Principles of Finance

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If I can buy a car today for $5,000 and it is worth $10,000 in extra income next year to me because it enables me to get a job as a traveling salesman, should I take out a loan from Larry the Loan Shark at a 90% interest rate if no one else will give me a loan?
Will I be better or worse off as a result of taking out this loan?
Can you make a case for legalizing loan sharking?

Some economists suspect that one of the reasons that economies in developing countries grow so slowly is that they do not have well developed Bnancial markets.
Does this argument make sense?

The U.S. economy borrowed heavily from the British in the nineteenth century to build a railroad system. Why did this make both countries better off?

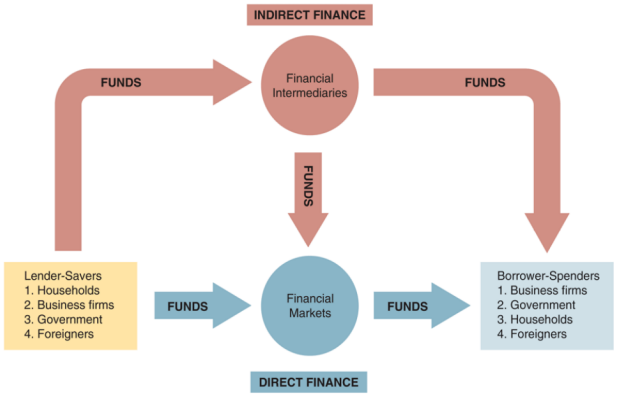
Seinfeld: The Blood

Financial Markets

Financial markets are markets in which funds are transferred from people and Brms who have an excess of available funds to people and Brms who have a need of funds

- Promotes economic efBciency by producing an efBcient allocation of capital, which increases production
- Directly improve the well being of consumers by allowing them to time purchases better

Flows of Funds Through the Financial System



Function of Financial Markets

Direct Bnance: borrowers borrow funds directly from lenders in Bnancial markets by selling them securities

Why is a share of Microsoft common stock an asset for its owner and a liability for Microsoft?

- security (Bnancial instrument)
  asset for the buyer
  liability for the seller / issuer

Indirect Finance: borrowers borrow funds through Financial Intermediaries, i.e. institutions that borrow funds from people who have saved, indirectly from lenders

Structure of Financial Markets

- Debt and Equity Markets
  - Debt instruments (maturity)
    - short term
    - intermediate term
    - long term
  - Equities (dividends)

If you suspect that a company will go bankrupt next year, which would you rather hold, bonds issued by the company or equities issued by the company? Why?

Structure of Financial Markets

- Primary and Secondary Markets
  - Investment Banks underwrite securities in primary markets
  - Brokers and dealers work in secondary markets

True or false:
"Because corporations do not actually raise any funds in secondary markets, they are less important to the economy than primary markets are."

Structure of Financial Markets

- Exchanges and Over the Counter (OTC) Markets
  - Exchanges: NYSE, Chicago Board of Trade
  - OTC Markets: Foreign exchange, Federal funds
- Money and Capital Markets
  - Money markets deal in short term debt instruments
  - Capital markets deal in longer term debt and equity instruments

What money market instruments do you know?
What capital market instruments do you know?

Money market instruments

- Treasury Bills
- Negotiable Bank CertiBcates of Deposit
- Repurchase Agreements
- Federal Funds / central bank deposits / unsecured interbank loan
- Foreign Exchange Swaps

Capital market instruments

- Stocks
- Mortgages & Morgage Backed Securities
- Corporate Bonds
- Government Securities / Bonds
- Consumer and Bank Commercial Loans

Internationalization of Financial Markets

- Foreign Bonds: sold in a foreign country and denominated in that country's currency
- Eurobond: bond denominated in a currency other than that of the country in which it is sold
- Eurocurrencies: foreign currencies deposited in banks outside the home country
- Eurodollars: U.S. dollars deposited in foreign banks outside the U.S. or in foreign branches of U.S. banks

- World Stock Markets

Decisions under Uncertainty and Risk

What is uncertain in an economy?

- future price
- future income
- current and future actions of economics agents
- future states of the world

Economic agents try to quantify uncertainty by assigning probabilities to possible outcomes of an action or events.

Uncertainty

A situation in which an action has several possible outcomes and the objective probability of any event is unknown.

Risk

A situation in which an action has a number of possible outcomes and the objective probability of each event is known.

Describing Risk

To measure risk we need to know:

1. All possible outcomes
2. The probability of each outcome

The probability

A probability is a number between 0 and 1 that indicates the likelihood that a condition occurs at a given time.

Lotteries

Possible outcomes:

- Not losing any contact lens (0 Euro)
- Losing one contact lens (100 Euro)
- Lose both contact lenses (200 Euro)

Their probabilities:

50% Not losing any contact lens (0 Euro)
30% Losing one contact lens (100 Euro)
20% Lose both contact lenses (200 Euro)

Expected Value

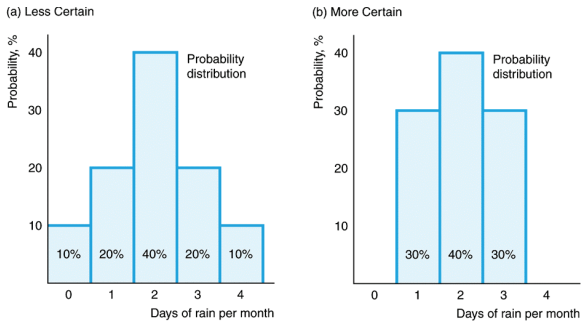
The weighted average of the payoffs or values associated with all possible outcomes. The probabilities of each outcome are used as weights.

- The expected value measures the *central tendency*, the payoff or value that we would expect on average.

The expected value:

$$EW = 0.5 \times 0 - 0.3 \times 100 - 0.2 \times 200 = -70$$

Probability Distribution



What measure would you use to describe the different distributions?

Describing Risk

The Variance

The variance is the sum of the squared distances between the expected value and the outcome.

- Variance measures the *variability* of the outcomes and thus is the risk.
- Other measures of variability are e.g.
  - Spread
  - Quartiles
  - Mean absolute deviation
  - Standard Deviation

Lotteries

Possible events and their probabilities:

50% Not losing any contact lens (0 Euro)
30% Losing one contact lens (100 Euro)
20% Losing both contact lenses (200 Euro)

The expected value:

$$EW = 0.5 \times 0 - 0.3 \times 100 - 0.2 \times 200 = -70$$

The variance:

$$\sigma^2 = 0.5 \cdot (0 + 70)^2 + 0.3 \cdot (-100 + 70)^2 + 0.2 \cdot (-200 + 70)^2$$
$$= 2450 + 270 + 3380 = 6100$$

Lotteries

Should I buy an insurance for contact lenses?

No insurance:

50% Not losing any contact lens (0 Euro)
30% Losing one contact lens (100 Euro)
20% Losing both contact lenses (200 Euro)

- Expected value = -70, Variance = 6100

With insurance (Costs 75 Euro, 75 Euro Reimbursement per lens):

50% Not losing any contact lens (75 Euro)
30% Losing one contact lens (100 Euro)
20% Losing both contact lenses (125 Euro)

- Expected value = $-92,5$, Variance = $256,25$

Risk ProBles

- Risk Averse
- Risk Neutral
- Risk Loving

Consider a bet where a fair coin is tossed and brings a proBt of 2 Euro and 4 Euro (depending if head or tail). The expected proBt is 3 euros.
Someone who

- is indifferent between the gamble or having a payment of 3 euros is called risk neutral.
- prefers the gamble is risk loving.
- prefers having the payment of 3 euros is risk averse.

Who wants to be a millionaire?

Let's say you're a candidate at "Who wants to be a millionaire?". You are at 250,000 and you are asked if you want to go to the 500,000 Euro question. You have your 50 50 Joker and can reduce the number of possible answers from four to two. If you are answering the next question correctly, you stand at 500,000 Euro, if you're wrong, your proBt is reduced to 32,000 Euro. Suppose you have no idea what the right answer is and have to guess.

What is the expected value?

If you are risk averse, you'd Bnish the game at 250,000 Euro. True? False? Maybe?

Buying Risky Assets

- Suppose there are two Brms, A and B.
- The share price for company A and for company B is 10 Euro.
- There are two states of the world that are equally likely to occur.
- In state 1, the share price of company A increases to 100 Euro and the share price of the company B to 20 Euro.
- In state 2, the share price of the company A increases to 20 Euro and the shares of the company B to 100 Euro.
- The decision maker has to invest 100 Euro.
- If one only buys shares of Company A, one can buy 10 shares
- In state 1, one earns 900 Euro, and in state 2 one earns 100 Euro
- Expected proBt $0.5 \times 900 + 0.5 \times 100 = 500$
- Variance:
  $\sigma^2 = 0.5(900 - 500)^2 + 0.5(100 - 500)^2 = 160000$

DiversiBcation

- If one only buys shares of company B, one can buy 10 shares.
- In state 1, one earns 100 Euro, and in state 2 one earns 900 Euro
- Expected proBt $0.5 \times 900 + 0.5 \times 100 = 500$
- Variance:
  $\sigma^2 = 0.5(900 - 500)^2 + 0.5(100 - 500)^2 = 160000$
- If one buys 5 shares of company A and 5 shares of company B, in state 1 one earns 500 Euro, and in state 2 one earns 500 Euro

  $$5 \times 100 + 5 \times 20 - 100 = 500$$

- Expected proBt $0.5 \times 500 + 0.5 \times 500 = 500$
- Variance: $\sigma^2 = 0.5(500 - 500)^2 + 0.5(500 - 500)^2 = 0$

DiversiBcation

- By diversifying the portfolio, one can convert the high risk expected proBt of 500 Euro in a sure gain of 500 Euro.
- This works here so well because the shares of both companies were perfectly negatively correlated.
- Typically, you will not Bnd a perfectly negatively correlated assets.
- But as long as the investments are not perfectly positively correlated, the risk can be reduced through diversiBcation.
- DiversiBcation into related values that have a high positive correlation will reduce the risk only slightly.

How may risk sharing beneBt both Bnancial intermediaries and private investors?

Function of Financial Intermediaries: Indirect Finance

- Reduce the exposure of investors to risk
  - Risk Sharing (Asset Transformation)
  - DiversiBcation
- Lower transaction costs (time and money spent in carrying out Bnancial transactions)
  - Economies of scale
  - Liquidity services

Seinfeld: The Alternate Side

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 behavior
  - The informed agent may proBt from the uninformed agent
  - Sometimes, with asymmetric information all are worse off than with complete information

Moral Hazard

Opportunistic behavior of an informed person; he proBts when a less informed person cannot observe an action.

- quality and quantity of work effort

Adverse Selection

Opportunistic behavior of an informed person; he proBts when a less informed person cannot observe some characteristics of a good or service.

- quality of a used car, experience goods, health

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

$\hookrightarrow$ 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

Why do loan sharks worry less about moral hazard in connection with their borrowers than some other lenders do?

If there were no asymmetry in the information that a borrower and a lender had, could a moral hazard problem still exist?

Why might you be willing to make a loan to your neighbor by putting funds in a savings account earning a 5% interest rate at the bank and having the bank lend her the funds at a 10% interest rate rather than lend her the funds yourself?

Function of Financial Intermediaries: Indirect Finance

Deal with asymmetric information problems

- (before the transaction) Adverse Selection: try to avoid selecting the risky borrower.
  - Gather information about potential borrower.
- (after the transaction) Moral Hazard: ensure borrower will not engage in activities that will prevent him/her to repay the loan.
  - Sign a contract with restrictive covenants.

Conclusion:
Financial intermediaries allow “small” savers and borrowers to beneBt from the existence of Bnancial markets.

Types of Financial Intermediaries

- Depository Institutions
- Contractual Savings Institutions
- Investment Intermediaries

Primary Assets and Liabilities of Financial Intermediaries

Type of Intermediary	Primary Liabilities (Sources of Funds)	Primary Assets (Uses of Funds)
Depository institutions (banks)		
Commercial banks	Deposits	Business and consumer loans, mortgages, U.S. government securities, and municipal bonds
Savings and loan associations	Deposits	Mortgages
Mutual savings banks	Deposits	Mortgages
Credit unions	Deposits	Consumer loans
Contractual savings institutions		
Life insurance companies	Premiums from policies	Corporate bonds and mortgages
Fire and casualty insurance companies	Premiums from policies	Municipal bonds, corporate bonds and stock, and U.S. government securities
Pension funds, government retirement funds	Employer and employee contributions	Corporate bonds and stock
Investment intermediaries		
Finance companies	Commercial paper, stocks, bonds	Consumer and business loans
Mutual funds	Shares	Stocks, bonds
Money market mutual funds	Shares	Money market instruments

True or false:
"In a world without information costs and transaction costs, Bnancial intermediaries would not exist."

How can the provision of several types of Bnancial services by one Brm be both beneBcial and problematic?

Regulation of the Financial System

To increase the information available to investors:

- Reduce adverse selection and moral hazard problems
- Reduce insider trading (SEC).

Regulation of the Financial System

To ensure the soundness of Bnancial intermediaries:

- Restrictions on entry (chartering process).
- Disclosure of information.
- Restrictions on Assets and Activities (control holding of risky assets).
- Deposit Insurance (avoid bank runs).
- Limits on Competition (in the US, mostly in the past):
  - Branching
  - Restrictions on Interest Rates