# Financing the firm – control aspects

Hart chapter 5

Recap:

- Incomplete contracts and relationship-specific investment lead to a hold-up problem. Can be solved by transferring ownership and control over assets between the parties.

- And a person should own an asset if he is *essential* in the use of it.

*Question:* What if this person does not have funds available for securing the ownership?

A new conflict of interest emerges: Between those with ideas (entrepreneurs) and those with finances (capitalist).

Simple model:
(Aghion & Bolton, *Rev. Econ. Stud.* 1992.)

*Entrepreneur* (*E*) vs *Capitalist* (*C*).
Capital needed: $K$
*E*'s initial wealth: $w$
Investment decision: $a \in A \subset \boldsymbol{R}$

Payoffs from investment:

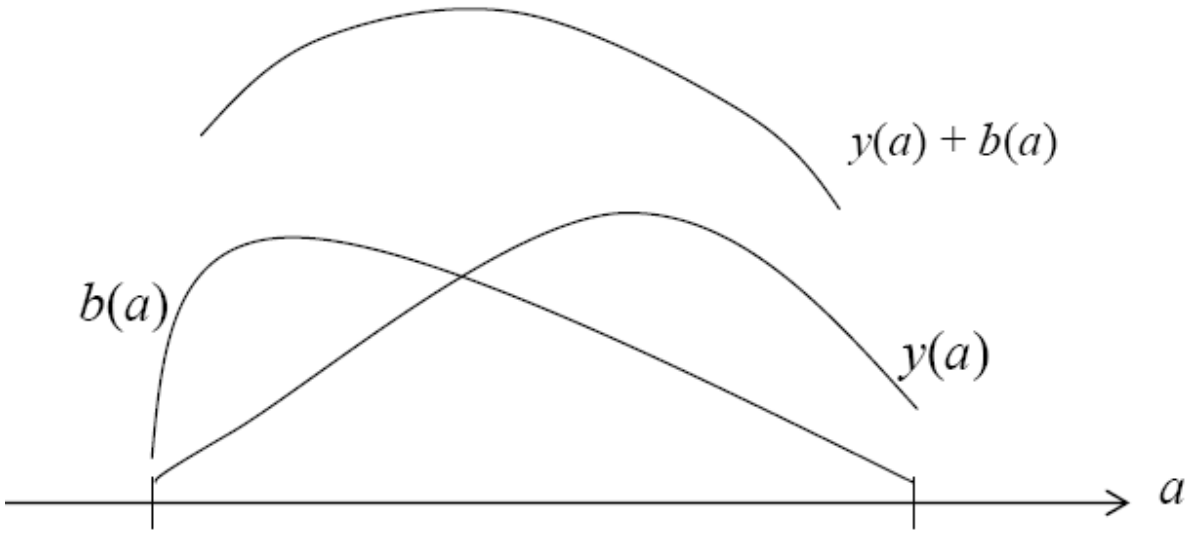
- pecuniary and verifiable: $y(a)$
- non-pecuniary and non-verifiable: $b(a)$

What is $b(a)$?
– Utility, measured in monetary equivalents, from the project obtained by *E*.

- perquisites
- family business
- other emotional ties to the firm

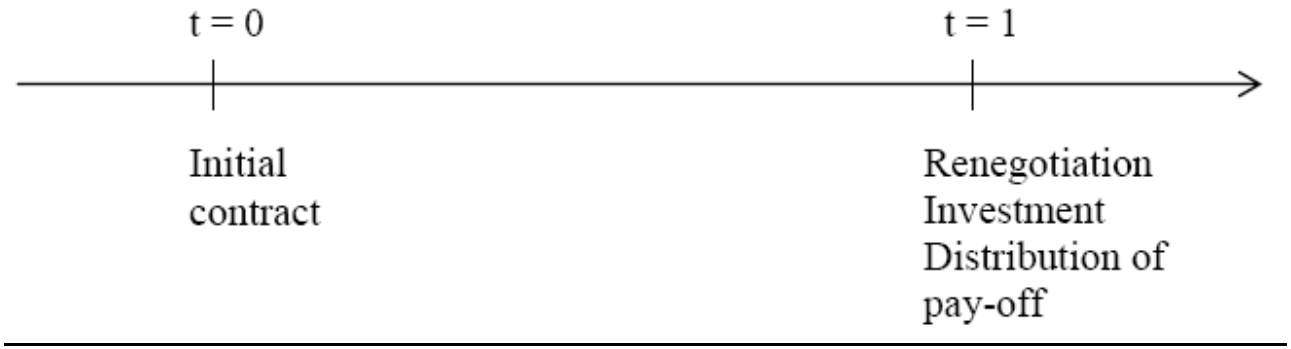
Assumptions: $y''(a) < 0$; $b''(a) < 0$.

Conflict of interest: $y(a)$ and $b(a)$ are maximized for different values of $a$.



1. Suppose first that $E$ has enough wealth: $w \geq K$.
$E$'s decision is the best possible:
$a^* = \text{argmax}_a [b(a) + y(a)]$

2. But what if $E$ is wealth constrained? Put $w = 0$.




Assumption on initial contract:
$C$ gets the pecuniary part: $u_C = y(a)$
$E$ gets the non-pecuniary part: $u_E = b(a)$
The choice of $a$ is non-verifiable and cannot be contracted upon.

Before signing initial contract: Allocation of control rights.
Two extreme cases:

2.1 *E* has control
2.2 C has control

## 2.1 *E* has control

Initial contract: *C* gets shares without voting rights, but he also gets all the dividend.
(*E* keeps all shares with voting rights.)

Investment decision: *E* chooses $a_E = \text{argmax } b(a)$

Without renegotiation: *C* gets $y(a_E)$

Scope for renegotiation?
Yes, a Pareto improvement is possible as $b(a_E) + y(a_E) \leq b(a^*) + y(a^*)$ and *C* has money to make an (more than) offsetting payment to *E*.

That is, *E* may offer to choose $a^*$ if *C* pays him $y(a^*) - y(a_E) \geq 0$
(assuming *E* has all bargaining power in renegotiation (simplifying))

*C* accepts and is left with:
$y(a^*) - [y(a^*) - y(a_E)] = y(a_E)$

*E* gets:
$b(a^*) + y(a^*) - y(a_E) \geq b(a_E)$

*C* invests if: $y(a_E) \geq K$.

2.2 *C* has control

As if *C* owns the firm; he has all shares with voting rights, *and* he gets all the dividend.

Investment decision: *C* chooses $a_C = \text{argmax}\, y(a)$

Scope for renegotiation? – Pareto improvement exists, but *E* has no funds available to offer in the renegotiation.

*C* invests if: $y(a_C) \geq K$

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Now consider the case:
$y(a_C) > K > y(a_E)$

If $E$ has control, then he will not be able to attract financing.
However, he does not have to give up more control than necessary.
Consider the following control distribution:

2.3 Stochastic control:
With probability σ, $E$ owns the firm;
with probability $(1 - \sigma)$, $C$ owns it.

If $E$ can choose σ, then he makes sure that:
$\sigma y(a_E) + (1 - \sigma) y(a_C) = K$.
($C$ breaks even on average)

We extend the stochastic control model to make it easier to interpret:

Suppose pecuniary pay-off is stochastic:
$y = y(a, \theta) = \alpha(\theta)z(a) + \beta(\theta)$,
where $\theta$ is a stochastic variable disclosed before $a$ is chosen.

Assumptions:

(i) $\alpha'(\theta) < 0$; $E$'s investment decision is of less importance, the higher is $\theta$.

(ii) $dy/d\theta > 0$: an increase in $\theta$ increases the pecuniary pay-off.
$(\alpha'(\theta)z(a) + \beta'(\theta) > 0)$

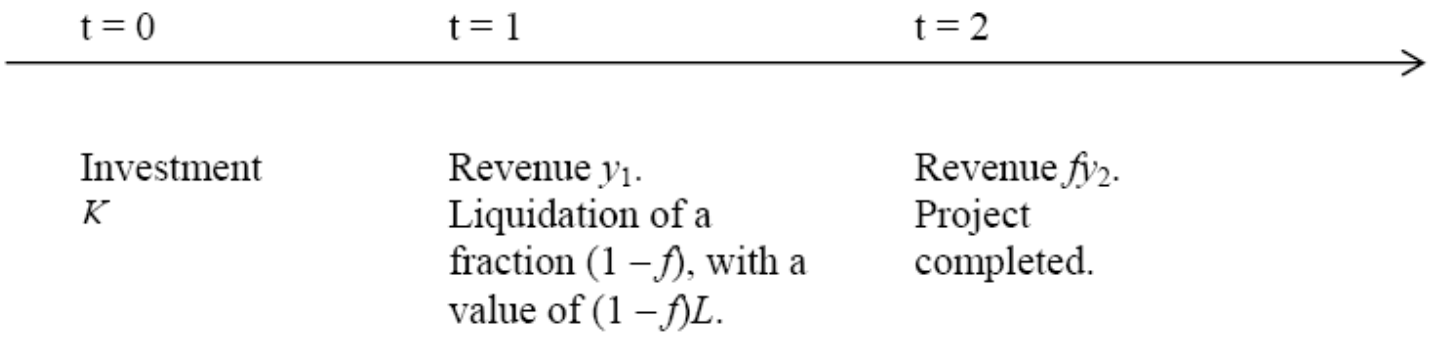
Suppose $E$ chooses a $\theta^*$ before $t = 0$, with the property that $E$ keeps control over $a$ if $\theta \geq \theta^*$ (pecuniary pay-off high) but hands over control to $C$ if $\theta < \theta^*$ (pecuniary pay-off low).
Optimal $\theta^*$ is such that $\sigma y(a_E) + (1 - \sigma)y(a_C) = K$, where $\sigma = \text{Prob}(\theta \geq \theta^*)$

But what is $\theta$?, verifiable?
The model, however, shows that the optimal contract has a contingent shift in control – such as a standard debt contract.

## An alternative model
(Hart & Moore)

Investments pay off at two points in time. Makes us able to model *financial distress*.

If the firm does not pay at $t = 1$, then control over the firm is transferred to the creditors and liquidated, in whole or in part.




Both $y_1$ and $y_2$ are non-verifiable.

Can $C$ trust that $E$ does not take the money and run? Can $C$ be sure that the debt is paid down at $t = 1$ when there is revenue available to do it?

Assumptions:

- $E$'s initial wealth $w \in (0, K)$
- $y_2 > L$, Continuing until $t = 2$ is first-best.
- $y_1 + y_2 > K \geq L$. Investment is profitable in first best; however, second-hand value of assets lower than first-hand.

Consider the contract $(B, P)$:
$E$ borrows $B \geq K - w$ at $t = 0$ and has to pay $P \leq L$ at $t = 1$. If he defaults on his debt, $C$ seizes control and liquidates the project.

Scope for renegotiation: In case $E$ defaults, it is possible for him to renegotiate with $C$ in order to carry on part of the project.

Assumption: $E$ has all bargaining power.

$t = 2$: $E$ keeps everything, $fy_2$.
$t = 1$: $E$ prefers to give $C$ as much as needed, since $y_2 > L$. $E$ has available $w + B - K + y_1$.

Thus, $f$ is determined as:
$f = 1$, if $w + B - K + y_1 \geq P$
$f$ solves:
$w + B - K + y_1 + (1 - f)L = P$, otherwise. (*)

$E$ has all bargaining power, so $P = B$

$$\Rightarrow \quad f = \min\left[1, 1 - \frac{K - w - y_1}{L}\right]$$

$t = 0$: Will $E$ obtain financing?
Yes, if the contract is
1) credible: $P \leq L$
2) sufficient: $B \geq K - w$

1)&2) implying: $L \geq K - w$
Liquidation value greater than (external) capital need
and

3) *E* must prefer these conditions to not investing, i.e. his participation constraint (PC) must be fulfilled: This is fine if $f = 1$. because the project is assumed to be profitable.

However if $f < 1$, we must check PC more thoroughly:
$B - (K - w) + y_1 - Min[B - (K - w) + y_1, P] + fy_2 > w$

Using (*) and that $P=B$ this can be reduced to (see calculation on blackboard):
$y_1 + fy_2 + (1 - f)L \geq K$ (i.e. positive NPV including possibility of some liquidation)
Correction to the lecture: inserting for $w$ is not needed, it cancels out!

Note:
*Ex post* inefficiency: If f<1 there will be (some) liquidation.

*Ex ante* inefficiency:
If $L<K-w$ profitable project will not be undertaken because C will loose money.
and
If $y+fy+(1-f)L<K$ profitable projects will not be undertaken because E will loose money.
(see book p 105-106 for examples).

# Corporate finance

-preliminaries and introduction

Finance:

- asset pricing and portfolio choice
- corporate finance

Why is corporate finance important?

The importance of providing capital to business

- …in a socially optimal way
  - …i.e. minimizing distortions (we'll see which)

Older corporate finance: Tax issues.

Modern corporate finance: Information and control issues.

Two sources of capital:

- banks
- stock market

Financial systems around the world: Bank-dominated: Germany, Japan, and market-dominated: US, UK. We will learn more about this in LaPorta et al. (1998). We will try to collect some pros and cons as we go along – as examples to the different issues.

And two basic types of capital:

- debt
- equity

Which is better?
response from old theory: Modigliani-Miller theorem: it doesn't matter. (MM is a little bit like saying: if markets are complete, there are no problems. We'll soon have a brief look at MM.)

A third type of capital

- the forgotten source of capital: retained earnings ("internal funds")

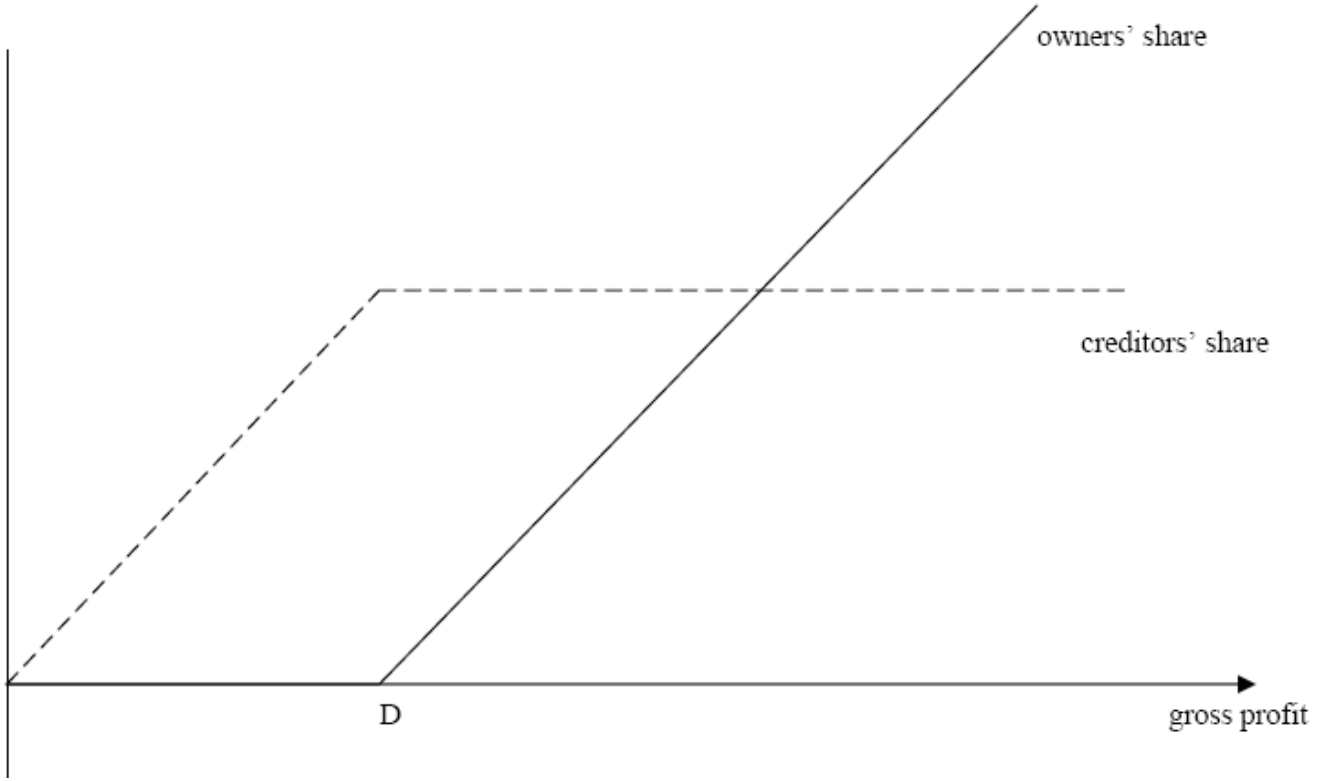
Tax issues (in brief):

- tax subsidy on interest payments on loans
- tax on profit vs. tax on dividend
  - A higher tax rate on dividend than on profit makes equity even more expensive.
  - This will shift firms towards
    - retained earnings
    - bank loans

More fundamental issues:

- Do firms get as much capital as they need?
  - Are profitable projects put aside because of lack of capital? Conf. ex ante efficiency in Hart ch 5.
  - "credit crunch"
  - e.g. are local banks better than regional or international?
- Is financial distress treated efficiently?
  - Are genuinely weak firms turned bankrupt while viable firms are brought through the difficulties? Conf. ex post efficiency in Hart ch 5. and Tone's lectures!

Modigliani-Miller theorem (extremely simplified, following Tirole's book (2006)):




let $V_O$ be owner's return and $V_C$ be creditor's return.
Total expected value is then:

$$V_O + V_C = E(\max(0, \mathrm{R} - D) + E(\min(R, D)) = E(R)$$

where *R* is total return and *D* is debt. So total expected value is independent of financing structure.

Moreover, does dividend policy matter? Consider the effect of dividend policy:

By arbitrage, the price of a share today is equal to the discounted sum of tomorrow's dividend and tomorrow's share price:

$$P_t = \beta E(d_{t+1} + P_{t+1})$$

And by mere accounting we have the following equality:

$$R_t + P_t(n_t - n_{t-1}) = n_{t-1}d_t + I_t$$

where $n$ is number of shares.

That is, (LHS:) available cash today (earnings and amount raised in capital market) must equal (RHS) total dividends paid (today) and investments (today).

Total value of firm is then:

$$V = n_t P_t = \beta n_t E(d_{t+1} + P_{t+1})$$

$$= \beta E(R_{t+1} - I_{t+1} + (n_{t+1} - n_t)P_{t+1} + n_t P_{t+1})$$

$$= \beta E(R_{t+1} - I_{t+1} + V_{t+1})$$

…independent of dividends, only on real figures.

Why then bother about financial structure? Why a big issue in the market?
Answer: Probability distribution of cash flow, $E(\mathbf{R})$, is not independent of the capital structure. ("technical answer")

Reasons for the technical answer:
1. When (financial) contracts are not perfect it matters whom the contract gives residual rights (residual rights=residual control and residual income). Conf. previous lectures.
   Examples:
   - Is it wise to have firms use retained earnings?
     - Who has the best incentives to find the best investment projects – managers or investors?
     - Who has the best skills in choosing projects?
   - Take a look at the revenue functions in the previous graph. Are incentives aligned? Who of the two should control the firm, and under which circumstances? Conf. Hart ch 5 (last lecture).
2. Direct costs or benefits: Bankruptcy costs and tax differences

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