Principles of Finance

Prof. Dr. Dennis A. V. Dittrich

2014

"No one who is risk-averse will ever buy a security that has a lower expected return, more risk, and less liquidity than another security."
Is this statement true, false, or uncertain? Explain your answer.

Why should a rise in the price level (but not in expected inflation) cause interest rates to rise when the nominal money supply is fixed?

An important way in which the Central Bank decreases the money supply is by selling government bonds to the public. Using a supply and demand analysis for bonds, show what effect this action has on interest rates.

If junk bonds are "junk," then why would investors buy them?

Predict what would happen to the risk premiums on corporate bonds if brokerage commissions were lowered in the corporate bond market.

In 2010 and 2011, the government of Greece risked defaulting on its debt due to a severe budget crisis. Using bond market graphs, show the edect on the risk premium between U.S. Treasury debt and comparable maturity Greek debt

Quizzes as Homework

Experiment

- market with 4 buyers and 3 sellers
- sellers have to pick a price and a quality grade (1 to 3)
- Each buyer can buy only 1 ꟍunitꟍ
- A buyer's earnings are calculated as the diderence between the value and the purchase price.
- Each seller can sell at most 2 ꟍunitsꟍ
- Sellers earn money by making one or more sales at a price that is above the cost of the unit

	grade 1	grade 2	grade 3
seller cost of 1st unit	$1.40	$4.60	$11.00
seller cost of 2nd unit	$2.40	$5.60	$12.00

	Grade 1	grade 2	grade 3
buyer value	$4.00	$8.80	$13.60

Asymmetric Information: Quality Uncertainty

- Experience Goods
  - quality is dih cult to observe in advance
- Post-experience Goods / Credence Goods
  - it is dih cult for consumers to ascertain the quality even after they have consumed them
- Economics of Asymmetric Information
  - A used car sales man knows more about the car than the buyer
  - An insured may know more about his risk then the insurance
  - A manager may know more about the riskiness of a project than the bank that 4nances it

Problems caused by Asymmetric Information

- If two parties (buyer and seller) involved in a transaction have limited information, one of them may have an advantage
- Asymmetric information leads to opportunistic behaviour
  - The informed agent may pro4t from the uninformed agent
  - Sometimes, with asymmetric information all are worse o5 than with complete information

Problems caused by Asymmetric Information

Moral Hazard
Opportunistic behavior of an informed person; he proets when a less informed person cannot observe an action.
- quality and quantity of work edort
- (ex post) risk taking behavior

Adverse Selection
Opportunistic behavior of an informed person; he proets when a less informed person cannot observe some characteristics of a good or service.
- quality of a used car, experience goods, health
- (ex ante) riskiness of a project

How quality uncertainty kills high-quality goods

- ▶ Often buyers do not know the quality of a good before their purchase decision (experience goods)
- ▶ The lack of complete information increases the risk and hence decreases the value of the good to the prospective buyer
- ▶ Example: low-quality used cars (lemons) may drive high-quality used cars out of the market
- ▶ Owners of lemons are more likely to sell their cars
- ↪ leads to adverse selection

George A. Akerlof, The Market for "Lemons": Quality Uncertainty and the Market Mechanism, The Quarterly Journal of Economics, Vol. 84, No. 3 (Aug., 1970), pp. 488-500

Choice of Quality and Adverse Selection

Assume a seller can choose the quality of his products to be either low or high.
What quality will he produce and sell?
Additional assumptions:

- ▶ Buyers are willing to pay 1400 Euro for a high-quality product and 800 Euro for a low-quality product
- ▶ Buyer cannot identify the quality of a product before their purchase decision
- ▶ The marginal costs of production are
  - ▶ 1100 Euro for a high-quality product
  - ▶ 1000 Euro for a low-quality product

Choice of Quality and Adverse Selection

Assume, only high-quality products are produced

- ▶ Buyers pay 1400 Euro and sellers realise a proet of 1400 - 1100 = 300 Euro per unit
- ▶ Buyers cannot identify the quality before their purchase decision, sellers therefore have an incentive to produce low-quality products and sell them for the price of a high-quality product increasing their proet to 400 Euro per unit
- ▶ The production of only high-quality products is not an equilibrium

Is producing only low-quality products an equilibrium?

Choice of Quality and Adverse Selection

Assume, only low-quality products are produced

- ▶ Buyers pay 800 Euro and sellers (would) realise a loss of 800 - 1000 = -200 Euro per unit
- ▶ The production of only low-quality products is not an equilibrium

Is there an equilibrium in which both qualities are produced and sold?

Choice of Quality and Adverse Selection

Assume, a fraction q of all products are of high quality

- ▶ Buyers are willing to pay at most the expected value of the product

$$EV = 1400q + 800(1 - q) = 800 + 600q$$

- ▶ Sellers (of high-quality products) need to earn at least the cost of production (of high-quality products)

$$800 + 600q \geq 1100 \Rightarrow q \geq 1/2$$

- ▶ At least half the products have to be of high quality

Choice of Quality and Adverse Selection

- ▶ Problem: Sellers of high-quality products could increase their proets by selling low-quality products instead.
- ▶ If all sellers think so no one will produce high-quality products
- ▶ Since there are no high quality products buyers are only willing to pay 800 Euro
- ▶ There is no equilibrium in which both qualities are sold
- ▶ There is not any equilibrium in which the products are sold

Adverse Selection can destroy markets!

The Lemons Problem: How Adverse Selection Inguences Financial Structure

- If quality cannot be assessed, the buyer is willing to pay at most a price that re8ects the average quality
- Sellers of good quality items will not want to sell at the price for average quality
- The buyer will decide not to buy at all because all that is left in the market is poor quality items
  In the enancial markets, this may explain:
  - Issuing marketable debt and equity securities is not the primary way in which businesses 4nance their operations
  - Stocks are not the most important sources of external 4nancing for businesses

Sources of External Funds for Nonflnancial Businesses
A Comparison of the United States with Germany, Japan, and Canada
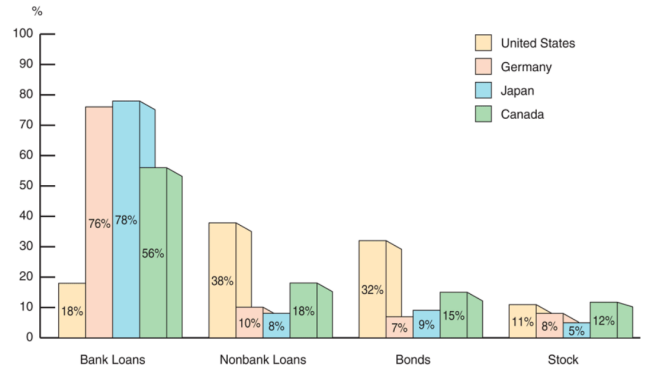
Solution to Adverse Selection: Harmonise Information

Screening
Action of the uninformed party to gain the information of the informed party
- test drive in the used car

Signalling
Action of the informed party to provide the information to the uninformed party
- product test report by an impartial agency to credibly signal quality of the product

ETrade Super Bowl Commercial 2000

Signalling

Signalling
An action that sellers (agents) can use to provide information (a signal) about the quality of their products to their potential customers (principals).

Strong Signal
- An edective signal has to be
  - costly
  - easy to obtain by the provider of high quality
  - hard to obtain by the provider of low quality

Signalling

Example:
Job candidates use the level of education as a signal for their productivity

Assumptions:
- Two types of job candidates
- Group 1: low productivity Y AP and MP = 1
- Group 2: high productivity Y AP and MP = 2
- Both groups of candidates are equally likely Y average productivity of all candidates = 1.5

Signalling
A simple model of signalling on the job market

Assumptions
- competitive product market
- $P = 10,000$ Euro
- Employees are on average employed for 10 years
- Group 1 Revenue = 100,000 Euro
  (10,000/year x 10)
- Group 2 Revenue = 200,000 Euro
  (20,000/year x 10)

Signalling

Complete Information
- w = marginal revenue
- Group 1 wage = 10,000 Euro/y.
- Group 2 wage = 20,000 Euro/y.

Asymmetric Information
- w = average marginal revenue
- Group 1 and 2 wage = 15,000 Euro

Signalling
Education as a signal to reduce the eoects of asymmetric information

- y = Level of education
  (years above compulsory level)
- C = Cost of obtaining the level of education y
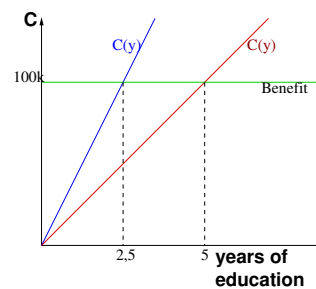- Group 1 Y $C_1(y)$ = Euro 40,000y
- Group 2 Y $C_2(y)$ = Euro 20,000y

Assumption: Productivity is independent of the level of education
Decision rule for the employer:
- y^* signals G_2 and wage = 20,000 Euro.
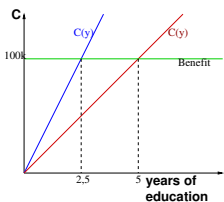- y below y^* signals G_1 and wage = 10,000 Euro.

Signalling

From the employers' point of view: What is the (optimal) level of education?

- Beneet = increase in wage due to signal under separation
- The decision for a particular level of education is based on a comparison of costs and beneets.

Signalling

- Costs for type 1
  - $C_1(y) = 40,000y$
  - $100,000 < 40,000y^*$
  - $y^* > 2,5$
  - As soon as the employer ask for more than 2.5 years of education the low productivity candidates will not provide the signal
- Costs for type 2
  - $C_2(y) = 20,000y$
  - $100,000 > 20,000y^*$
  - $y^* < 5$
  - As long as the employer does not ask for more than 5 years of education the high productivity candidates will provide the signal

Signalling
Comparison of costs and benepts

- The decision rule is edective if y^* lies between 2.5 and 5.
- If $y^* = 4$:
  - Group 1 will not bbuy the signalc

$$4 \times 40,000 = 160,000 > 100,000$$

  - Group 2 will bbuy the signalc and obtain $y^* = 4$ years of education

$$4 \times 20,000 = 80,000 < 100,000$$

Warranties as Signals

- Warranties signal high quality and reliability
- It is cheaper to produce a low quality product. If a producer sells it without a warranty at the same price as a high quality product he has a higher proet.
- If you sell both low- and high quality products with life time warranties high quality products will cause lower server costs. Total costs may be lower than for a low quality product.
- Warranties are an edective signal for high quality since the costs of warranties to the producer of a low quality product are too high.

## Tools to Help Solve Adverse Selection Problems
in Financial Markets

- Private production and sale of information
    - Rating agencies
- Government regulation to increase information
    - The 4nancial system is among the most heavily regulated sectors of the economy
    - Does not always works to solve the adverse selection problem
- Financial intermediation
    - Indirect 4nance is many times more important than direct 4nance
    - Financial intermediaries, banks, are the most important source of external funds used to 4nance businesses.
    - Only large, well-established corporations have easy access to securities markets to 4nance their activities
- Collateral and net worth
    - Collateral is a prevalent feature of debt contracts for both households and businesses.

Sources of External Funds for Nonflnancial Businesses
A Comparison of the United States with Germany, Japan, and Canada
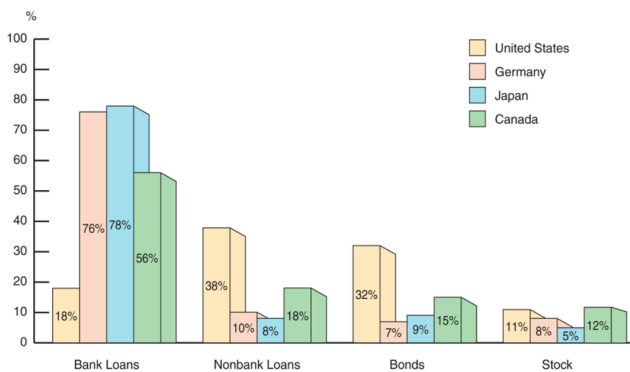
Transaction Costs

Financial intermediaries have evolved to reduce transaction costs

- Economies of scale
- Expertise

Moral Hazard, the Choice Between Debt and Equity Contracts, and Adverse Selection

the Principal-Agent Problem

Principal less information (stockholder)

Agent more information (manager)

Separation of ownership and control of the erm
- Managers often pursue personal beneets and power rather than the proetability of the erm

Borrowers have incentives to take on projects that are riskier than the lenders would like.
- This may prevent the borrower from paying back the loan.

Tools to Help Solve the Principal-Agent Problem

- Monitoring (Costly State Veriecation)
    - Stocks are not the most important sources of external 4nancing for businesses
- Government regulation to increase information
    - The 4nancial system is among the most heavily regulated sectors of the economy
- Financial Intermediation
    - Indirect 4nance is many times more important than direct 4nance
    - Venture capital 4rms send btheirc people to be part of the management
- Debt Contracts
    - Equity capital is not the most important source of 4nancing for businesses

Tools to Help Solve Moral Hazard
in Debt Contracts

- ▶ Net worth and collateral
    - ▶ Incentive compatible
- ▶ Monitoring and Enforcement of Restrictive Covenants
    - ▶ Discourage undesirable behavior
    - ▶ Encourage desirable behavior
    - ▶ Keep collateral valuable
    - ▶ Provide information
- ▶ Financial Intermediation
    - ▶ Indirect 4nance is many times more important than direct 4nance
    - ▶ Financial intermediaries, banks, are the most important source of external funds used to 4nance businesses.

Asymmetric Information in Transition and
Developing Countries

"Financial repression" created by an institutional environment characterized by:
- ▶ Poor system of property rights (unable to use collateral e– ciently)
- ▶ Poor legal system (di– cult for lenders to enforce restrictive covenants)
- ▶ Weak accounting standards (less access to good information)
- ▶ Government intervention through directed credit programs and state owned banks (less incentive to proper channel funds to its most productive use).

Financial Development and Economic Growth

- ▶ The 4nancial systems in developing and transition countries face several di– culties that keep them from operating e– ciently
- ▶ In many developing countries, the system of property rights
    - ▶ the rule of law,
    - ▶ constraints on government expropriation,
    - ▶ absence of corruption

functions poorly, making it hard to use the tools to solve asymmetric information problems e4ectively