OWNERSHIP AND CONTROL
Adverse selection and capital structure

Myers, S. and N. Majluf (*Journal of Financial Economics*,1984)

- *Managers'* level of information about investment projects is greater than the investors' level of information.

- The quality of the good (investment project) exchanged is better (or exclusively) known by *the managers*

  asymmetric information => <u>adverse selection</u>

THE MODEL

Assumptions:

1. Information asymmetry between manager and shareholders

2. ➡ ONE opportunity of investment which requires the sum (of money) → I
   ➡ Firm's own financial stock → S

3. If $S < I$:
   $E = I - S$ → the value of equity shares that must be issued to undertake the project

4. Three periods:

t = -1;   t = 0;   t = +1

t = -1:

The market has the same information that the management does.

t = 0:

The management receives additional information about the value of the firm's asset and of the investment opportunity, and updates the asset's value accordingly.

The market has not this information.

t = +1:

Also the market receives the information about the value of the firm's asset and of the investment opportunity.

t = -1

- Both *the managers* and the market only know: the **expected value** of the assets held by the firm → **A**

  and the **expected** net present value of the investment project → **B**

  ➡️ **Symmetric information**

_t_ = 0

- **ONLY The managers** observe the realization of the stochastic variables _A_ and _B_

$$\rightarrow a \text{ and } b$$

By assumption:

$a \geq 0$

$b \geq 0$

t = 0

- **The investors** can only observe:

  Either: $E = 0$

  Or: $E = I - S$

- **The managers** act in the interest of the "*old shareholders*" (the ones who already own shares at the beginning of t=0)

  Old shareholders are assumed to be *passive*

  (they do not buy new equities)

t = 0

- **Managers** hence maximize:

$$V^{OLD} = V(a,b,E)$$

  the market value (function of *E, A, B*) of these old shares will not generally equal V^{OLD}

- Be:

  P = the market value at *t = 0* of the existing

   equity shares *when E*=0

  P' = the market value at *t = 0* of the existing

   equity shares *when E = I - S*

_t_ = +1

- also the investors observe the realization of the stochastic variables _A_ and _B (that is a_ and _b)._

Symmetric information

_S_ (firm's own financial stock) is assumed to be fixed through all three periods and known by both managers and the market

THE FORMAL MODEL

$$0 \leq S < I$$

Two situations are possible:

(i) The managers of the firm, knowing the true values a and b, <u>decide not to issue</u> new shares (They give up the investment opportunity)
The firm is owned by its current (OLD) shareholders and the value of their shares (= the value of the firm) is:

$$V^{OLD} = S + a \rightarrow \text{value of the firm without investment}$$

(ii) The managers of the firm, knowing the true values a and b, decide to issue new equity shares to finance the project (and to invest in the project). In this case:

$$E = I - S$$

And the value of the firm is:

$$V = E + S + a + b \rightarrow \text{value of the firm with}$$
$$\text{Investment}$$

if P' is the market value of the equity shares held by the old shareholders, they will hold a share equal to:

$$\frac{P'}{P'+E}$$

→The value of the firm hold by the old shareholders is:

$$V^{OLD} = \frac{P'}{P'+E}\left(E+S+a+b\right)$$

Managers will issue new equity shares if and only if:

$$S + a \le \frac{P'}{P' + E}(E + S + a + b) \qquad (1)$$

That is:

$$\frac{E}{P' + E}(S + a) \le \frac{P'}{P' + E}(E + b) \qquad (2)$$

[(share of existing assets and fund of the firm going to new shareholders) ≤ (share of increment to firm value obtained by old shareholders)]

Condition (2) can also be written as:

$$(E+b) \geq \frac{E}{P'}(S+a)$$ (3)

The line:

$$(E+b) = \frac{E}{P'}(S+a)$$

Divides the set of pairs (a, b) into two regions: M and M'

(**figure**)

- If the outcome (a, b) falls in region M', the managers issue and invest.

- If the outcome (a, b) falls in region M, the managers do nothing

Be:

- *M'* the set of pairs (*a,b*) that satisfy inequality (3);

and

- *M* the set of pairs (*a,b*) that do not satisfy inequality (3).

For each pair: $$(a,b) \in M'$$

managers issue new equity shares and the investment project is undertaken;

For each pair: $$(a,b) \in M$$

it is not in the interests of old shareholders the emission of new equity shares and then the investment project is not undertaken. Also projects with positive net present value are not undertaken

NOTE:

➢ The greater is *a* the grater must be *b* to decide to issue and invest

→ the higher *b*, the higher the gain old

shareholder get from issuing and investing

➢ *P'* , the market value of the shares hold by old shareholders depends on whether *a* and *b* are in region *M* or *M'*, and the boundaries of *M* and *M'* depend on *P'*.

→*P', M* and *M'* are simultaneously

determined.

EXAMPLE

- Two equally probable states of nature.

- The true state is revealed to management
  at t = 0

- To investors at t = + 1.

	State 1	State 2
Value of the assets	$a = 150$	$a = 50$
NPV	$b = 20$	$b = 10$

- $S = 0$.
- $I = 100$,
- $E = 100$ (if invest)
- $P' = Exp(A+B) = 115$

State 1

- If the managers <u>decide to invest</u>:

    V=E+S+a+b =270

    $$V^{OLD} = \frac{P'}{P'+E}(E+S+a+b) = \frac{115}{215}270 = 144{,}42$$

- If the managers <u>decide not to invest</u>

    $V = V^{OLD} = E+S+a+b = 150$

State 2

- If the managers <u>decide to invest:</u>

$$V = E+S+a+b = 160$$

$$\Longrightarrow \quad V^{OLD} = \frac{P'}{P'+E}(E+S+a+b) = \frac{115}{215}160 = 85{,}58$$

- If the managers <u>decide not to invest:</u>

$$V = V^{OLD} = E+S+a+b = 50$$

Summing up:

Payoff	Issue and invest (E=100)	Do nothing (E=0)
V^{OLD} in state 1	144,42	150
V^{OLD} in state 2	85,58	50

Remember that the condition that must be respected for deciding to issue new shares is:

$$(E+b) \geq \frac{E}{P'}(S+a)$$

State 1:

(100+20)<100/115(0+150)   [120<130,43]

$\longrightarrow (a,b) \in M$

The investment project is not undertaken!

State 2:

(100+10)>100/115(0 + 50) [110>43,47]

$\longrightarrow (a,b) \in M'$

*T*he investment project is undertaken

(figure)

- If the managers follow this strategy, issuing stock signals state 2 and P' drops to 60

- The decision to issue equity shares reduces share price → region M' is "BAD NEWS"

Underlying mechanism:

When managers issue new equity, investors believe that managers think that the firm is **<u>overvalued</u>** and managers are taking advantage of this over-valuation.

As a result, investors will place a lower value to the new equity issuance.

- Investors know neither the value of the assets of the firm (*a*) nor the net present value of the investment (*b*), but just their probability distribution.

- Investors know *mangers'* rule of conduct.

→ They are able to form expectations about the value of the firm and of the investment project from the observation of *managers* behavior.

- Managers' decision not to issue equity shares signals that the return to the project is low compared to the value of the assets that already make up the firm.

- Managers' decision to issue equity shares signals that the return to the project is high compared to the value of the assets.

LOSS OF EFFICIENCY:

Managers do not undertake investment projects that have a positive net return (and that therefore would be efficient to implement), but not so high to satisfy the condition (1-2-3)

(condition of invariance of old shareholders' utility)

(compare *b* in state 1 and *b* in state 2)

Pecking order theory of the capital structure

→ the firm that wants to undertake an

investment project should use:

- First: its own capital;

- secondly: debt

- last: emission of equity shares.

- A contract in which *managers* remuneration depends on the value of the project, would lead them to act not only to protect the interests of old shareholders.

- This would solve the problem of the "signal" linked to *the managers* behavior and the resulting undervaluation of the firm.