Money and Banking

An Economic Analysis of Financial Structure

Mishkin (12th) Chapter 8

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Lemons Problem (Akerlof 1970)

- It illustrates the possibility of nonexistence of equilibrium due to adverse selection.
- Consider the market for used cars. The current owners have better information about the quality than does potential buyers.
- Suppose that we can index the quality of a used car by some number q, which is distributed uniformly over the interval, $[0, b]$. Then, the average value of q will be $\frac{b}{2}$. Why?
- There is a large number of buyers for used cars who are willing to pay $\frac{3}{2}q$ for a car of quality q, and there is a large number of sellers who are each willing to sell a car of quality q for a price of q.

Lemons Problem (Akerlof 1970)

- If quality were observable, each used car of quality q would be sold at some price between $\frac{3}{2}q$ and q.
- However, quality is not easily observable. Then it is sensible for the buyers to attempt to estimate the quality by considering the average quality of cars offered in the market. Thus the willingness to pay for a used car will be $\frac{3}{2}\bar{q}$.
- What will be the equilibrium price in the market? Assume that the equilibrium price is some number $p > 0$. Then all owners whose car value is equal to or less than p will want to offer their cars for sale.
- Since quality is uniformly distributed over $[0, p]$, the average quality in the market will be $\bar{q} = \frac{p}{2}$.
- We see that a buyer would be willing to pay $\frac{3}{2}\bar{q} = \frac{3}{2} * \frac{p}{2} = \frac{3}{4}p$. This is less than p, the price at which we assumed a used car would be sold.

Lemons Problem (Akerlof 1970)

- Since the price p was arbitrary, no used cars will be sold at any positive price. The only equilibrium price in this market is $p = 0$.At this price, demand is zero and supply is zero.
- This example show that asymmetric information b/w buyers and sellers has destroyed the market for used cars.
- One way to get out of this situation is signalling (for example, issuing a warranty).

Market Equilibrium w/ Adverse Selection

- **Rothschild & Stiglitz (1976):** https://www.uh.edu/~bsorense/Rothschild&Stiglitz.pdf
- Equilibrium credit rationing occurs whenever some borrower's demand for credit is turned down, even if this borrower is willing to pay all the price and nonprice elements of the loan contract: **Baltensperger [1978]**
- The phrase "price elements of the loan contract" means interest rate charged by the bank, while "nonprice elements" refers to collateral. If a borrower is turned down because he does not have enough collateral, this cannot be denominated as credit rationing.
- The expected return on a bank loan for a given category of borrowers is not a monotonic function of the nominal interest rate of this loan. Since a bank will not lend the money above some level of interest rate, knowing that there would be only risky borrowers above that level, loan supply will be decreasing over the level $\longrightarrow$ backward-bending loan supply curve.

Tools to Help Solve Adverse Selection Problems

1. Private production and sales of information
   - Companies such as Standard and Poor's, Moody's, and Value Line. However, it would not solve the problem completely due to **free-rider problem**.
2. Government regulation to increase information
   - Government agency requires firms to adhere to standard accounting principles and to disclose information about their sales, assets, and earnings. In case of U.S., the Securities and Exchange Commission (SEC) plays the role. $\longrightarrow$ it helps explain puzzle 5. What is puzzle 5?
   - Although government regulation lessens the adverse selection problem, it does not eliminate it. Firms still have more information than investors.

Tools to Help Solve Adverse Selection Problems

3. Financial intermediation
   - A financial intermediary, such as a bank, becomes an expert in producing the information about firms. Banks can make profit by lending to good firms. This profit allows them to engage in this information production activity.
   - They can avoid free-rider problem by issuing private, nontraded loans.
   - This explains puzzle 3 and 4. A corollary of this analysis is that as information about firms becomes easier to get, the role of banks should decline.
   - It also explains puzzle 6. The better known a firm is, the more information about the firm is available in the market.

Tools to Help Solve Adverse Selection Problems

4. Collateral and net worth
   - Collateral, property promised to the lender if the borrower defaults, reduces the problem because it reduces the lender's losses in the event of a default. Collateral can raise the chance of getting a loan in the first place (perhaps at a better loan rate). It explains puzzle 7.
   - Net worth (also called equity capital), the difference b/w a firm's assets (what it owns) and its liabilities (what it owes), can perform a similar role to collateral. In case of defaults, the lender can recoup some of the losses from the loan by selling the firm's net worth. In addition, net worth can play a role of cushion (buffer stock) to negative shocks or events.
   - Providing collateral and/or having high net worth make lenders more willing to make loans. ("Only the people who don't need money can borrow it!!") $\longrightarrow$ **Muhammad Yunus**'s microfinance theory.

How Moral Hazards Affect the Choice b/w Debt and Equity Contracts

Differences b/w Debt and Equity

1. Debt
   - Not an ownership interest and creditors do not have voting rights
   - Interest is considered a cost of doing business and is tax deductible
   - Creditors have legal recourse if interest or principal payments are missed
   - Excess debt can lead to financial distress and bankruptcy
2. Equity
   - Ownership interest and common stockholders vote for the board of directors and other issues
   - Dividends are not considered a cost of doing business and are not tax deductible
   - Dividends are not a liability of the firm and stockholders have no legal recourse if dividends are not paid
   - An all equity firm can not go bankrupt

How Moral Hazards Affect the Choice b/w Debt and Equity Contracts

Moral Hazard: The Principal-Agent Problem

- Moral Hazard arises in any situation where one thinks one can get away with taking a risk w/o having to pay the consequences if the risk doesn't turn out well.
- Equity contracts, such as common stock, are claims to a share in the profits and assets of a business.
- Equity contracts are subject to a particular type of moral hazard called the **principal-agent problem**.
- In the viewpoint of the stockholders who own most of the firm's equity (the principal), it is the best interest to maximize profits. However, the managers in control (the agent) may act in their own interest (for example, maximize the power in the firm or short-term profits)
- Another example of a principle-agent problem is that of manager and a worker.

- In solving a principal-agent problem, there are two constraints involving the agent.
  1. participation constraint (often called the individual rationality constraint): The agent may have outside option available to him that gives him some reservation level of utility, and that the principal must ensure that the agent gets at least this reservation level in order to be willing to participate.
  2. incentive compatibility: The principal is not able to observe and choose the agent's action directly. He can only influence the action by his choice of the incentive scheme (payment).
- The principal-agent problem, which is an example of moral hazard, arises only because an agent has more information about his activities than the principal does.

- Assume that the owner (the principal) is risk-neutral and the manager (the agent) is risk averse.
- The manager's utility function is:

$$\text{Expected Utility}=E(w)-\phi Var(w)-g(e)$$

$$g'(0)=0 \text{ and } g',\ g''>0 \text{ for } e>0.$$

- The manager's reservation utility is

$$\bar{u}=0$$

- The realization of profit (π) is conditional on effort level (e). More specifically,

$$\pi \tilde{} N(e,\sigma^2)$$

- We are going to focus on linear compensation schemes, which take the form of

$$w(\pi)=\alpha+\beta\pi$$

- Then we can show that the manager's expected utility is given by

$$\alpha + \beta e - \phi\beta^2\sigma^2 - g(e)$$

- When e is observable, there is no asymmetric information problem and we can obtain the first-best outcome. What is β in this case■
- When e is not observable, we need to find the second-best solution. What is the optimal linear compensation scheme? What is β in this case?

Tools to Help Solve the Principal-Agent Problems

1. Monitoring
   - One way for stockholders to reduce moral hazard problem is to monitor the firm's activities: auditing the firm frequently and checking on what management is doing.
   - The problem is that the monitoring can be expensive in terms of money and time $\longrightarrow$ costly state verification (additional explanation for puzzle 1)
2. Government regulation to increase information
   - Governments everywhere have laws to force firms to adhere to standard accounting principles that make profit verification easier.
   - They also pass laws to impose legal penalties on those who commit the fraud of hiding and stealing profits. It also explains puzzle 5.

Tools to Help Solve the Principal-Agent Problems

3. Financial intermediation

- Financial intermediaries have the ability to avoid the free-rider problem in the face of moral hazard, and this is another reason why indirect finance is important (puzzle 3)
- Banks as delegated monitoring
- Venture capital firms

Tools to Help Solve the Principal-Agent Problems

4. Debt contracts

- Moral hazard arises with an equity contract, which is a claim on profits in all situations, whether the firm is making or losing money.
- Debt contracts ask the borrower to pay fixed amount of money at periodic intervals. When the firm make high profits, the lender receives the contractual payments and does not need to know the exact profits.
- Only when the firm cannot meet its debt obligation, thereby being in a state of default, there is a need for the lender to verify the state of the firm's profits.

How Moral Hazards Influences Financial Structure in Debt Markets

- Even with the advantages of debt contracts, they are still subject to moral hazard.
- Because a debt contract requires the borrowers to pay out a fixed amount and lets them to keep any profits above this amount, the borrowers have an incentive to take on riskier projects than the lenders would like.

Tools to Help Solve Moral Hazard Problem in Debt Contracts

1. Net worth
   - The greater the borrower's net worth is in the investment, the greater the borrower's incentive to behave in the way the lender expects and desires.
   - High net worth can make the debt contract incentive-compatible
2. Monitoring and enforcement of restrictive covenants
   - Debt contract can be very complicated by asking covenants to discourage undesirable behavior, to encourage desirable behavior, to keep collateral valuable, and to provide information. (puzzle 8)
3. Financial intermediation
   - Again, use bank for delegating monitoring. Banks' private and unmarketable loans are free from free-rider problem of monitoring.