

Chapter 7: Moral Hazard

Financial Microeconomics

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Part 3 of the course: contract theory

- Asymmetric information:
 - Situation in which one party has more information than the other
- Example: managers compared to investors...
 - regarding effort exerted
 - regarding future cash flows
- In this part:
 - Chapter 7: moral hazard (ex-post asymmetric info)
 - Chapter 8: adverse selection (ex-ante asymmetric info)

In this chapter...

- What are “moral hazard” and “agency costs”?
- Conflicts of interest between debt holders & shareholders
- Conflicts of interest between managers & shareholders
- A model of agency costs (Holmstrom and Tirole, 1979)

Agency problems

- In an agency relationship...
 - a principal engages an agent to perform a task on his or her behalf
 - involves delegating authority by the principal
- Examples?
- Questions:
 - Will the agent act in the best interest of the principal?
 - What will the principal need to do? And the agent?
- Moral hazard: tendency to behave “inappropriately”
- Agency costs: costs associated to these conflicts of interest

Conflicts of interest between insiders & outsiders

- Managers...
 - often own shares and are elected by shareholders (“insiders”)
 - *generally* maximise shareholder’s wealth, sometimes at the expense of other investors (debt holders) and even at expense of the firm’s value
- An example:
 - Risk-shifting: managers/shareholders may take excessive risks

Conflicts of interest between managers & shareholders

- Separation of ownership and control. Managers...
 - own small participations (median of 0.25% Jensen and Murphy, 1990)
 - are rarely dismissed (Warner et al., JFE 1988)
 - but control the corporation (why are they hired?)
- Managers care about. . .
 - Investors (equity and debt holders)
 - Customers and suppliers, employees
 - Themselves!

Examples of conflicts between ownership and control

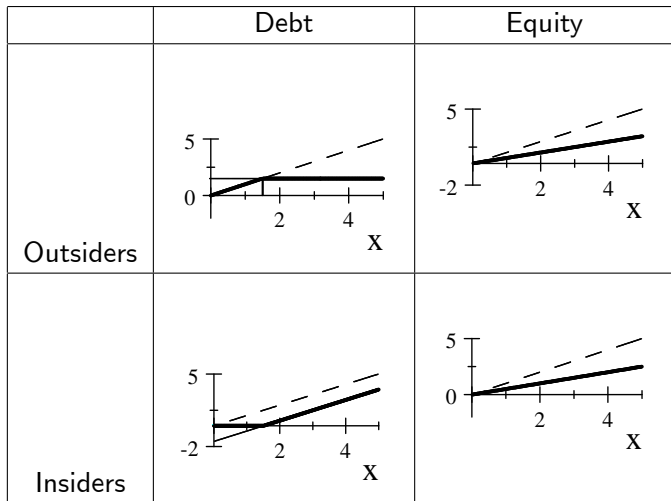
- Managers might have incentives to:
 - Not exert effort or shirk
 - Engage into wasteful expenditure (perks)
- Investment in bad projects:
 - Empire building: increase size of the firm
 - Overconfidence
- Free cash flow (FCF) hypothesis (Jensen, AER 86):
 - Wasteful spending more likely if large FCF
 - Leverage...
 - (i) commits firm to make interest payments
 - (ii) reduces manager's ability to misbehave
 - (iii) forces debtholders to monitor more
 - As a result, it increases the firm's value

A model of agency conflicts

Holmstrom and Tirole, 1979

- Setup:
 - Entrepreneur (“insider”) needs external financing
 - Investor (“outsider”) provides capital to finance the project
 - Conflict of interest between insiders and outsiders
 - Asymmetric information leads to “moral hazard”
- Questions:
 - What is the “optimal contract”?
 - Does it resemble debt or equity?

Debt versus equity contracts



Model

- Entrepreneur has a project that requires investment I
- Her assets are only worth $A < I$ (needs to borrow $I - A$)
- Project may be
 - successful (probability p) and yield $R > 0$
 - or fail (probability $1 - p$) and yield 0
- Entrepreneur may
 - exert effort ($p = p_H$) or shirk ($p = p_L$) with $\Delta p = p_H - p_L > 0$
 - if she shirks she obtains private benefits $B > 0$
- Limited liability (no punishment for failure)

Optimal Contract

- Optimal contract specifies how profit should be shared:
 - Both should get 0 in case of failure (limited liability)
 - In case of success, define sharing rule as $R_b + R_l = R$
- Assume:
 - Project has positive NPV if effort exerted: $p_H R - I > 0$
 - Negative NPV if not: $p_L R - I + B < 0$ (even adding B)
 - Rewriting, $p_L R_l - (I - A) + p_L R_b + B - A < 0$ (effort necessary)
- Consider, in turn, that bargaining power is held by:
 - (1) Outsiders: make take-it-or-leave-it offer to entrepreneur
 - (2) Insiders: outside investors are competitive (many)

Timing

- 1 Agreement (sharing rule in the case of success)
 - 2 Investment
 - 3 Effort or shirk (unobserved)
 - 4 Outcome and payments
- What would be the contract if effort is instead observed?

Credit Analysis

- Need to ensure that entrepreneur exerts effort
 - Trade-off: private benefits vs. higher probability of success
- Incentive compatibility constraint:

$$p_H R_b \geq p_L R_b + B$$

or

$$R_b \geq \frac{B}{\Delta p}$$

- This is the minimum entrepreneur must keep (rent)
- Maximum that can be pledged (promised to the investor) is

$$R - R_b = R - \frac{B}{\Delta p}$$

- Since it is paid only in case of success, project financed only if

$$p_H \left(R - \frac{B}{\Delta p} \right) \geq I - A$$

or

$$A \geq I - p_H \left(R - \frac{B}{\Delta p} \right) = p_H \frac{B}{\Delta p} - (p_H R - I) \equiv \bar{A}$$

- To make things interesting assume that $\bar{A} > 0$ or

$$p_H \frac{B}{\Delta p} > p_H R - I \text{ (necessary rent} > \text{NPV)}$$

- Financing possible only when $A \geq \bar{A}$, even if:
 - when $A < \bar{A}$, the project also has positive NPV
 - the entrepreneur willing to give a higher fraction of return

Utilities: investor's bargaining power

- If $A \geq \bar{A}$ entrepreneur gets, in case of success,

$$R_b = \frac{B}{\Delta p}$$

and therefore in net expected terms

$$p_H R_b - A = p_H \frac{B}{\Delta p} - A \text{ (as long as this is positive)}$$

- The investor gets

$$p_H R_I - (I - A) = p_H (R - R_b) - (I - A) = p_H R - I - (p_H \frac{B}{\Delta p} - A)$$

Utilities: entrepreneur's bargaining power

- Competitive lending implies: $p_H R_I = I - A$
- Again entrepreneur needs to keep minimum rent and therefore needs to have enough assets to be financed
- If $A \geq \bar{A}$, entrepreneur's gets in case of success

$$R_b = R - R_I = R - \frac{I - A}{p_H} \geq R - \frac{I - \bar{A}}{p_H} = \frac{B}{\Delta p}$$

and the entrepreneur's net payoff is given by

$$p_H R_b - A = p_H (R - R_I) - A = p_H R - I \text{ (all NPV)}$$

- Investor obtains

$$p_H R_I - (I - A) = 0$$

Debt or equity?

- Optimal contract was a profit sharing agreement
- In this simple binary example, this can be thought as a “debt” contract:
 - Borrow $I - A$ in exchange of a repayment of R_l
 - In case of success, borrower keeps $R_b = R - R_l$
 - In case of failure, borrower (and lender) get 0
- ...or as an equity contract:
 - Entrepreneur's share $\alpha = R_b/R$ and investors' $1 - \alpha = R_l/R$

Conclusions

- In sum,
 - Because of moral hazard there is a limit to pledgeable income
 - Projects with positive NPV may not be funded
 - The entrepreneur needs to have enough assets to be financed
 - Higher private benefits, higher threshold for financing
- This model can also explain the “credit rationing” puzzle:
 - Lenders are not willing to raise interest rates even if the demand for loans exceeds their supply at the prevailing rates
 - Loan markets are personalised
- Explanation:
 - Higher interest rates reduces the stake of the entrepreneur
 - Reduced stake may demotivate the entrepreneur and may lower the probability of repayment (moral hazard)
 - Alternative: If lenders cannot distinguish good from bad borrowers, higher interest rates may attract worse borrowers (adverse selection)