Concentrating on reason 1, we're back where we started – with applied economics of information…

Recap before continuing: The three(?) informational problems (rather 2+1 sources of problems)
>
> 1. hidden information – adverse selection
> 2. hidden action – moral hazard
> 3. Incomplete contracts

1. Hidden information
>
> The firm's management has better information about its future profitability than outside investors.
> If so, external finance is more expensive for the good firms than if outside investors had been informed. Good firms stay out of the capital market. (Conf. market for lemons)
> • Bank vs. market:
>> Economies of scale in collection of information:
>>> • Banks
>>> • Financial analysts?
>>> • Storing information for later use
>>> • Bank/customer relationships

2. Hidden action

The firm's management is unable to verify to outsiders
- its efforts
- the information it obtains about the profitability of the firm's operations

Solution: trade-off incentives / risk-sharing (Principal – Agent problem)
Which outsider is the best at monitoring the firm's operations?
Banks:
- yes, monitors,
- but does the bank get on the inside? not allowed to be a board member

Stock market:
  monitoring done by:
  - financial analysts
  - institutional investors (pension funds, etc.)
  - speculators
Should banks be allowed to hold equity positions?
  - makes banks' monitoring easier
  - may decrease banks' solidity (more risky and volatile)
  - increases banks' power
    - Germany

"3." Incomplete contracts

- Information is sometimes known to both the firm's management and outside investors but cannot be verified by third parties, like courts.
- Contracts cannot cover all possible contingencies.

Ex:

An *infeasible* contract:

"The firm pays the creditor 1 million if it has enough funds to do so"

A *feasible* contract:

" The firm's management keeps control of the firm if the firm pays as agreed. If not, then creditors take control."

This contract does not specify what should be done, only who has the right to decide (*control*).

When contracts are incomplete, there will be lots of trade-offs to make.

The art of trading off different aspects of the available incomplete contracts.
Two very central aspects (there are of course a lot more):

a) Choice of debt vs equity and allocation of control rights:
    Debt:
        If financial distress → Transfer of control rights
    According to this view, the debt/equity ratio should be high if:
        (i) investors are good managers
        (ii) the firm's assets are liquid
        (iii) transfer costs are low
            - costs of coordinating creditors
            - costs of the bankruptcy process

b) Short-termism
    Is business sufficiently long-term in its decision-making?
    If not, is the financing to blame?
        • Hidden information: Projects with quick pay-off give investors early information about profitability. But these projects may not be the ones that maximize net present value. (Conf. "tyranny of quarterly financial reports")
            - Long-term financing may be helpful, e.g. bank financing.

- Hidden action: Investors intervene because they do not trust the management when earnings are low in the short term – even though the NPV maximizing investment choice might have been made.
    - Long-term financing may be helpful, e.g. banks.

The threat of change of ownership (acquisitions) disciplines the management:

Management is concerned about today's stock price, *but*, management may waste resources in order to keep outside raiders away. (Are "poison pills" wasteful?)
(conf. Tone's lectures)

Bank vs. stock market. Is there a conclusion?

Banks score relative to stock market because of
- long-termism
- information storage

But:
- Can we trust the banks?
    - the Norwegian bank crisis
    - inflexible?
    - centers of risk? Banks currently trading away risk, too.

- conflicts between bank management / bank owners
- Institutional investors are important (e.g. Pension funds)
  - monitoring
  - long-term ownership
  - indirect vs. direct monitoring
- Internationally, financial systems are becoming increasingly similar …
  … and were perhaps not that different after all

Jensen & Meckling (1976)
(Their theory of the firm: Nexus of contracts.)
(Reading: skip the parts about firm size, and ch. 6)

Hidden action and conflicts of interest.
(Separation of ownership and control. Adam Smith)

Problem 1: Owners vs. management:
Owner is principal and manager the agent.
(The agency costs of outside equity)

When an entrepreneur-manager has external financing (here: stock owners), non-pecuniary benefits to manager becomes cheaper for him – because owners pay their part of it.
  Non-pecuniary benefits: Big offices, overinvestment/empire-building etc.

However, if the stock owners recognize this, they will spend resources on monitoring the manager.

And, if stock owners *anticipate* monitoring resources, they will pay less for the stocks – exactly reflecting the monitoring costs.

If so, *it's the entrepreneur-manager who loses* from his own propensity to shirk.

Hence, the entrepreneur-manager is willing to abstain from non-pecuniary benefits if, and only if, he can do so credibly – such that the stock owners can trust that monitoring costs are not necessary.

Or, (more realistically with no possible credible commitment and/or with positive monitoring costs), the entrepreneur-manager may be willing to pay monitoring costs directly – because he will also pay them if they're incurred indirectly….
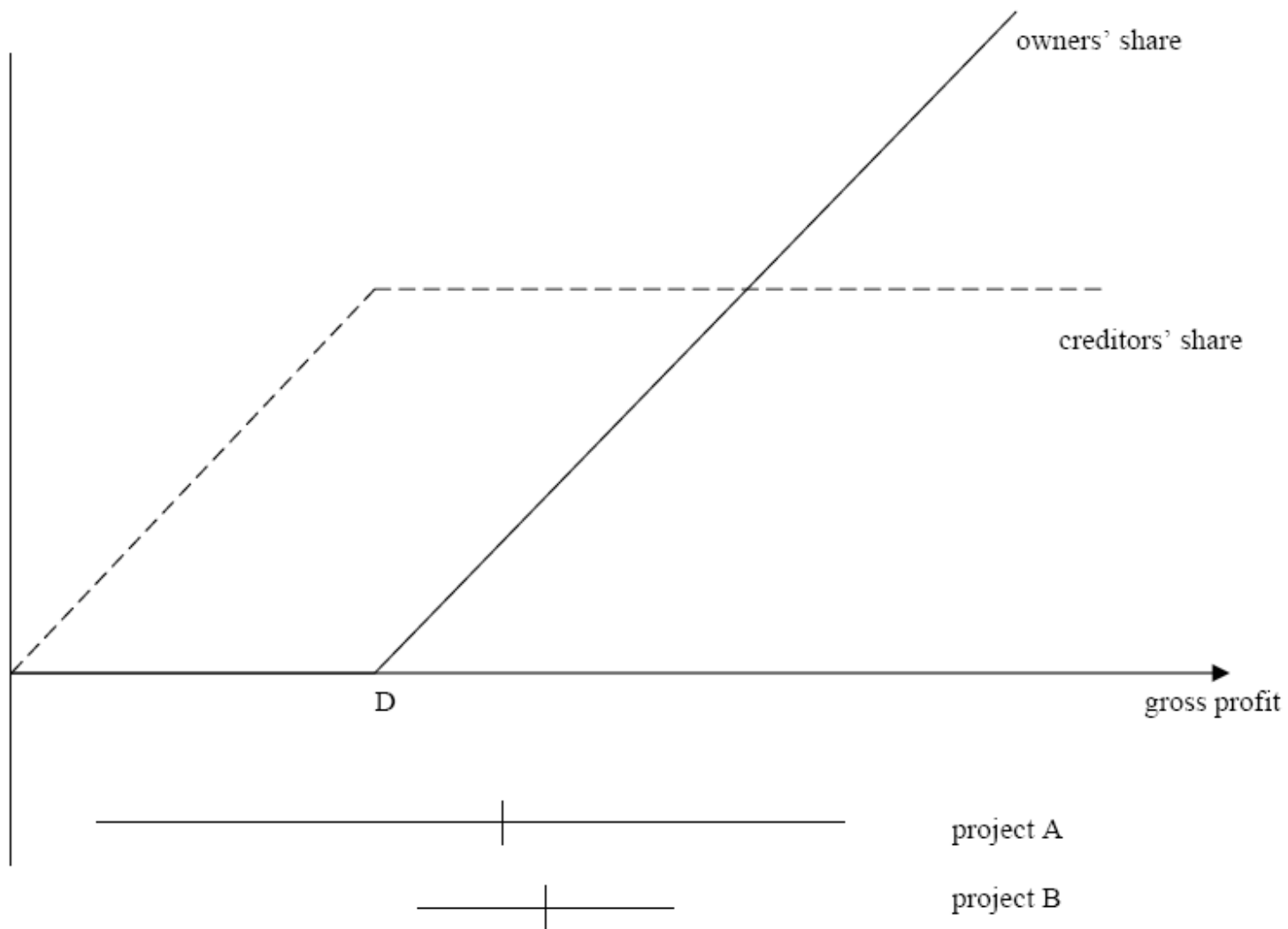
Example: The existence of financial analysts is in the entrepreneur-manager's interest – as well as publishing wage and perqs in the annual report.

Other solutions to problem 1:
  i)   Manager owning 100%
  ii)   using debt (ties up capital to interest and downpayments), but…

Problem 2: Owners vs. creditors:
(The agency costs of debt)

owners' share

creditors' share

D

gross profit

project A

project B

Which project will the owners prefer? and creditors?

This is called the *asset substitution effect.*

If creditors anticipate this, they will demand higher interest on loan to cover for monitoring resources and/or increased risk. Debt will, hence, become more expensive for the firm.

(In addition there are bankruptcy and reorganization costs of debt, but on the other hand also a tax subsidy of debt.)

The combination (trade-off) of problem 1 and 2 implies an optimal debt/equity ratio.

Harris and Raviv (1991)
A well-written literature survey.

Because of asset substitution effect:
- expect industries where scope for asset substitution is lower to have more debt
- expect debt contracts to contain remedies for asset substitution, e.g. prohibit investments in other than firm's core industry.

Moreover,

- expect firms with higher liquidation value to have more debt.

etc….

I highly recommend reading this article.

..and you're supposed to know the theory on page 307-8 (179-180) of it, namely a presentation of:

Myers and Majluf (1984)
   which you're only supposed to know chapter 1 and 2 of.

Their idea, as presented in Harris and Raviv p. 307 is as follows:
(also presented in a similar fashion in Gibbons "A primer in Game Theory" page 205-207)
(and parallel to Daniel and Titman (1995))

Firm insiders (manager) knows more than outsiders (outside investors).
$\Rightarrow$a hidden information problem about
      - the value of the firm (*assets in place*), and/or
      - the value of a new project (we will study this one)

This, we will see leads to *The Pecking Order* hypothesis of capital, namely:
Internal funds is better than Debt which is better than Equity

Why? we use a *signaling game* model to explain:

Using game theory, having both uncertainty and a time sequence, using the solution concept *Perfect Bayesian Equilibrium*. That is, both *strategies* and *revised beliefs* are in equilibrium. (A player's action typically affects other players' *payoff* and *beliefs*.)

Setup:
Stage 1: The *informed* player chooses an action (*signals*)
Stage 2: The uninformed player observes the action chosen at stage 1, revises his beliefs about the informed player, and chooses an action.

Value of the firm (assets in place): $\theta \in \{H, L\}$, $H > L$.
The value of the firm is the insiders' *private information*.

The insiders can choose to invest or not.

Investors' (outsiders') *ex-ante* beliefs:
$\Pr(\theta = H) = p$
$\Pr(\theta = L) = 1\text{-}p$

Thus, $E\theta = pH + (1 - p)L$

Project revenue: V
Project costs: I
Project value (NPV): $V - I > 0$.

Consider now:

If the firm invests and outsiders have beliefs q, then <u>outsiders expect</u> the firm's value to become:

$$q(H + V) + (1 - q)(L + V) = V + qH + (1 - q)L$$

Capital market is competitive, and
Investors are risk neutral, i.e.:

$\Rightarrow$ Investors' expected revenue = expected costs

$$\Leftrightarrow f[V + qH + (1 - q)L] = I,$$

where
f = share of the firm owned by new owners (new equity holders, that is)

$$\Rightarrow f = \frac{I}{V + qH + (1-q)L}$$

Current owners are left with:

$$(1 - f)(\theta + V), \quad \theta \in \{H, L\}$$

Investment is profitable if (i.e. insiders thinking: should we invest?):

$(1 - f)(\theta + V) \geq \theta \Leftrightarrow$

$$f \leq \frac{V}{\theta + V}$$

Two possible cases:

Case (i): The firm has low value: $\theta = L$
Investment is profitable if

$$\frac{I}{V + qH + (1-q)L} \leq \frac{V}{L + V}$$

which always holds,
 because $I < V$, and $V + qH + (1 - q)L \geq V + L$.

Thus: Low-value firms always invest.

Case (ii): The firm has high value: $\theta = H$
Investment is profitable if

$$\frac{I}{V+qH+(1-q)L} \leq \frac{V}{H+V} \quad \Leftrightarrow$$

$$q \geq \frac{I(H+V)-V(L+V)}{V(H-L)}$$

…not always profitable, depends on beliefs q.

To find equilibrium:
Now consistency of beliefs requires:
    (a) Since type L always invests, type H investing is consistent with beliefs only if: $q = p$ (important to understand why!)

Thus, an equilibrium exists in which
    - the firm invests, whether it has a high value or a low value, and
    - $q = p$,

if:

$$p \geq \frac{I(H+V)-V(L+V)}{V(H-L)} \quad \Leftrightarrow$$

$$\frac{V}{I} \geq \frac{H+V}{\bar{\theta}+V}$$

where $\bar{\theta}=E\theta$

i.e. to have $q=p$ and investment by high value firm, the exogenous parameter p must be inside the range where q is consistent with investment by high value firm, and this in turn has implication for the other parameters (H,L,V,I).

    (b) Since type L always invests, type H <u>not</u> investing is consistent with beliefs only if: $q = 0$

Investment is <u>not profitable</u> for high value firm if

$$q \leq \frac{I(H+V)-V(L+V)}{V(H-L)}$$

An equilibrium exists in which
- the firm invests if and only if it has a low value, and
- $q = 0$,

if:

$$\frac{I(H+V)-V(L+V)}{V(H-L)} \geq 0 \iff$$

$$\frac{V}{I} \leq \frac{H+V}{L+V}$$

…i.e. a criterion for parameters (firm, project and costs) to be such that investment is not profitable for the high value firm when beliefs, q, is equal to zero.

Conclusion:
- Two possible equilibria
- with adverse selection when only type L invests (remember: project is profitable per assumption – for both firm types!)
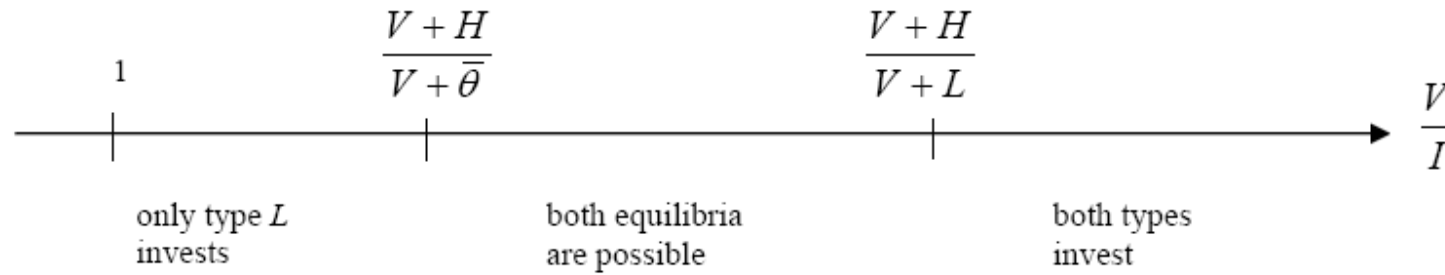
The model shows that issuing equity can be costly.

Riskless debt and internal funds is better as they do not involve any undervaluation. However, in practice debt is (more or less) risky, so there is some undervaluation involved in issuing debt. Hence, the pecking order:

Internal funds > Debt > Equity

Is there anything a high-value firm can do in order to convince investors about its true quality?

- Yes, if the high-value firm can credibly signal that it is high-value: Do something the low-value won't do, but that still is a better alternative for the high-value than not doing it.

For example, it can be shown (Daniel and Titman) that "money burning" is such an action. This works because the low-value firm won't afford to waste resources (burn money), while the high-value will because it's better than the alternative not to invest.