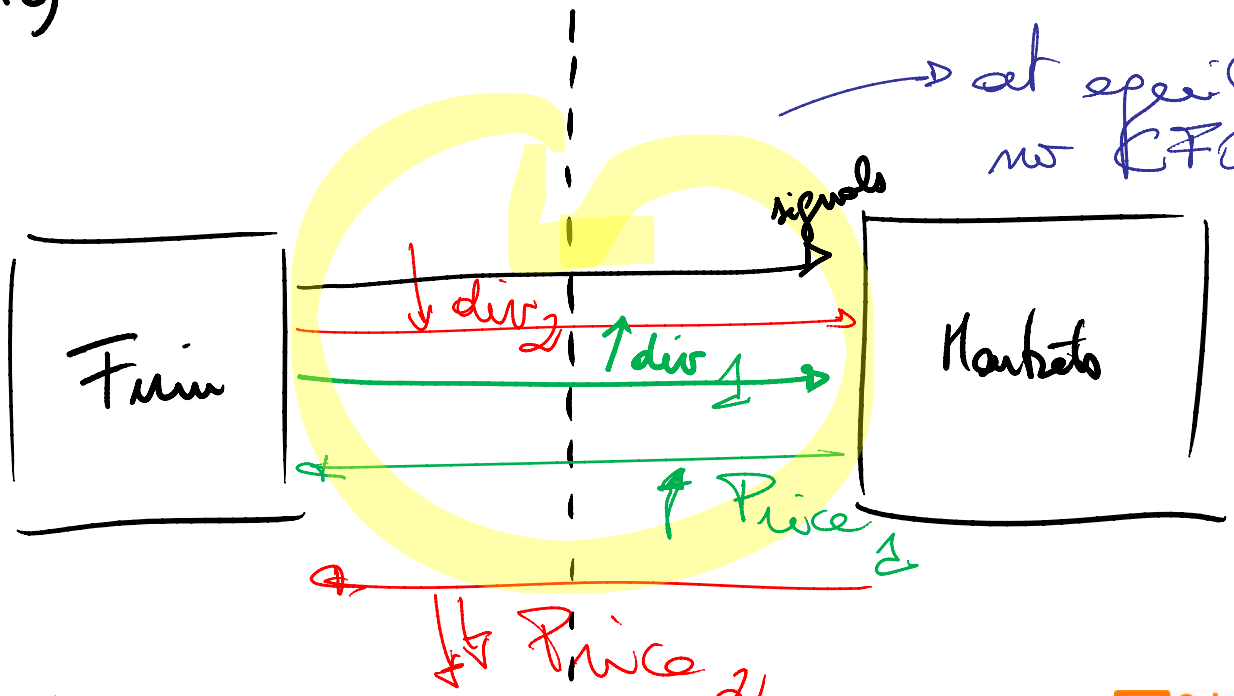


DDM: dividend - discount model

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t (1+g)}{(1+k_e)^t} = \frac{D_0 (1+g)}{k_e - g} \Rightarrow \text{dividends are stable}$$

$$P_0 = \frac{D_1 + P_1}{(1+k_e)} \quad \frac{D_2 + P_2}{(1+k_e)^2}$$

↑ div → (+) nice projects
↑ div → (-) no new opport.



→ at equilibrium, no CFO wants to ↓ dividends except if very good opportunities

solution : reduce asy. of info.
how : communication

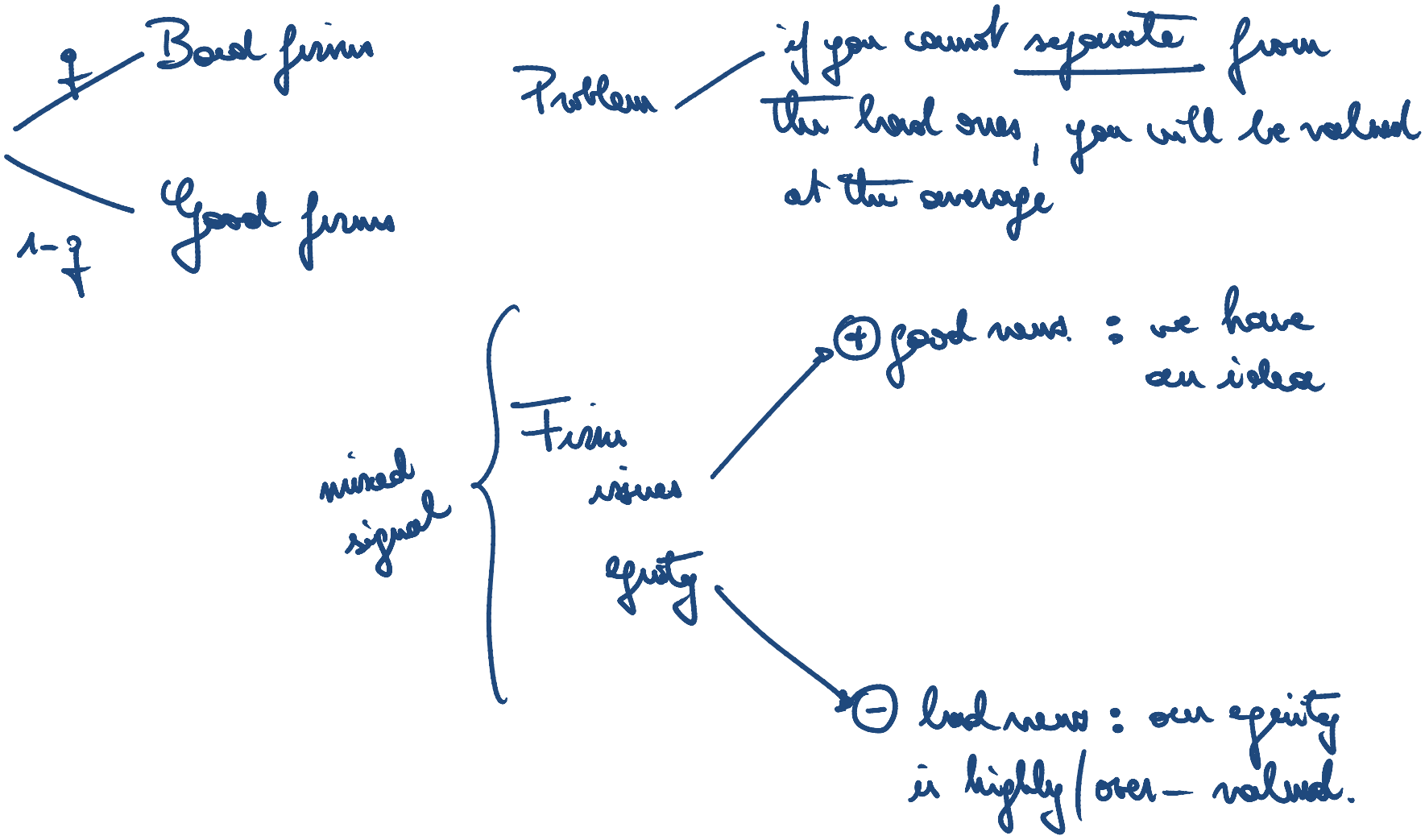
Signalling: Separating vs. pooling equilibrium

⇓ the good firm & the bad firm don't/cannot show the same signal

⇓ You are not able to discriminate the firms on the basis of the signal

⇒ the signal must be costly

Signalling: Separating vs. pooling equilibrium (cont'd)



Ross [1977]: Signalling firm-quality with debt

- Two types of firms, A and B, producing cash flows "a" or "b" at time 1

$$a > b$$

- If investors cannot distinguish between the types, market value at time 0 is

average value $V_0 = qa + (1-q)b$

- Management incentive scheme

$$M = \alpha_0 V_0 + \alpha_1 V_1 \qquad \text{if } V_1 \geq D$$
$$= \alpha_0 V_0 + \alpha_1 (V_1 - L) \qquad \text{if } V_1 < D$$

  - » D = scheduled debt repayment
  - » Managers are penalized if the firm go bankrupt (= L)

imagine that high debt means a good firm because it can afford it.

- What could "L" represent in real life?

at $t=0$ ← they don't know who you are → they realise who you are. at $t=1$ (truth is revealed)

Ross [1977]: Ins & Outs

- Can we support a separating equilibrium in debt?
  - » Firms A choose D^A rather than D^B provided that $(\alpha_0 + \alpha_1)a \geq \alpha_0 b + \alpha_1 a$
  - » Firms B choose D^B rather than D^A provided that $(\alpha_0 + \alpha_1)b \geq \alpha_0 a + \alpha_1 (b - L)$

$$L = \frac{\alpha_0 (a - b)}{\alpha_1}$$

if L is sufficiently high then B will not choose D_A to try to show a better signal at time 0!

- Problems
  - ↳ not sure that high debt is a good signal necessarily.

- $a > D_a$
- $b < D_a$
  $> D_B$

$\Rightarrow D_a > D_B$

$b > D_a$ is / means that B companies can't afford having a high debt

Leland & Pyle [1977]: Signalling project quality with investment

- Entrepreneur, type A ("good") or B ("bad"), has an investment project
- Project returns

randomness

$$r_A = a + \varepsilon$$
$$r_B = b + \varepsilon \qquad \text{with } a > b,\ E[\varepsilon] = 0,\ Var[\varepsilon] = \sigma^2$$

same idea as with Ross, but Leland & Pyle allow for "bad luck" as well. Thus, there is uncertainty about if it is because of bad management or just bad luck.

  - » Capital market investors are risk-neutral, no discounting
  - » Entrepreneur can borrow enough funds to finance project and retain all equity
  - » Entrepreneur is risk averse and would like to lay off some risk, retaining only a fraction α.

$$EU(W_1) = E(W_1) - 0.5\beta \operatorname{var}(W_1)$$

  - » A's time 1 wealth is $W_1(A) = \alpha r_A + (1-\alpha)a$
  - » B's time 1 wealth is $W_1(B) = \alpha r_B + (1-\alpha)b$

- What is the optimal value of α that maximizes $EU(W_1(A))$?

Leland & Pyle (1977) cont'nd

- Now suppose that only the entrepreneur knows her type.
- If both types continued to offer $\alpha = 0$, the market price would have to be

$$qa + (1-q)b$$

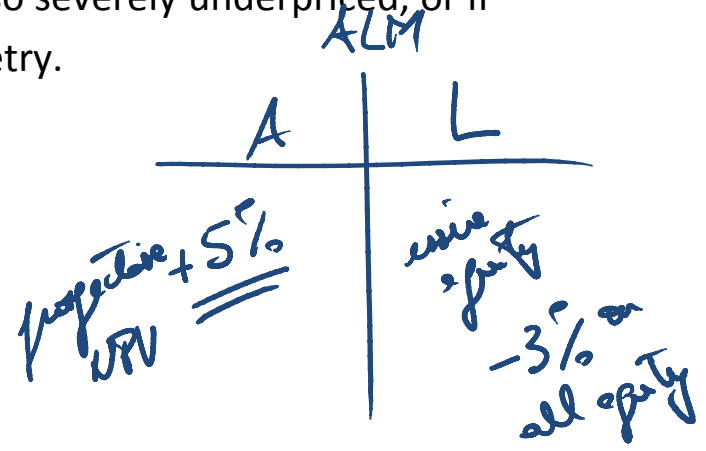
- But A types are receiving too low a price whereas B types are receiving too high a price.
- Is this an equilibrium?
  - » The entrepreneur's strategy is a choice of α
  - » An investor's strategy is a price of equity conditioned on α: $p(\alpha)$
- We need the definition of Perfect Bayesian Equilibrium
  - » Condition 1:
    - ✓ Given its type and investor's strategy, the entrepreneur maximizes his expected utility
    - ✓ Given an offer α by the entrepreneur and investor's belief about the entrepreneur's type $y(\alpha)$, the investor's strategy maximizes his expected utility.

    $y(\alpha)$ is the subjective probability that the entrepreneur is of type A.
  - » Condition 2: The belief $y(\alpha)$ is derived from Bayes rule when possible.

Asymmetric info: Myers & Majluf [1984]

- To the "pecking order" hypothesis: Myers & Majluf [1984]
  - » Investors are less well-informed than insiders and this may undervalue equity in this market
    - ✓ The market does not know if the firm is issuing equity because equity is currently overvalued or because the firm has a real NPV positive project in mind (mixed/hybrid signal)
  - » If firms are required to issue equity in the markets to finance new projects, the underpricing of equity can be so severe that it prevents the firm from investing.
  - » The underinvestment problem can be avoided if
    - ✓ the firm finds another type of security that is not so severely underpriced, or if
    - ✓ the firm is able to reduce the information asymmetry.

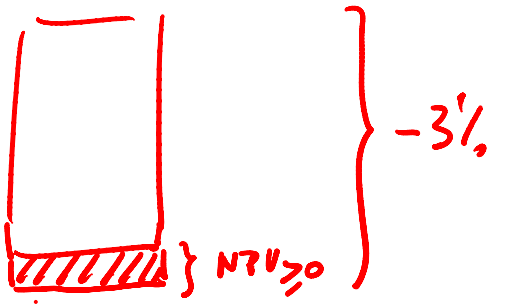
- Pecking order (preference of order)
  1. Financial slack (cash flow or cash)
  2. Debt
  3. Mezzanine Financing
  4. Equity



Another form of dilution...

You have a nice project : $NPV = R - I \geq 0$

You want to finance it with equity : announcement effect of -3% on average.



Myers & Majluf [1984] – Developments

- Endowments:
  - » There are firms in the market with: A_H (High Assets) or A_L (Low Assets)
  - » In proportions q and (1– q)
  - » All firms have a potential project with R (return) for an I (investment) (R– I = NPV)
    This investment is financed by an issue of new Equity.

$$\bar{A} = q A_H + (1-q) A_L$$

- Case of a "high" firm:
  - a) Value of the firm to old shareholders if no issue and no investment: A_H
  - b) Value of the firm to old shareholders if issue and invest:
    - ✓ Proportion to new shareholders $s_N = \frac{I}{\bar{A}+R}$
    - ✓ Value to old shareholders $(1-s_N)(A_H+R)$
  - » Invest if and only if b) > a) : $(1-s_N)(A_H+R) \geq A_H$

invest with new equity

normally: $\frac{I}{A_H+R}$

Myers & Majluf [1984] – Solution

$$(1-s_N)(A_H+R) \geq A_H \Rightarrow \left(1-\frac{I}{\bar{A}+R}\right)(A_H+R) \geq A_H$$

$$\Rightarrow A_H + R - (A_H+R)\frac{I}{\bar{A}+R} \geq A_H$$

$$\Rightarrow R - I\,\frac{A_H+R}{\bar{A}+R} \geq 0$$

$$\Rightarrow R - I\,\frac{A_H+R}{\bar{A}+R} - I \geq -I$$

$$\Rightarrow R - I \geq \left(\frac{A_H+R}{\bar{A}+R} - 1\right) I$$

$$\Rightarrow R - I \geq \left(\frac{A_H+R-\bar{A}-R}{\bar{A}+R}\right) I$$

$$R - I \geq \left(\frac{A_H-\bar{A}}{\bar{A}+R}\right) I \geq 0$$

Conclusion: $NPV \geq \left(\frac{A_H-\bar{A}}{\bar{A}+R}\right) I \geq 0$

if $A_H \gg \bar{A}$ then you will need to have a very high NPV to accept the project.

Conclusion on Asy. Inf., Myers & Majluf (84)

= Pecking order = Preferences theory.