# Financial Economics

## Lecture 01. Financial Economics and Financial System

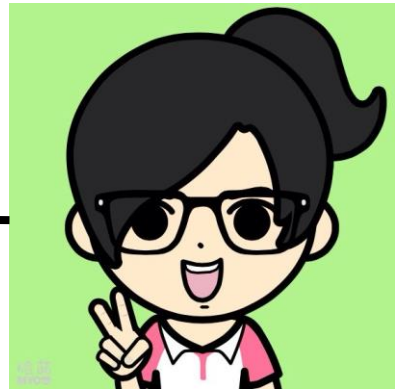
LIN, Mengyun SOE&WISE

AY22-23, SPRING

# What is Finance

- Finance 1.0
- I want to open a milk tea store, but I do not have the money.
  - Borrow $100 from my friend, and guarantee to pay back $110 in one year

Borrowers

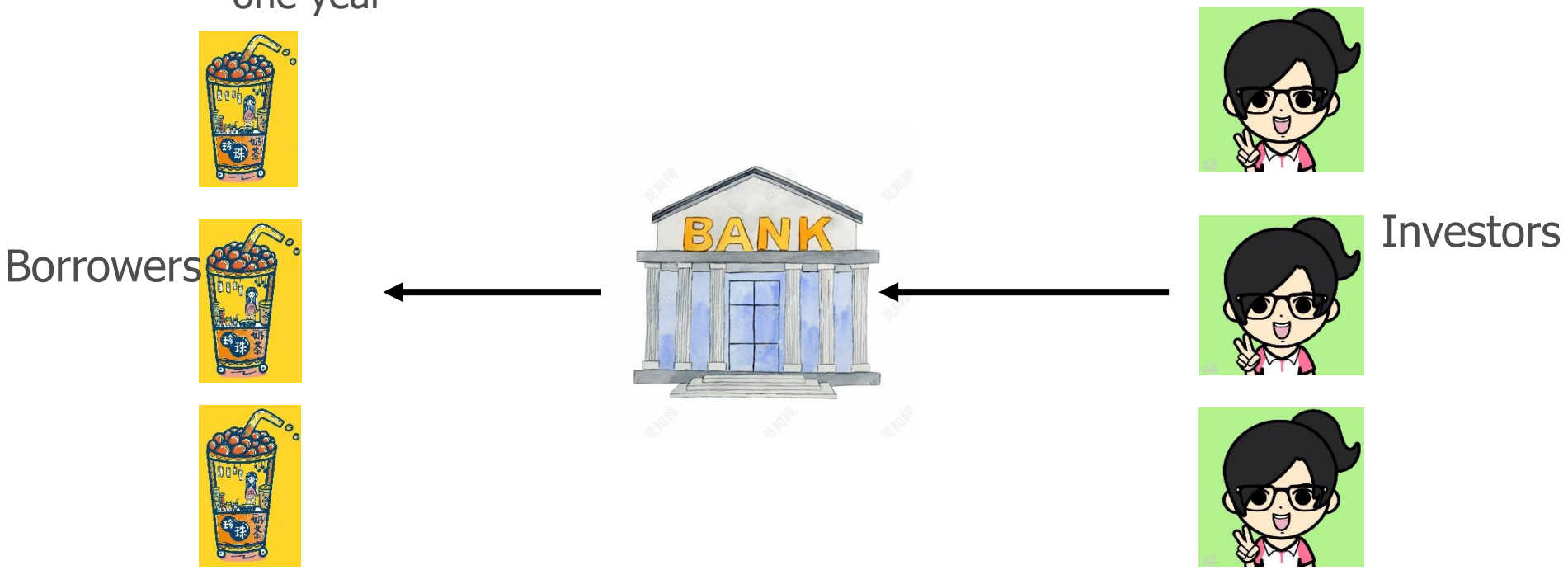



Investors

- To enable the money flow and achieve efficient allocation

# What is Finance

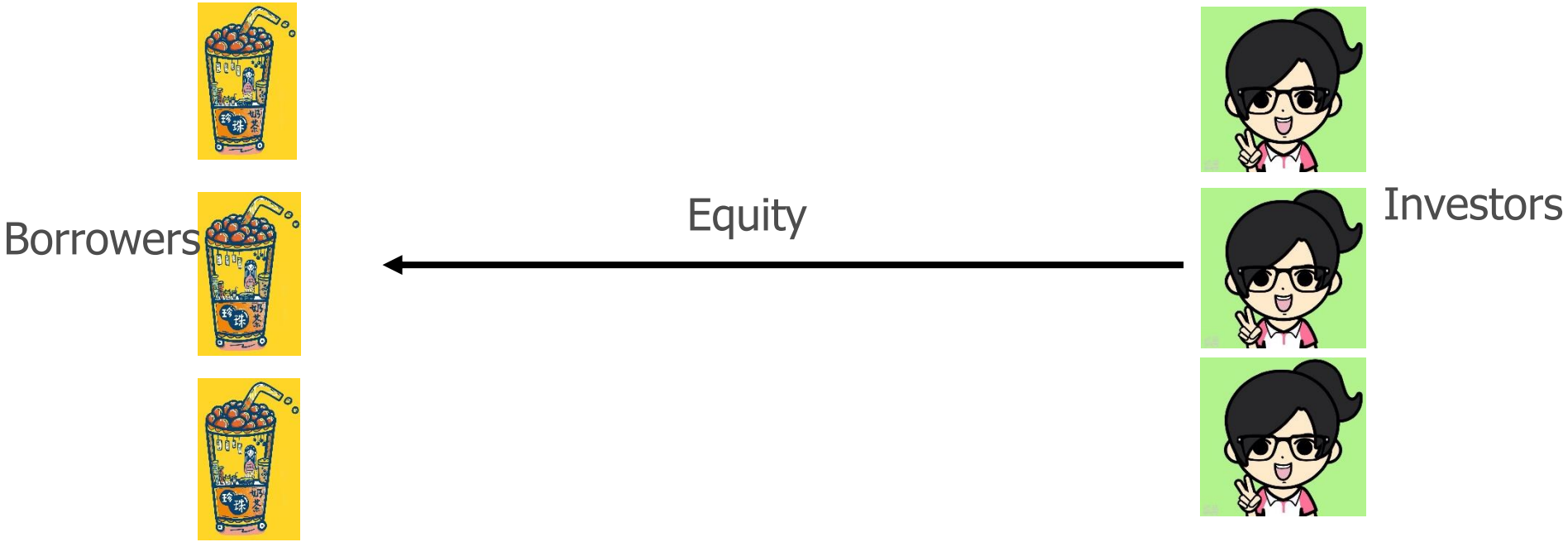
- Finance 2.0
- My milk tea business prospers and I need more money.
  - Borrow $10000 from the bank, and be obliged to pay back $10100 in one year




- To make the money flow and achieve efficient allocation

# What is Finance

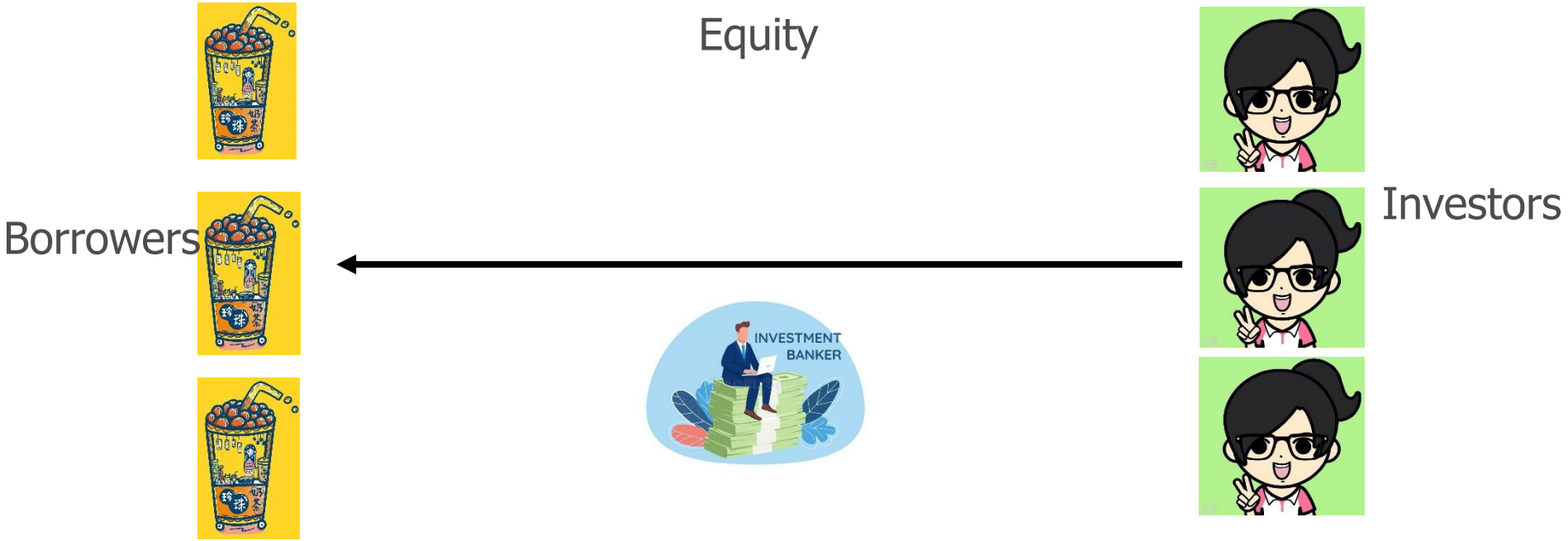
- Finance 3.0
- I have a seemingly brilliant idea to invent a new type of milk tea, but too risky to borrow from the bank
  - Invite shareholders to invest $10000 and offer part ownership




- To make the money flow and achieve efficient allocation

# What is Finance

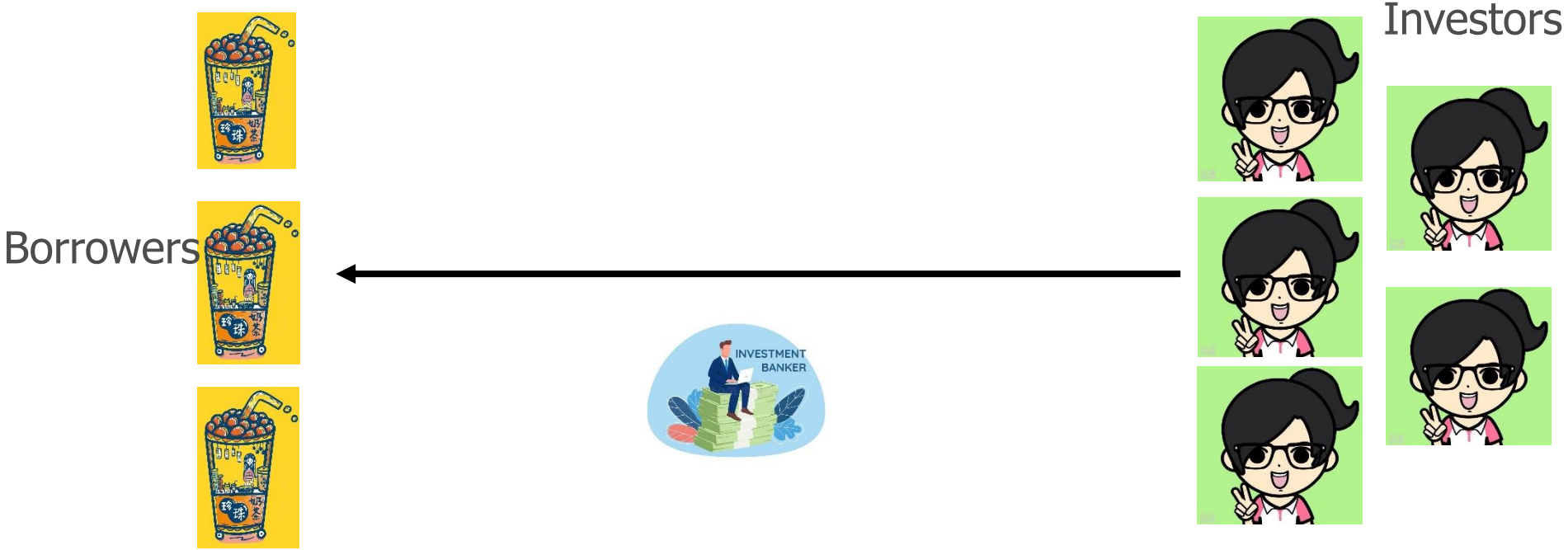
- Finance 4.0
- Too costly and difficult to find shareholders by myself
  - Turn to investment banks, brokers, etc., for help




- To make the money flow and achieve efficient allocation

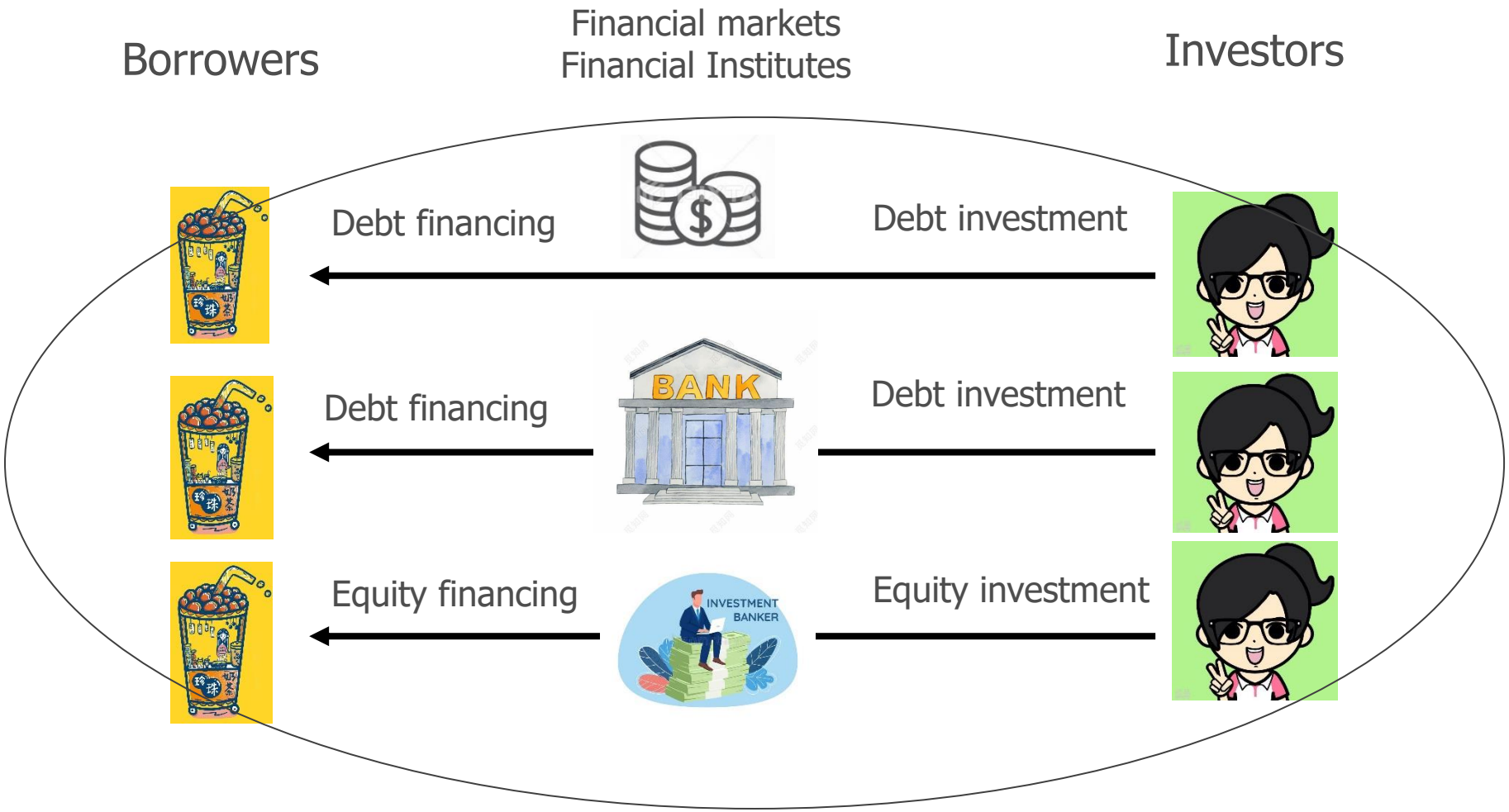
# What is Finance

- Finance 5.0
- Grow into a Giant Milk Tea Corporation
  - IPO: issue stocks/shares to the public (Investment bank help with it)




- To make the money flow and achieve efficient allocation

# What is Finance




**Financial System**

# What is Finance

- Finance = Money?

- Finance is a discipline concerned with **VALUE**
  - **VALUE** assessment (what something is worth today)
  - Making decisions based on that **VALUE** assessment.

- Finance is the study of how people allocate scarce resources (Acquiring, Investing, and Managing)
  - **Time:** Costs and benefits are distributed over time
  - **Risk:** But the actual timing and size of future cash flows are uncertainty

# Individual/Household Financial Decisions

1. **Consumption and saving decisions**
   - When should I start saving for retirement? How much to save?
   - Should I buy a normal refrigerator or a energy-saving one but more expensive?
2. **Financing decision**
   - I want a house with a mortgage. Should I get a 10-year, 20-year, or 30-year contract?
3. **Risk management**
   - During online shopping, should I get freight insurance?
   - Should I buy commercial health insurance?
4. **Investment decision**
   - I have some spare money to invest, should I use bank deposits, bonds, or stocks?
   - I have a brilliant business idea, should I become an entrepreneur?

# Corporate Financial Decisions

1. **Capital budgeting:** allocate funds they have for productive uses
   - A company wants *to replace* its current production line with a line of new more expensive and more efficient machines. Good idea?
   - A firm needs to purchase a piece of equipment. Should it buy a cheaper machine with a shorter *lifespan* or a more expensive machine that lasts longer?
2. **Working capital management:** how to manage short-term assets and liabilities, to make sure that the firm runs smoothly.
   - A company is trying to decide whether to develop *a new product* - how can it deal with the fact that most of the development costs will be incurred before any sale revenues have been realized?
3. **Capital structure:** the most efficient way to finance the firm's operations
   - All businesses, from international conglomerates to small "hawker" shops, have to decide how they'll finance their operations. Will they borrow or will they bring in new investors/shareholders?

# Course Outline

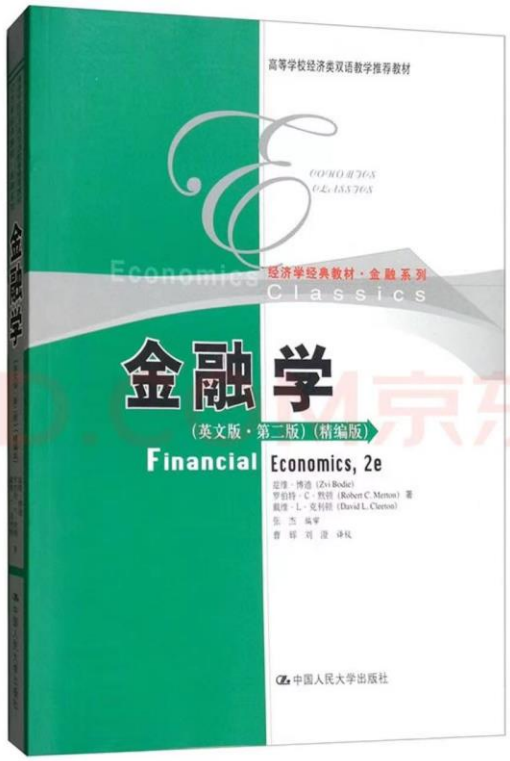
| | | |
|---|---|---|
| • Week 1 | Lecture 01 Finance and the Financial System | (Chp01&02) |
| • Week 2 | Lecture 02 Time Value of Money | (Chp03) |
| • Week 3&4 | Lecture 03 Corporate Finance | (Chp05&Chp15) |
| • Week 5 | Lecture 04 Principles of Market Valuation | (Chp06) |
| • Week 6 | Lecture 05 Valuation of Bonds | (Chp07) |
| • Week 7 | Lecture 06 Valuation of Stocks | (Chp08) |
| • Week 8 | [Midterm] | |
| • Week 9 | Lecture 07 Principles of Risk Management | (Chp09) |
| • Week 10 | Lecture 08 Portfolio Choice | (Chp11) |
| • Week 11&12 | Lecture 09 Capital Market Equilibrium | (Chp12) |
| • Week 13&14 | Lecture 10 Household Finance | (Chp04) |
| • Week 15 | Review/Q&A | |
| • Week 16 | [Final] July 29 | |

# Lectures and Breaks

- 50-min lecture
- 15-min break
- 50-min lecture
- 15-min break
- 50-min lecture

# Textbook

- *Financial Economics, 2e, by Zvi Bodie, Robert Merton, David Cleeton*



# Assessment

- [40%] Midterm exam
- [40%] Final exam
- [10%] Homework x 2
- [10%] Attendance
  - "F" if absent for 3 times or more

# Instructor and Teaching Assistant

- Instructor
  - LIN Mengyun (林梦芸), PhD in Economics
  - Assistant Professor, SOE & WISE
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  - Office Hours: Monday 16:30-17:30 (online by appointment)

- Teaching Assistant
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  - Email: jiangyue1@stu.xmu.edu.cn

# Outline

- Household & Corporate Financial Decisions
- The Financial System
- Financial System Functions
- Financial Markets Rates

# The Financial System

- Financial decisions are made within the context of a financial system
- The financial system both constrains and enables the decision maker


- A financial system is comprised of
  - Financial markets
  - Financial intermediaries
  - Service firms
  - Other institutions used to carry out the financial decisions of households, business firms, and governments

# The Financial Markets

- Where "**financial instruments**" are traded
  - Debt, also called fixed-income securities
    - Issued by anyone who borrows money
    - Fixed Income Instruments promising fixed future payments
    - Corporate/government bonds, mortgages, loans
  - Equities (Common Stock/Shares)
    - Claim of the owner of a firm
    - Residual claim on assets
    - Limited liability
  - Derivatives (Options, Forwards, Futures)
    - Securities that derive their value from other securities

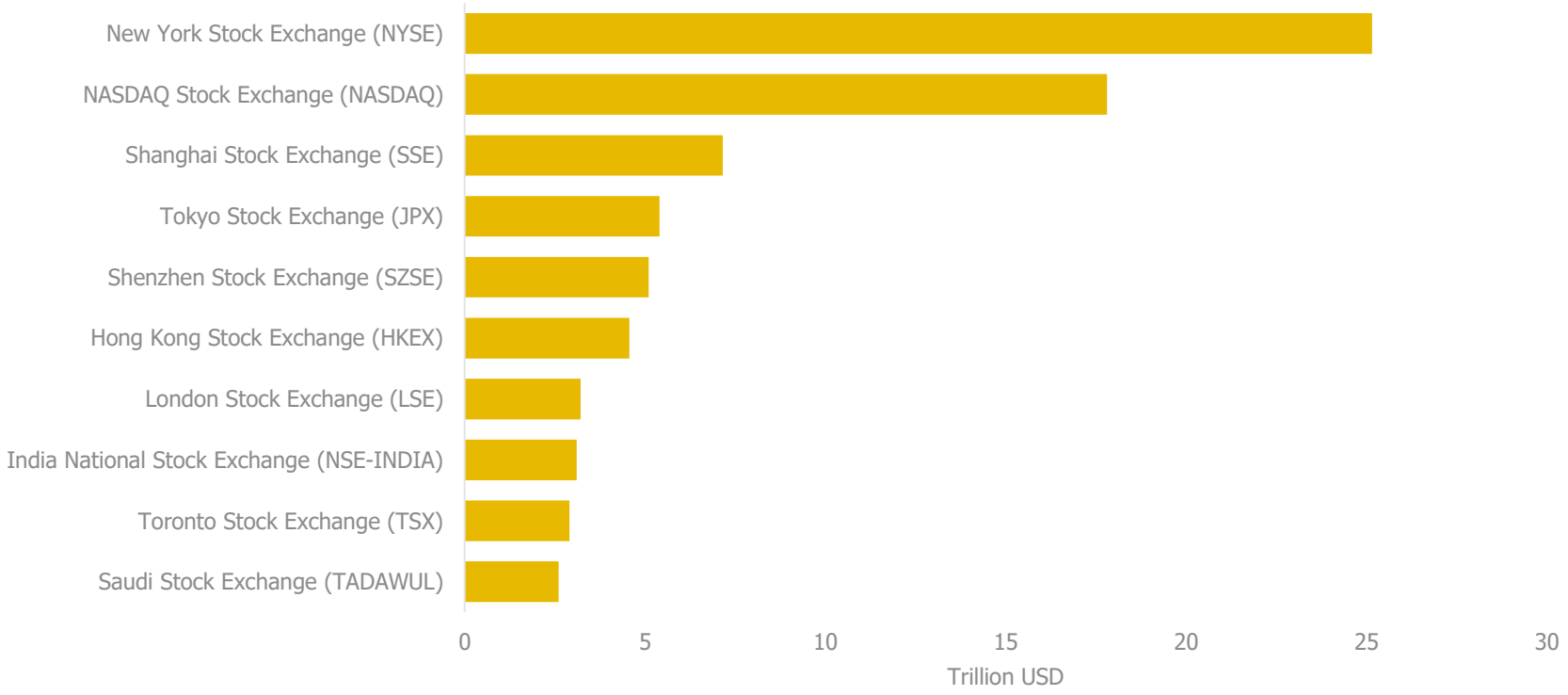
# Different Forms of Business Organizations

1. Sole proprietorship
   - An individual owns and manages the business
   - Easy to start, least regulated, single owner keeps all profits
   - **Unlimited liability:** personally responsible for the debts and obligations of the business
2. Partnership
   - A group of individuals collectively own and manage the business
   - Similar to sole proprietorship except for more people
   - Unlimited liability (general vs. limited partnership)
3. Corporation
   - Ownership and management are separated
   - **Limited liability**: the liability is limited to the amount of investment

# The Financial Markets

- By maturity
  - Money markets: where debt securities of less than one year are traded (treasury securities, commercial paper, bills, inter-bank loans)
  - Capital markets: where equity and long-term debt claims are publicly traded
- By the stage
  - Primary markets: new financial instruments are issued
  - Secondary markets: existing financial instruments are traded

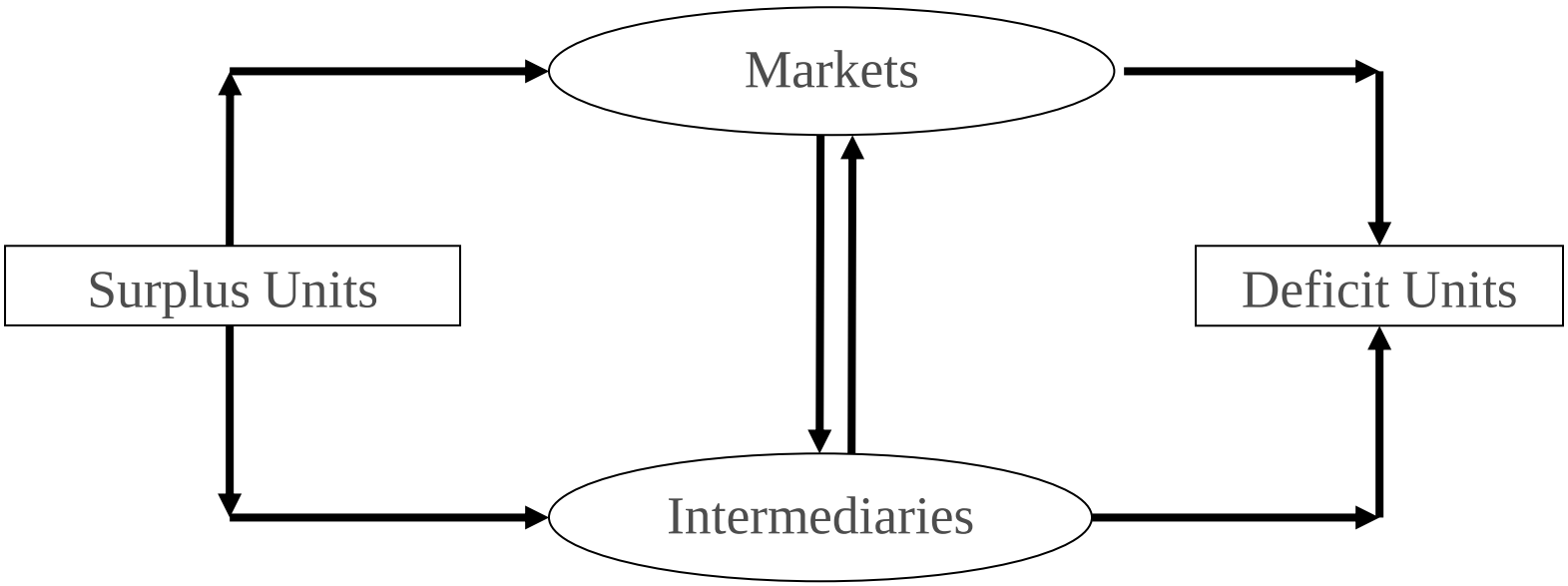
# Famous Stock Exchanges around the World



# Examples of Exchanges in China

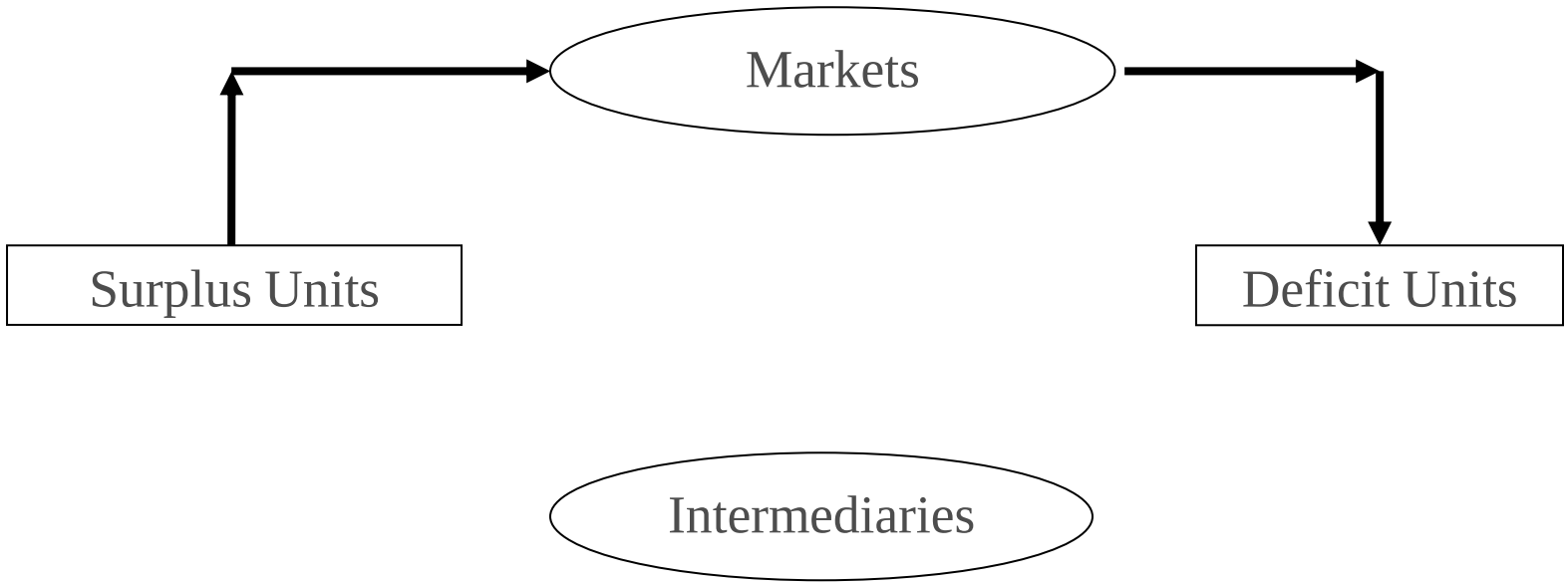
- Shanghai Stock Exchange (上海证券交易所)
- Shenzhen Stock Exchange (深圳证券交易所)
- Beijing Stock Exchange (北京证券交易所)
- Zhengzhou Commodity Exchange (郑州商品交易所)
- Dalian Commodity Exchange (大连商品交易所)
- Shanghai Futures Exchange (上海期货交易所)
- Guangzhou Futures Exchange (广州期货交易所)
- China Financial Futures Exchange （中国金融期货交易所）
- Guangzhou Emissions Exchange (广州碳排放权交易所)

# The Flow of Funds Diagram



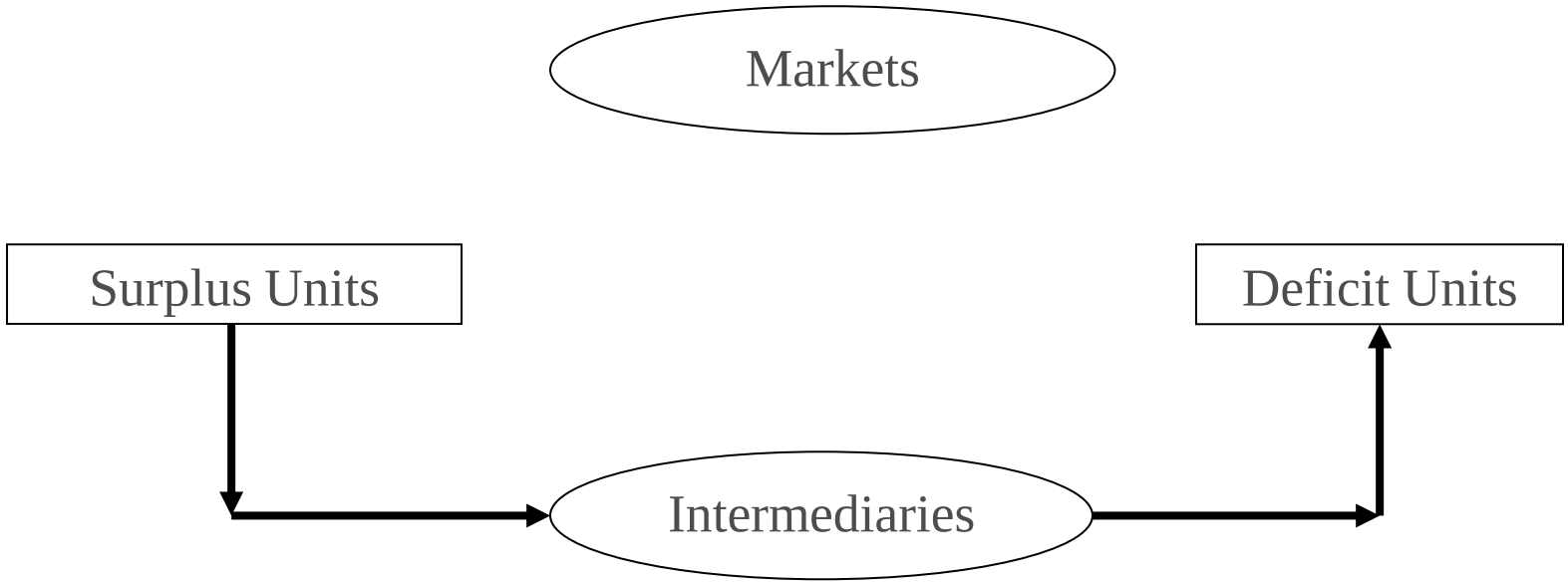

- Funds may flow from the surplus unit to the deficit unit
  - Directly (possible but difficult)
  - Through markets
  - Through intermediaries

# Fund Flows via Market




- Example: A household with surplus funds invests them in government bonds

# Fund Flows via Intermediary




- Holders of surplus funds may use an intermediary, such as a bank, to invest for them.
- E.g., The bank receives the surplus funds, and makes a loan to the deficit units

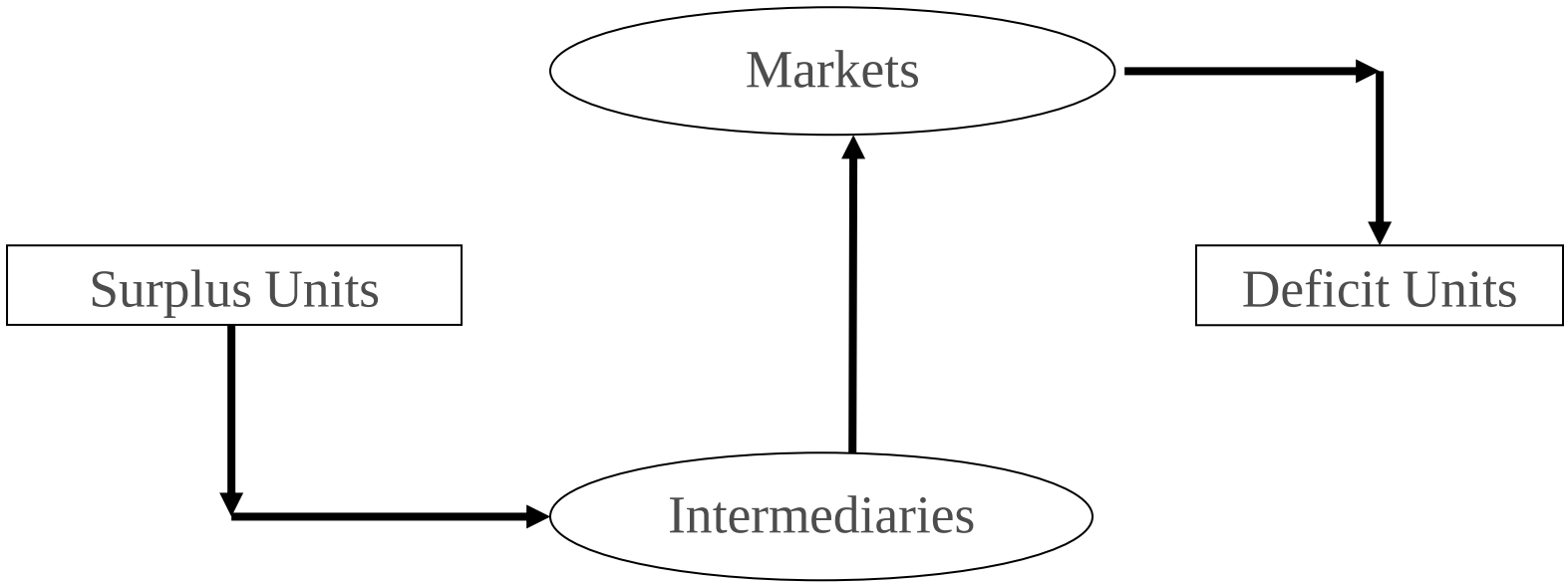
# Financial Intermediaries

- Firms whose primary business is to provide customers with financial products and services that cannot be obtained more efficiently by transacting directly in securities markets

# Financial Intermediaries

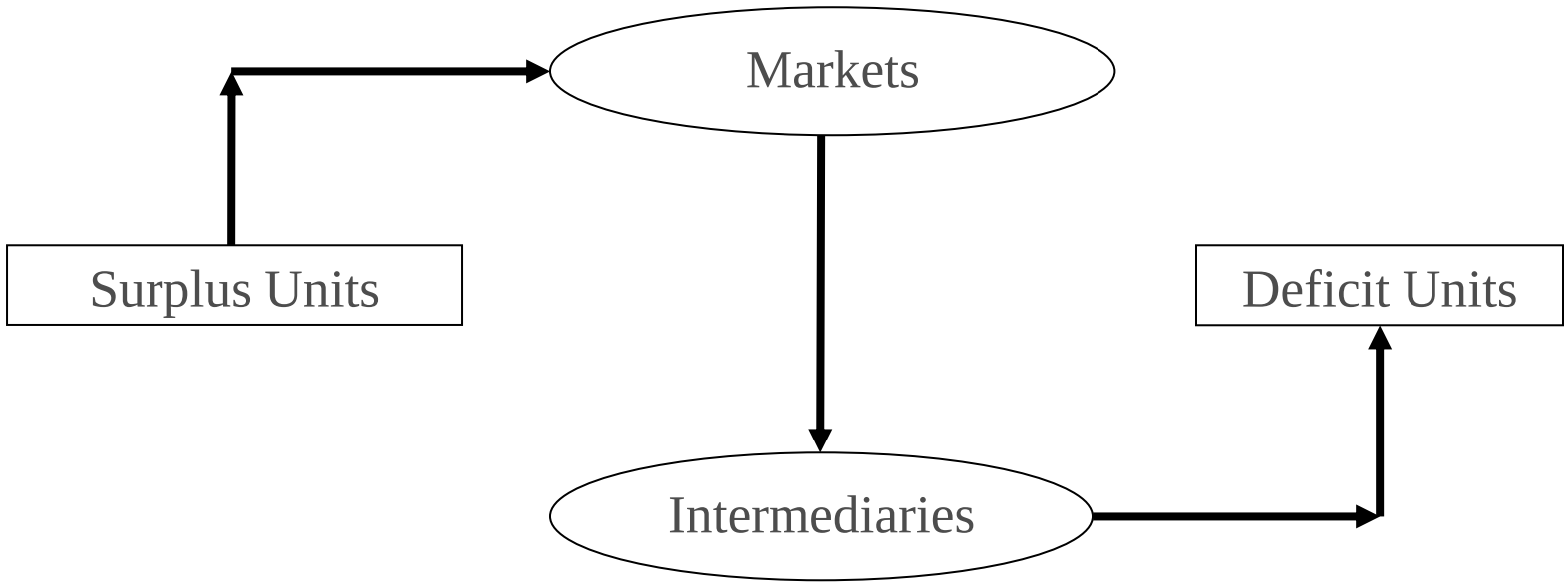
- **Banks:** take deposits & make loans/mortgages
- **Insurance companies:** shed specific risks (property, health, life, etc)
  - Payments are called Premiums, and these are invested in real estate, stock and bonds
- **Pension and retirement funds:** allow you to save while you are working, to replace your income upon retirement
  - Defined-contribution vs. Defined-benefit
- **Mutual funds:** a portfolio of stocks, bonds, and other assets purchased in the name of a group of investors and managed by a professional investment company or a financial institution.
- **Investment banks:** Assist businesses and governments raise funds by issuing securities; facilitate mergers and acquisitions
- **Venture Capital firms/Private Equity firms:** provide capital to start-up firms/established firms, take equity stake in the firm, and help the firm grow, and then sell them at a good price or go public.
- **Asset Management firms, Information services, etc**

# Fund Flows via Intermediary and Market




- Sometimes the intermediary itself has surplus funds, and invests them in the market or another intermediary
- E.g., a middle-aged couple saving for retirement (surplus unit) may invest its savings in an insurance company (intermediary), for say buy annuities; the insurance company may invest the funds in the bonds (markets) issued by a company (deficit unit)

# Funds Flow via Markets and Intermediaries




- Intermediaries obtain funds from the financial markets.
- E.g., a finance company that makes loans to households might, for instance, raise those funds by issuing stocks and bonds in the markets for those securities.

# Outline

- Household & Corporate Financial Decisions
- The Financial System
- Financial System Functions
- Financial Markets Rates

# Six Key Financial Functions:

1. Transferring Resources Across Time & Space
2. Clearing and Settling Payments
3. Providing Information
4. Managing Risk
5. Pooling Resources and Subdividing Shares
6. Dealing with Incentive Problems

# Function 1: Transferring Resources Across Time & Space

- A financial system provides ways to transfer economic resources through **time**, across **geographic regions**, and among **industries**
- Example:
  - A Dutch household currently has excess funds needed in ten years
  - A Chinese business would become more profitable with new investment funds
  - Financial markets make this match

# Function 2: Clearing and Settling Payments

- To facilitate the exchange of goods, services, and assets
  - Gold (requires purity assay, heavy)
  - Paper money (restricted geographically)
  - Credit cards (not universally accepted)
  - Personal, cashier's or traveler’s checks (acceptability varies)
  - Modern examples: AliPay, WePay, Apple Pay, Digital RMB

# Function 3: Providing Information

- Investors need current prices to evaluate their portfolios
- Prices may be used to estimate the value of similar non-quoted securities
- Prices may help to reveal the fundamentals of underlying assets
  - A firm's stock price

# Function 4: Managing Risk

- Suppose you want to start a business and need ￥100,000.
  - Use your own savings (Empty pocket 😟)
  - Borrow from your friends or relatives (Empty pocket x 2 😟)
  - Take a loan from a bank (￥30,000 at an interest rate of 6%/yr)
  - Give a private investor a share of your company (￥70,000 for 75% share)
- If your business goes broken 😟, with only ￥20,000. Who loses money?
  - Bank gets back ￥20,000, loses ￥10,000 and interest
  - Private investor loses all ￥70,000
  - But the depositors of the bank are safe.
- How to avoid the risks of losing money?
  - The bank requires someone to guarantee the loan or a collateral.
  - The private investor may turn to some financial derivatives.

# Function 5: Pooling Resources and Dividing Ownership in Large Assets

- Pooling of funds to undertake large-scale indivisible enterprises
  - You want to invest in a racehorse that costs $100,000, but you only have $10,000
  - Create an investment pool and distribute shares to 10 investors: $100,000=10 x $10,000
  - Any earnings or costs are shared by the 10 investors
- Subdividing of shares in large enterprises with many owners
  - A household wishes to divest itself of its ownership in a chain of restaurants
  - Form a corporation, and sell its stock

# Function 6: Dealing with Incentive Problems

- Incentive problems occur
  - when one party to a financial transaction has information that the other party does not (**Information asymmetry**)
    - Moral Hazard
    - Adverse Selection
  - when one party is an agent and makes decisions for another (**Principal-Agent Problem**)

# Moral Hazard: after contracting

- A situation in which having insurance against some risk causes the insured party to take greater risk or to take less care in preventing the event that gives rise to the loss.
- Example:
  - Adam enters into an insurance contract with Carmel. Adam pays Carmel a premium of $10,000. Camel will reimburse Adam's costs should a fire damage his business during the next year, but pay nothing otherwise.
  - Adam can eliminate the probability of fire by installing a cheap sprinkler, costing only $100.
  - Will Adam install the sprinkler?

# Moral Hazard: after contracting

- A situation in which having insurance against some risk causes the insured party to take greater risk or to take less care in preventing the event that gives rise to the loss.
  - Fire insurance
  - Health insurance
    - Ex-ante moral hazard: not take good care of health
    - Ex-post moral hazard: use more healthcare after being sick
  - Life insurance

- Contracting
  - Pre-paid salary
  - Pre-awarded degree

# Adverse Selection: before contracting

- Those who purchase insurance against risk are risker than the general population.
- Example:
  - A firm sells life annuities to people retiring at age 65, at a price that reflects a 15-year of life expectancy.
  - There are equal numbers of three types of people in the general population.
    - Type A: live for 10 years
    - Type B: live for 15 years
    - Type C: live for 20 years
  - Who will buy the annuities?
- Lemon market problem and death spiral

# Principal-Agent Problem

- A situation arising when the agent who is assigned a task by a principal does not act in the principal's best interests.
- Example of "empire-building".
  - Shareholders (principal) of a company delegates the running of the firm to its managers (agents)
  - CEO tries to increase the size of the firm at the cost of shareholders because a larger firm size may bring CEOs personal benefits (e.g., greater power of control or higher compensation).
  - For instance, they may use excess corporate cash holdings to pursue value-decreasing acquisitions instead of paying out to shareholders.

# Function 6: Dealing with Incentive Problems

- Contracts are designed to prevent incentive problems.
  - Debt contracts have the following features
    - collateral requirements
    - guarantor requirements
    - restrictions on cash flow use
  - Sometimes, the threat of reputational damage is strong enough to eliminate incentive problems.

# Outline

- Household & Corporate Financial Decisions
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# Financial Market Rates

- Interest rates: The promised rate of return to fixed-income instrument.
  - Mortgage rate
  - Commercial loan rate
- Exchange rates: The price of one currency in terms of the other
  - E.g. 1 USD to 6.36 RMB
- Stock-market indicators

# Interest Rates

Depend on

- **Unit of account:** medium in which the payments are denominated
  - Usually a currency, but may be a commodity such as gold, silver, a standard "basket" of goods and services
- **Maturity:** term structure of interest rates
  - Usually (but not always), the longer the maturity, the higher the interest rate
- **Default Risk:** the risk structure of interest rates
  - Possibility that some interests or principal on a fixed-income instrument can not be repaid in full.
  - The greater the default risk, the higher the interest rate.

# Unit of Account

- Exercise 1: Suppose you live in the US, and earn USD. Last year, you bought a bond with a face value of $1,000, which matures in one year, interest rate per annum is 10%. How much do you receive at maturity?
  - $1,000*(1+10%)=$1,100

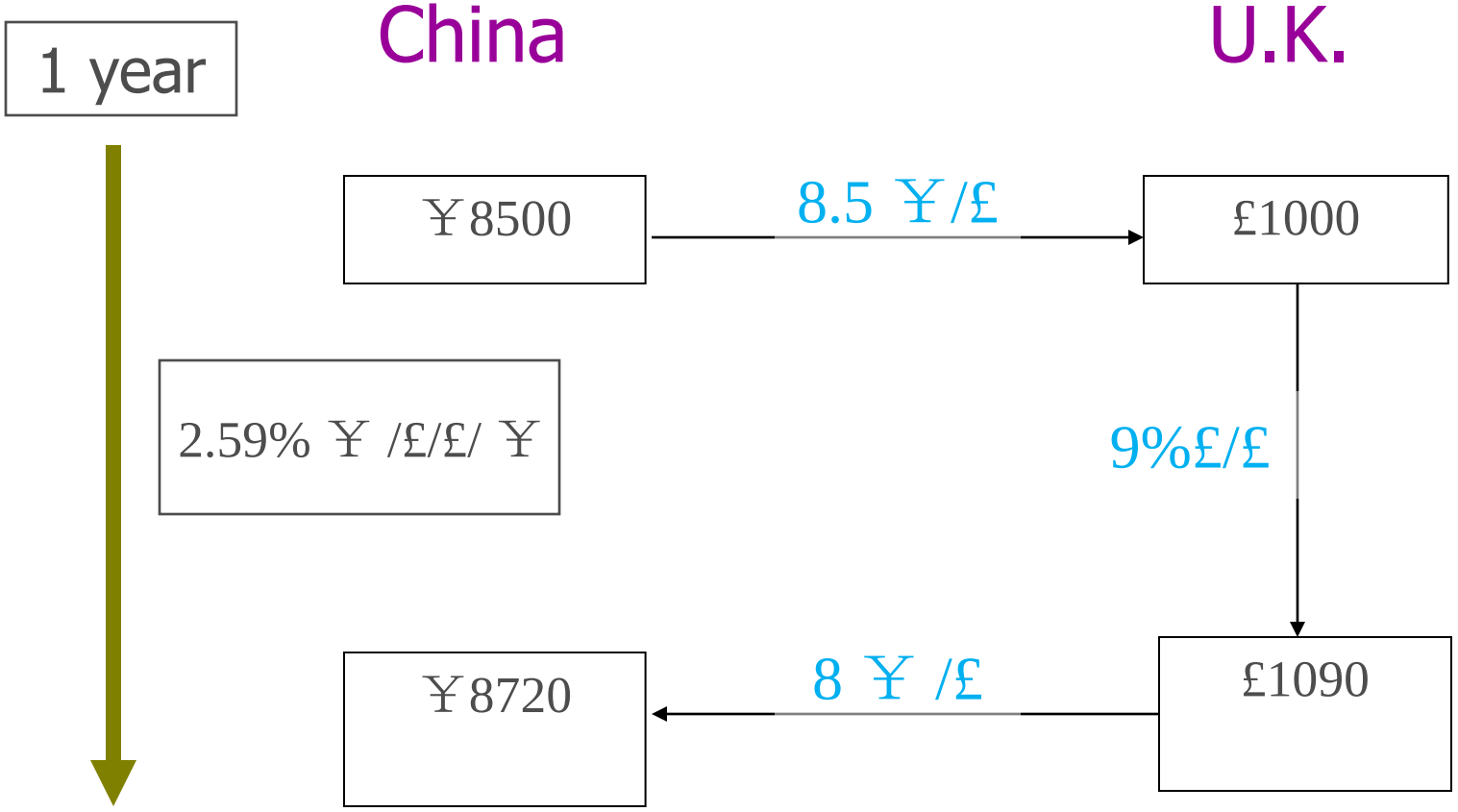
# Unit of Account

- Exercise 2: Suppose you live in China and earn RMB. Last year, you bought a US bond with a face value of $1,000, which matures in one year, interest rate per annum is 10%. **At the time of purchase**, the exchange rate was **1 USD to 6.53 RMB**. **Now**, it is **1 USD to 6.36** RMB. How much RMB do you pay at purchase and receive at maturity? What is the interest rate in terms of RMB?
  - At purchase: $1,000*6.53=RMB 6,530
  - At maturity: $1,000*(1+10%)*6.36=RMB 6,996
  - RMB interest rate: (6996-6530)/6530*100%=7%

# Example: Exchange Rate Risk

- Suppose:
  - You are a Chinese Investor wishing to make a 1-year investment
  - Current exchange rate: 8.5 RMB/Pound
  - Chinese bonds yield 3%
  - British bonds yield 9%
  - Investment 8,500 RMB
  - Future exchange rate 1-year from now: 8 RMB/Pound
- You can
  - Directly invest in Chinese bonds
  - currency speculation: Convert RMB to Pounds, invest in British bonds, and convert Pounds back to RMB

# Exchange Rate Example



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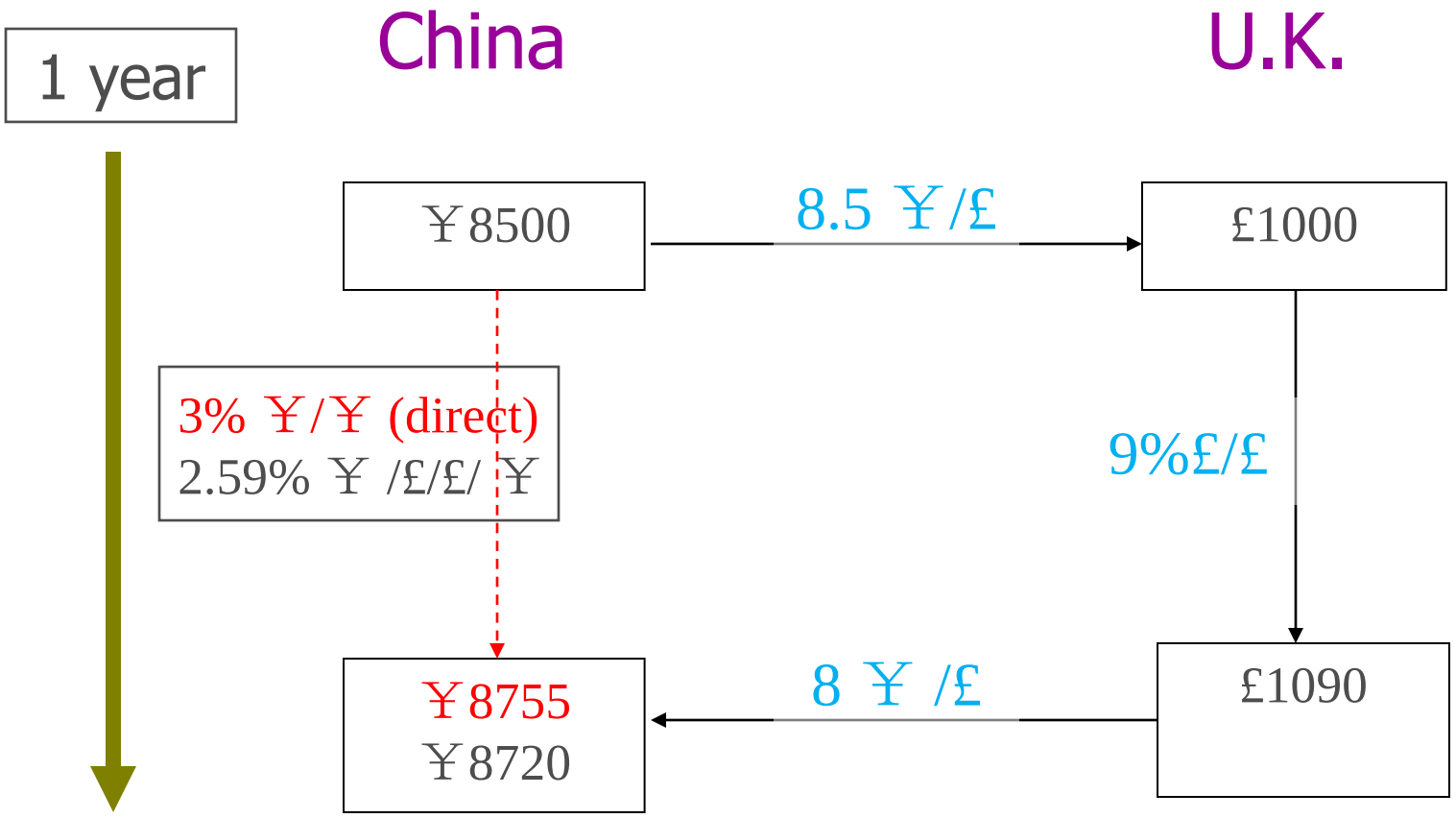
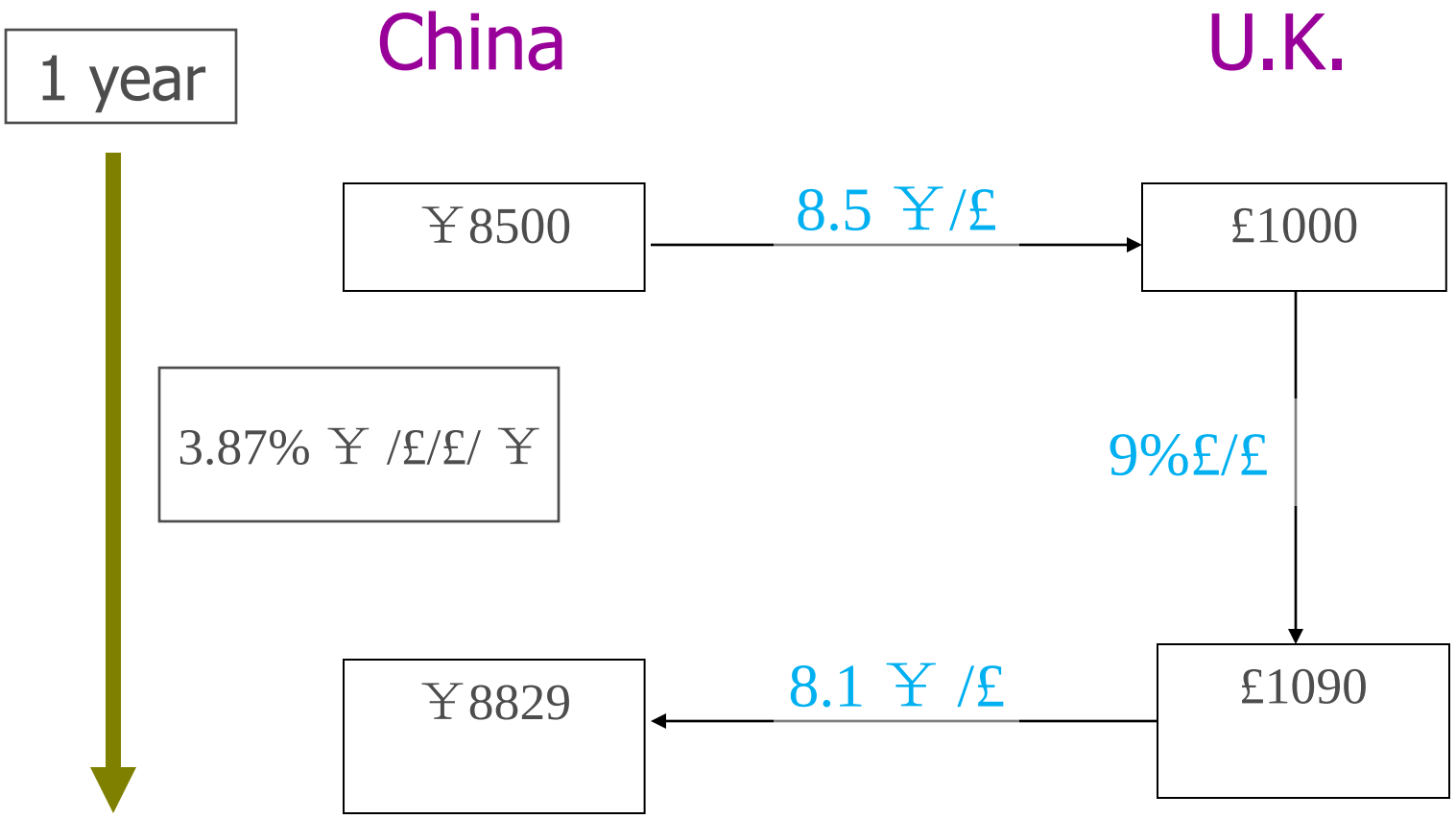



- The currency speculation *doesn't* pay-off under this scenario. It returns only 2.59%, which is below the 3% offered by a direct Chinese investment.

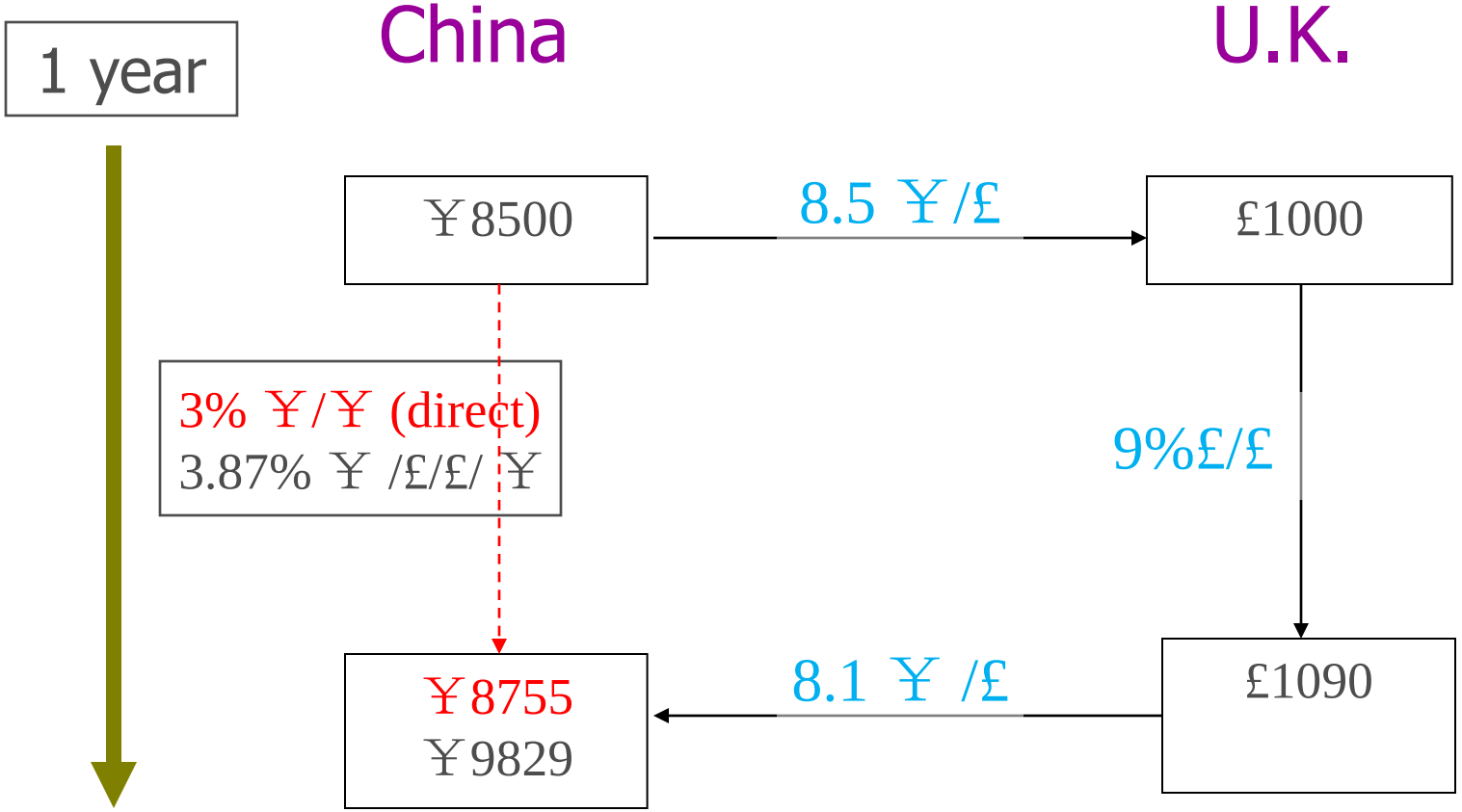
# Exchange Rate Example

- Suppose:
  - You are a Chinese Investor wishing to make a 1-year investment
  - Current exchange rate: 8.5 RMB/Pound
  - Chinese bonds yield 3%
  - British bonds yield 9%
  - Investment 8,500 RMB
  - Future exchange rate 1-year from now: 8.1 RMB/Pound

# Exchange Rate Example



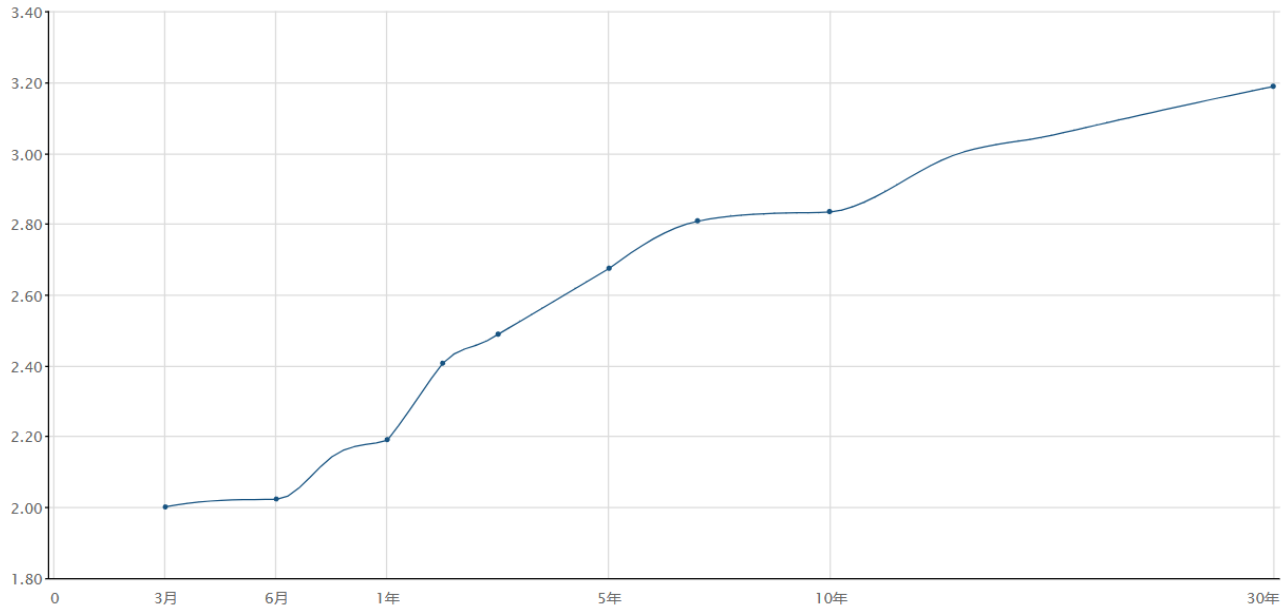
# Exchange Rate Example




- The currency speculation *wins*. It returns 3.87%, which is above the 3% offered by a direct Chinese investment

# Maturity

- The date of, or period to, its final cash flow
  - Usually upward sloping, but sometimes downward sloping has special meanings
  - China Government Bonds Yield Curve

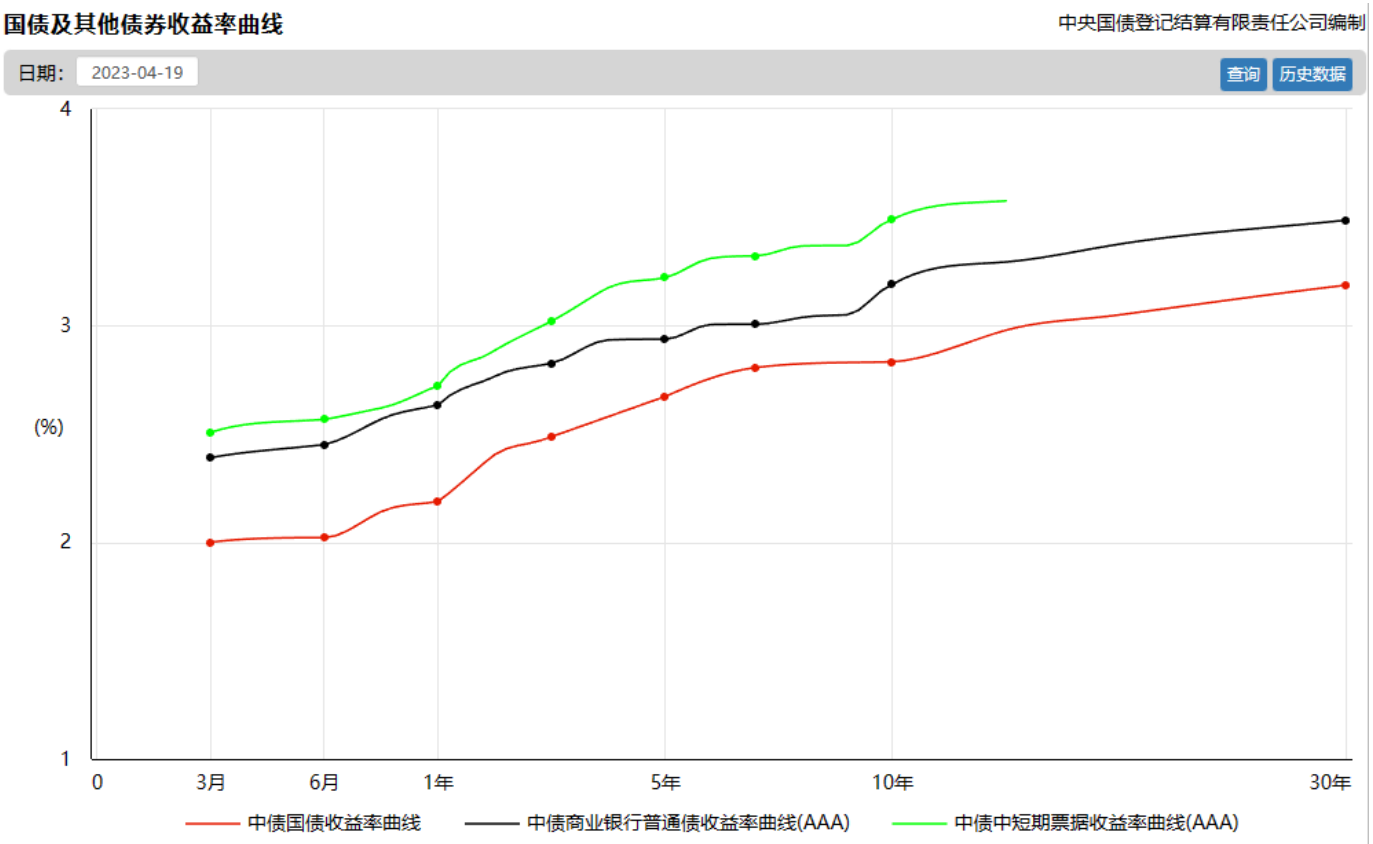



Sources: https://yield.chinabond.com.cn/cbweb-czb-web/czb/moreInfo?locale=cn_ZH&nameType=1

# Default Risk

- The possibility that some portion of the interest or the principal on a fixed-income security will not be paid in full
  - The greater the perceived default risk, the higher the interest rate the issuer must promise to give
  - Yield Spread: difference in yields

# Yield Comparisons




| 2023-04-19(%) | 3月 | 6月 | 1年 | 3年 | 5年 | 7年 | 10年 | 30年 |
|---|---|---|---|---|---|---|---|---|
| 中债国债收益率曲线 | 2.0010 | 2.0220 | 2.1891 | 2.4881 | 2.6735 | 2.8069 | 2.8333 | 3.1875 |
| 中债商业银行普通债收益率曲线(AAA) | 2.3914 | 2.4512 | 2.6346 | 2.8272 | 2.9377 | 3.0069 | 3.1907 | 3.4874 |
| 中债中短期票据收益率曲线(AAA) | 2.5083 | 2.5677 | 2.7233 | 3.0215 | 3.2214 | 3.3221 | 3.4913 | |

Sources: http://www.cbirc.gov.cn/cn/view/pages/index/guozhai.html

# Rates of Return on Risky Assets

- Many assets do not *promise* a rate of return
  - Real Estate
  - Equity Securities
  - Works of Art
- Simple rate of return=(current value-initial value)/initial value
  - regardless of the length of holding period (may hold for 1 day, 1 year, or 10 years)
- Assume
  - You bought a house 10 years ago at $30,000.
  - You see an appraiser and he tells you that you can sell it today for $213,000.
  - What is your rate of return for the period?

# Rates of Return on Risky Assets

- Return of stock comes from:
  - Any Cash Flows from the Asset (i.e. stock cash dividends)
  - Capital Gain/loss (i.e. gain or loss in the market price during the holding period)
- Assume:
  - Purchase price of share was $100
  - Selling price 1-year later was $105
  - Cash dividends paid in year were $5

$$RateofReturn = \frac{(EndPrice - StartPrice) + CashDividend}{StartPrice}$$

$$RateofReturn = \frac{(\$105 - \$100) + \$5}{\$100} = 0.10 = 10\%$$

- What if you do not sell it by the end of the year?

# Market Indexes and Market Indexing

- If you hold a stock, it is good to have a benchmark price against which to measure the performance of your investment.
- **Market Indexes:** Overall level of stock prices of a predetermined basket of stocks
  - Global: MSCI World, S&P Global 100
  - Regional: FTSE Developed European Index
  - National
    - China: Shanghai SE Composite Index
    - US: DJI, SP500
- **Market Indexing:** a passive investment strategy to hold all securities in the index
  - Replicate the investment results of the target index
  - Cheap

# Inflation and Real Interest Rates

- Money is only valuable if it can be used to buy things.
- **Nominal** rate of return: expressed in terms of currency (the actual money you receive)
  - With a $100 bond with an interest rate of 5%, you will receive $105 at maturity
- **Real** rate of return: expressed in terms of purchasing power
  - With a $100 bond with an interest rate of 5%, you will receive $105 at maturity
  - but the price of goods goes up by 5% (**Inflation rate**)
  - With $105 could buy things only worth $100 at the beginning. You could not buy more things.
  - Real rate of return is 0%, in terms of purchasing power.

# Inflation

- Price increases -- Money depreciates
- Hyperinflation
  - Germany 1923: $1.5 \times 10^{56}\%$
  - Hungary 1946: $7.5 \times 10^{170}\%$
  - Zimbabwe 2008: $7.3 \times 10^{108}\%$
- US 2022

# Nominal to Real

$$(1+NominalRate)=(1+RealRate)*(1+InflationRate)$$

$$\Rightarrow$$

$$RealRate=\frac{NominalRate-InflationRate}{1+InflationRate}$$

- Inflation rate: the change rate of price of a basket of consumption goods.
- An easy approximation: $RealRate = NominalRate - InflationRate$
- Example:
  - With a $100 bond with an interest rate of 5%, you will receive $105 at maturity
  - The inflation rate is 8%, indicating that, a basket of good worth $100 now, will be worth $108 in one year
  - For every basket you give up now, you can only buy $105/$108=0.9722 basket
  - Real rate of return = (0.9722-1)/1*100%=-2.78%

# Interest Rate Equalization

- If the financial markets are competitive, interest rates on equivalent assets should be the same.
  - Equivalent in terms of maturity and risk.
- Example
  - If 1-yr US treasury pays an interest rate of 4%
  - What interest rate would World Bank pay on its 1-year US dollar bond, assuming similar risk?
  - Most likely 4%
  - What if much lower than 4%?
- Law of one price (will learn later)

# Fundamental Determinates of Rates of Return

- Expected Productivity of Capital Goods
- Capital Goods Productivity Uncertainty
- Time Preferences of People
- Risk Aversion

# To summarize

- Household & Corporate Financial Decisions
- The Financial System
- Financial System Functions
- Financial Markets Rates

Next lecture

- Time: May 3
  - (No lecture on April 29, make-up lecture TBD)
- Topic: Time value of money

# Make-up lectures TBD

- We need to have 3 make-up lectures so that we have a total of 14 lectures, excluding midterm, before July 29.
- Option 1: after final exam of the spring semester, i.e., 2 lectures per week in July