PRINCIPLES OF FINANCE

WEEK 1

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General information on the course

Objectives

- To acquire an in-depth knowledge of the core corporate finance and financial market theories
- To be able to identify the right model in order to analyze corporate and investors' decisions

Rules

- Need 10 or more to pass. No retake exam.
- Absence at an exam gives zero.
- In person classes: No computer, no mobile phone, do not arrive late.

Structure of the course

Each week

- In person/Zoom class, starting with a quiz (not graded)
- Q&A
- Real-life example illustrating a part of the course
- Video (occasionally 2) with part of the lecture to study before the next class.

What you will learn

- Valuation (securities, projects)
- Portfolio allocation under risk
- Relation between risk and expected return
- Introduction to options
- Capital structure and firm valuation

Outline of today's lecture

- Introduction: what is corporate finance?
- Debt and equity
- The time value of money
- Security valuation: general principles
- Bond valuation
- Stock valuation

Introduction

Four Types of Firms

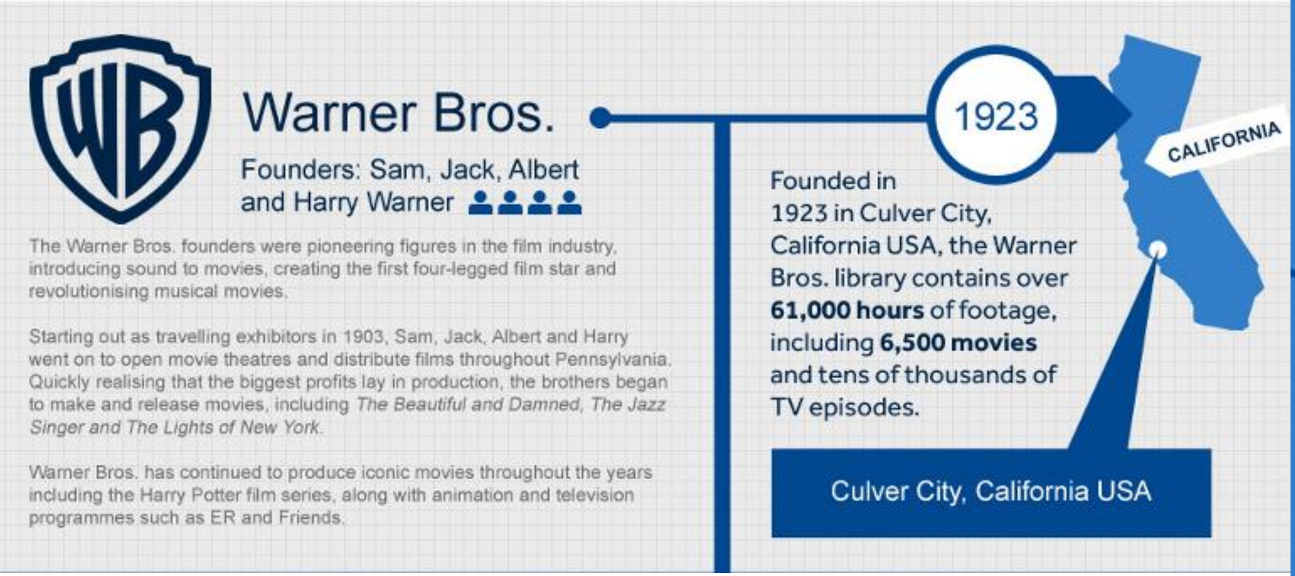
- **Sole Proprietorship**: business owned and run by one person
  - Usually small
  - No separation between the firm and the owner.

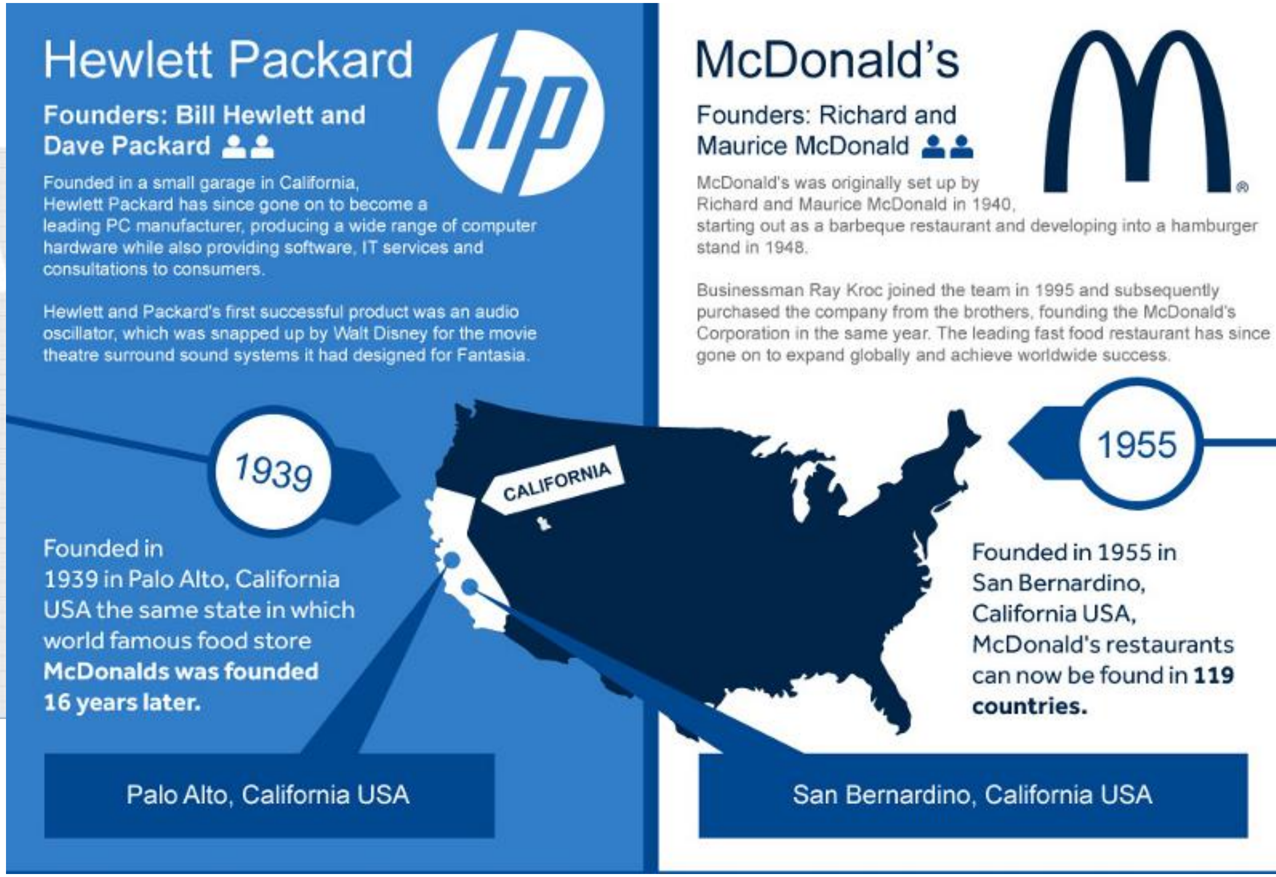
- **Partnership**: identical to a sole proprietorship but with more than one owner.
  - Example: law firms, groups of doctors, accounting firms
  - Limited partnerships: have general partners but also limited partners whose liability is limited to their investment.

- **Limited Liability Company**: Limited partnership without a general partner.
  - All the owners have limited liability.
  - Very common in France (SARL)

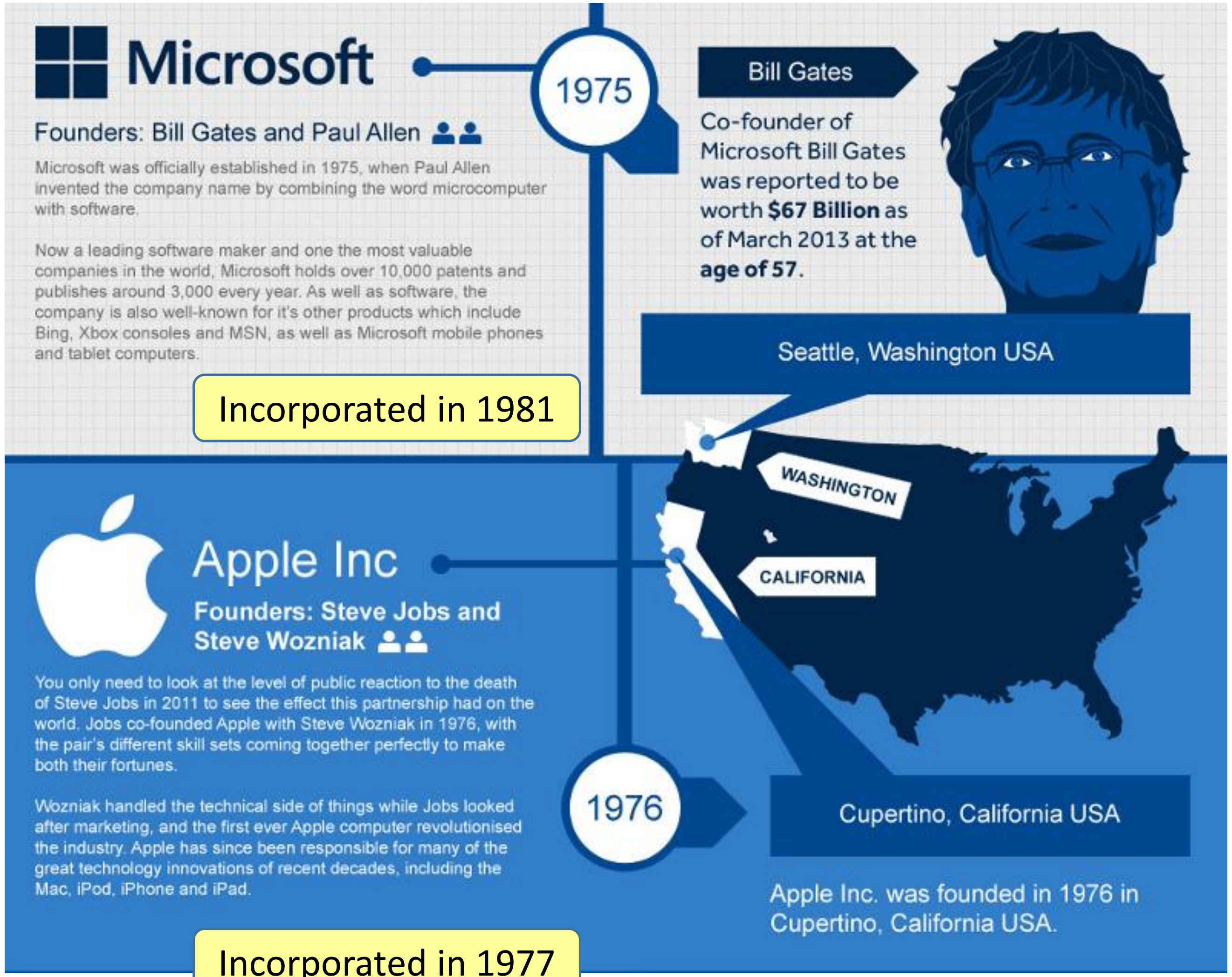
- **Corporation**: legally defined, artificial being, separate from its owners.
  - Most large investment banks (Goldman Sachs, Morgan Stanley) started as partnerships and became corporations as they grew.
  - No limit on the number of owners (**shareholders = stockholder = equity holder**)
  - Shareholders have limited liability (example of Lehman Brothers)

Successful Partnerships



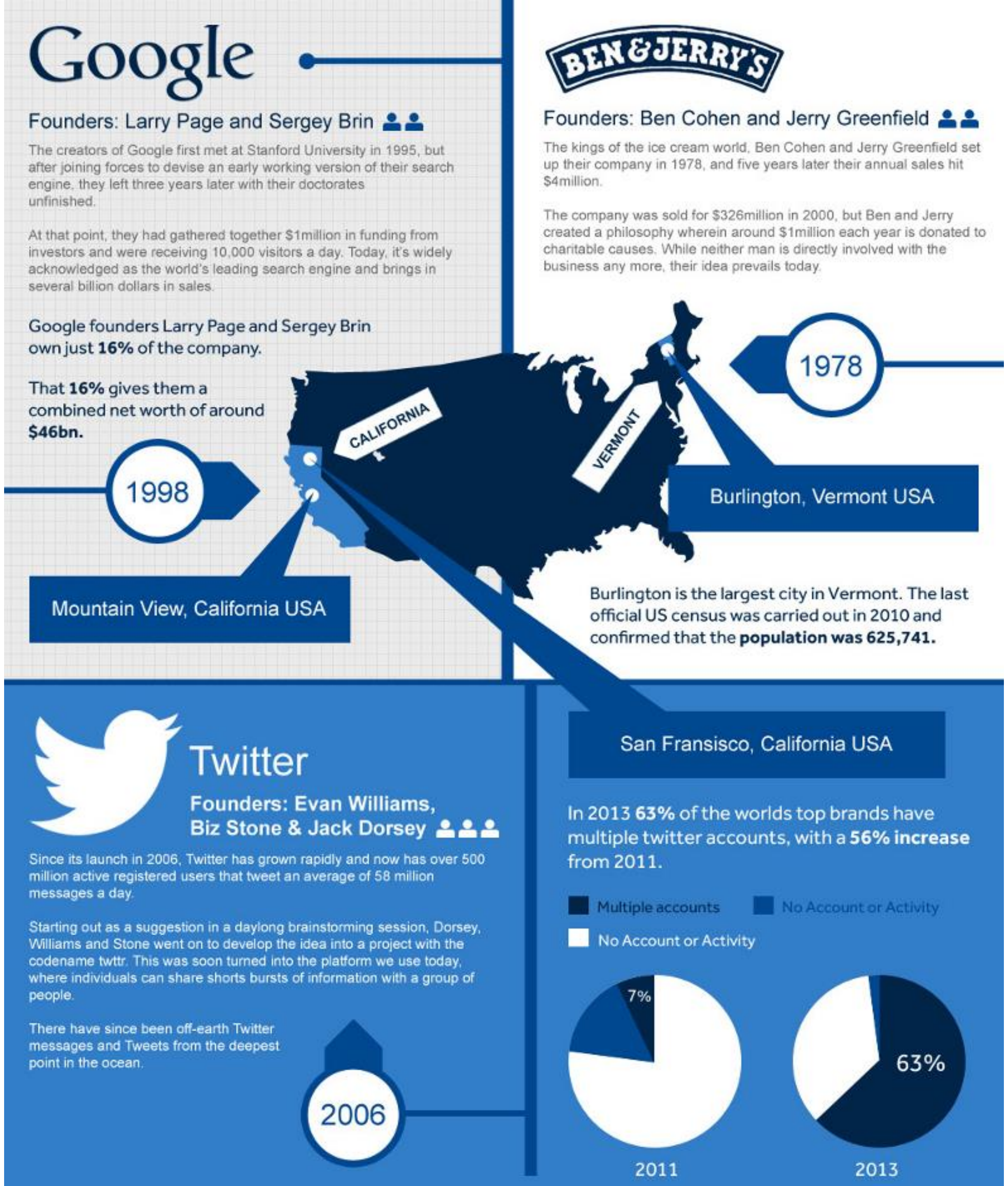


Successful Partnerships



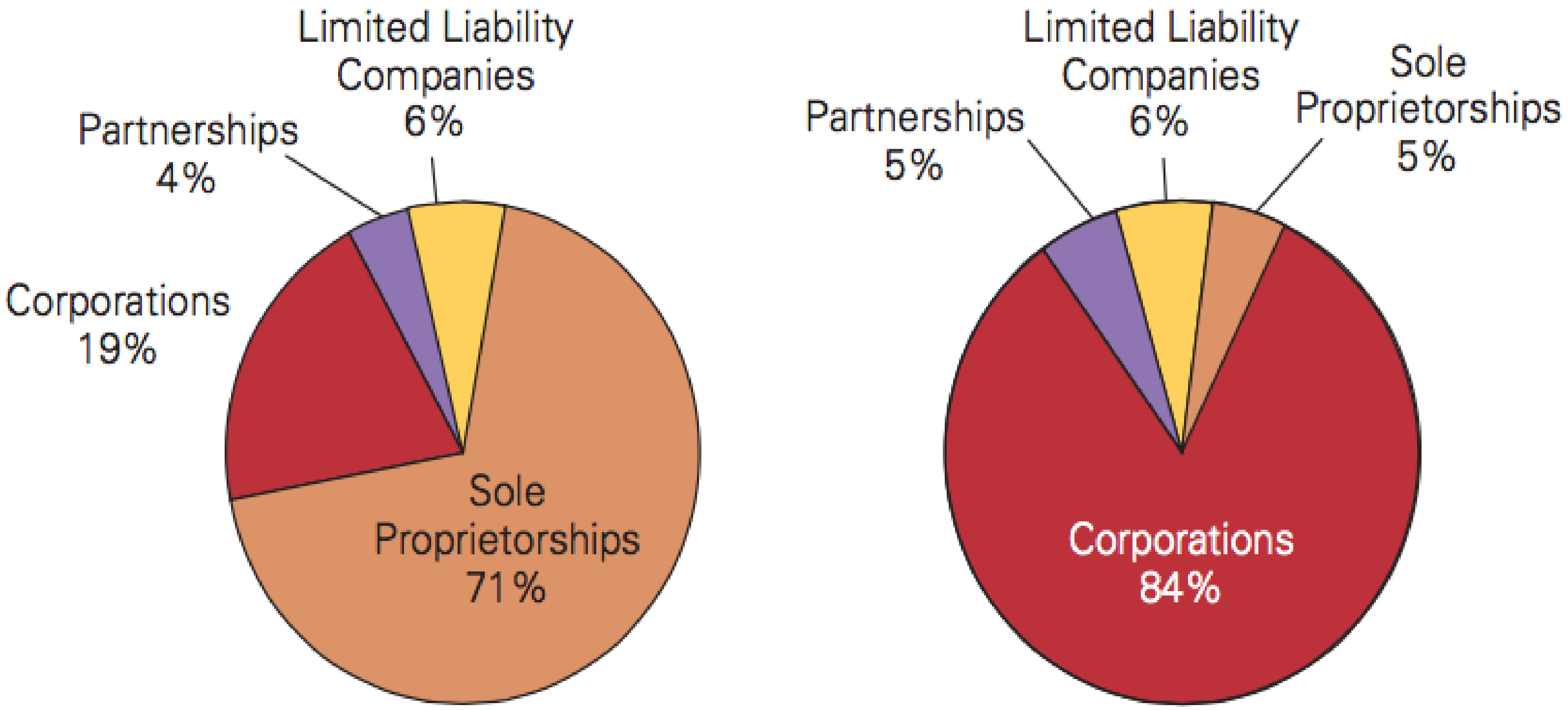
Incorporated in 1981

Incorporated in 1977



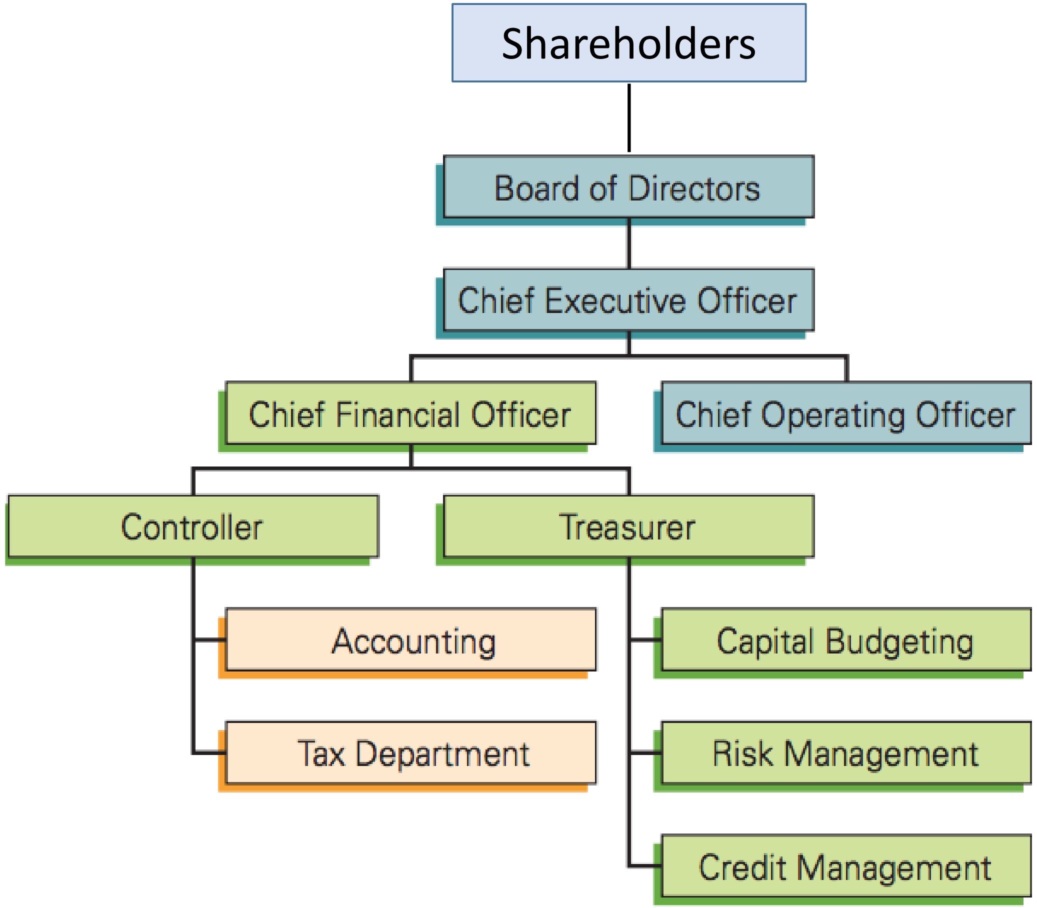
Amazon

- Amazon Inc. is a corporation.
- It has a lot of subsidiaries that are either LLCs or corporations (Amazon.com LLC in Delaware, Amazon Services LLC in Nevada…)
- Tax advantages.



(a) Percentage of Businesses **(b)** Percentage of Revenue

Organization Chart of a typical corporation

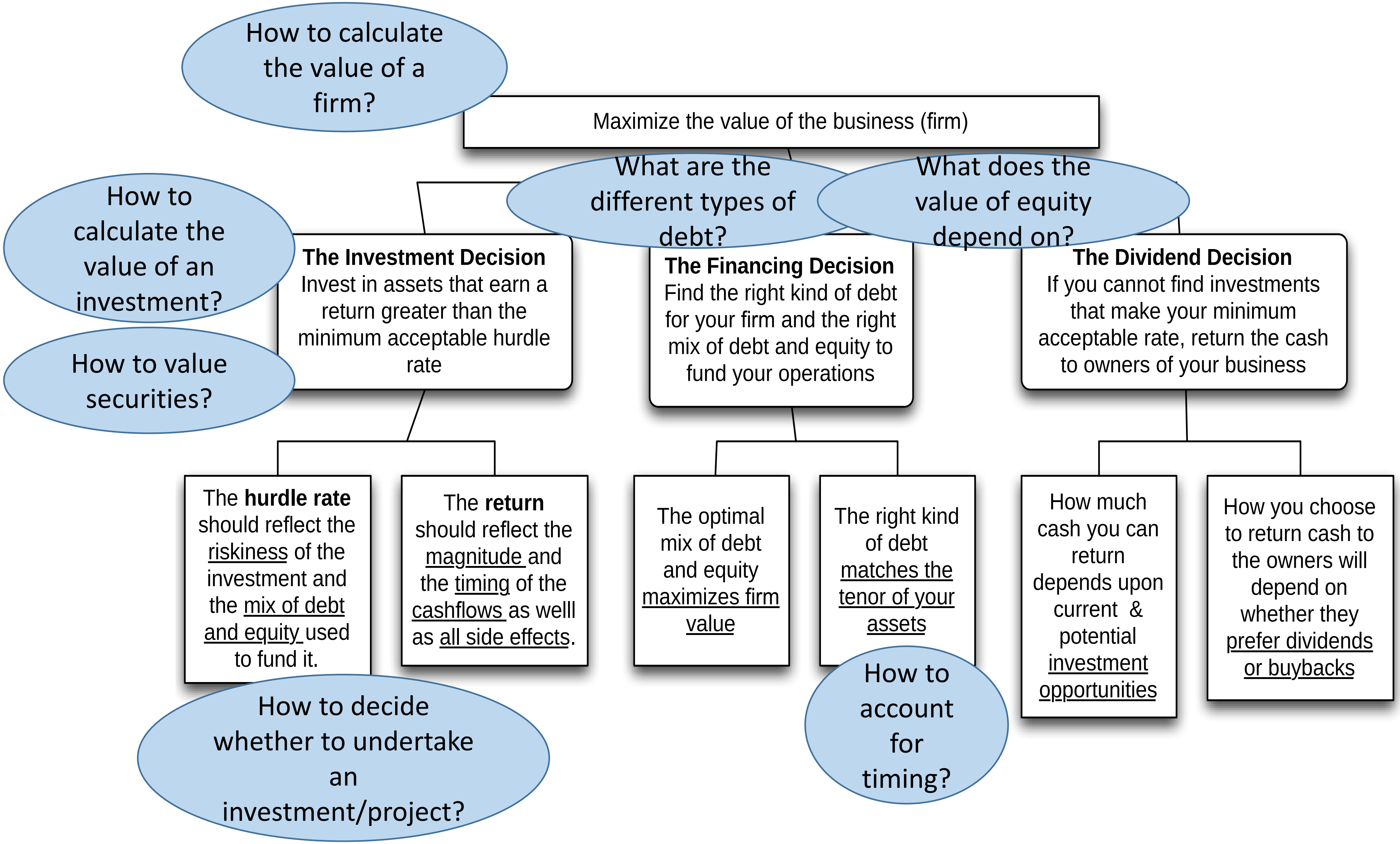


- Shareholders elect a board of directors who have the **ultimate decision-making authority** in the corporation.
- The board of directors delegates most decisions that involve day-to-day running of the corporation to its management: CEO--> CFO/COO.
- Three main tasks of CFO: making investment decisions and financing decisions, and managing firm's cash flows.
- Examples of investment decisions and financing decisions?

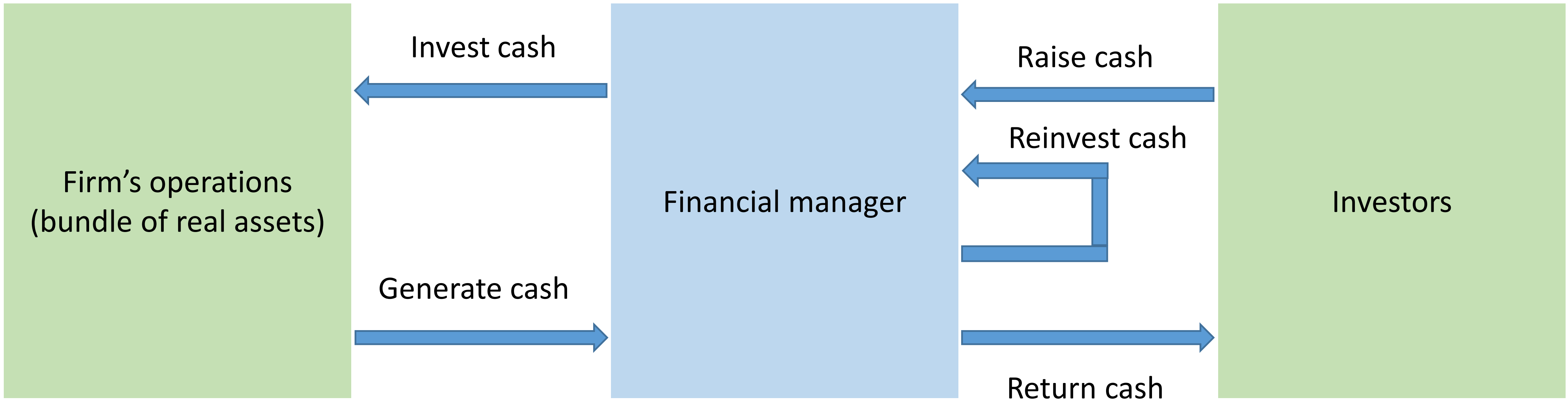
Corporate Finance

Mainly addresses the following questions:

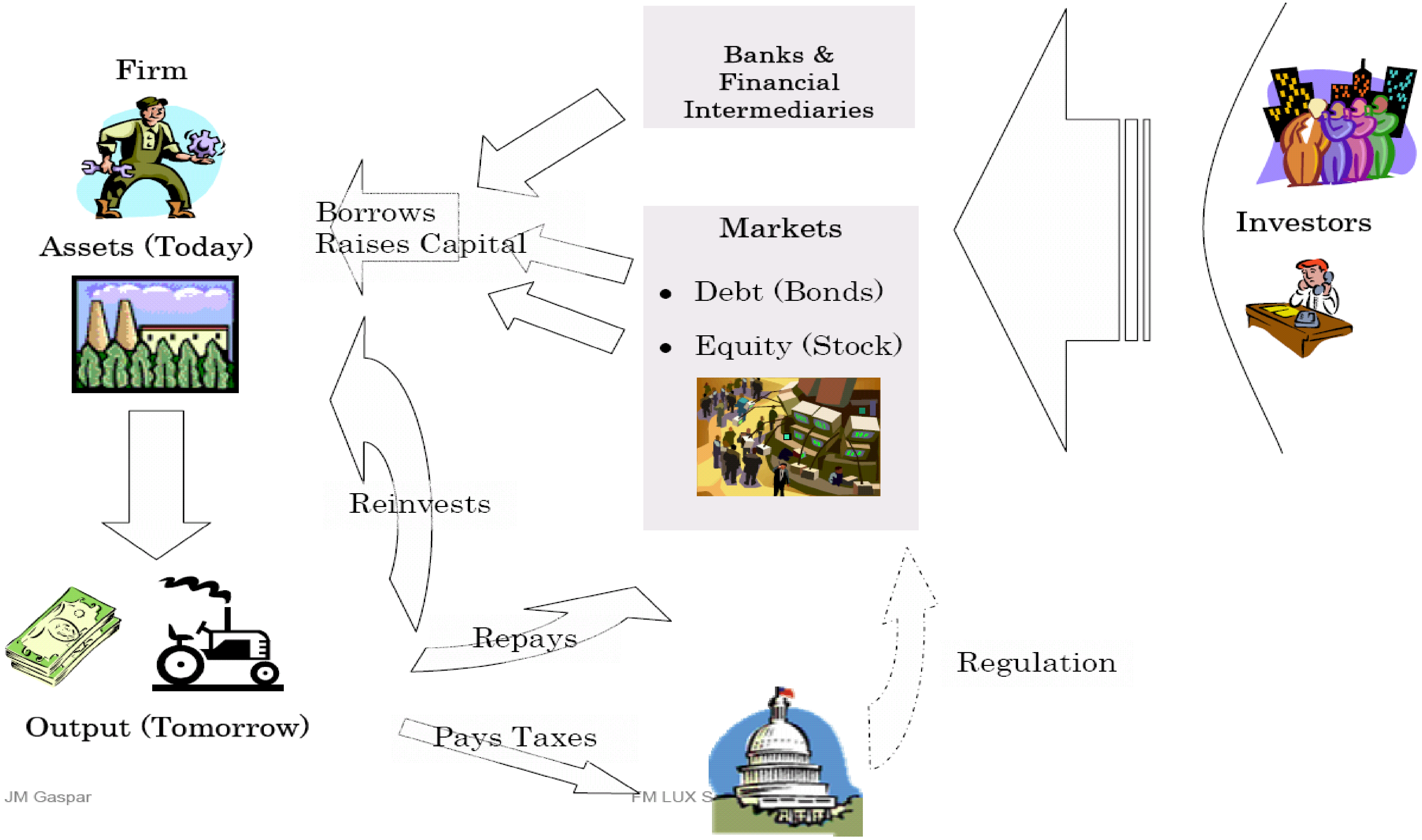
- What long-term investments should the firm engage in?
  → investment decisions
- How can the firm raise the money for the required investments?
  → financing decisions
- How much cash flow should be paid to the investors?
  → dividend decisions


How to calculate the value of a firm?
Maximize the value of the business (firm)
How to calculate the value of an investment?
How to value securities?
What are the different types of debt?
What does the value of equity depend on?
The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate
The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations
The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business
The **hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it.
The **return** should reflect the magnitude and the timing of the cashflows as welll as all side effects.
The optimal mix of debt and equity maximizes firm value
The right kind of debt matches the tenor of your assets
How much cash you can return depends upon current & potential investment opportunities
How you choose to return cash to the owners will depend on whether they prefer dividends or buybacks
How to decide whether to undertake an investment/project?
How to account for timing?

Cash flows



- A firm should generate more cash flows than it uses.
- The size, timing and risk of the cash flows should be accounted for.


Firm
Assets (Today)
Output (Tomorrow)
Borrows
Raises Capital
Reinvests
Repays
Pays Taxes
Banks &
Financial
Intermediaries
Markets
• Debt (Bonds)
• Equity (Stock)
Investors
Regulation

Debt and equity

How would you finance an investment?

Two ways of financing an investment:

- **Bonds** = debt. Issuing bonds is borrowing from creditors.

The issuer (borrower) has the contractual obligation to make periodic fixed or floating interest payments (**coupons**) to the bond holder (lender/creditor) and to repay the bond's principal (**face value**) at **maturity** date

- **Stocks**: Issuing stocks is selling ownership of the firm.

	Debt	**Equity**
Security issued	Bonds	Shares of stock
Issuer	Government / Corporation	Corporation
Payments to investors	Contractually fixed (interest)	Common Stock: Discretionary (dividends)
Maturity of securities	Fixed, finite life	Infinite life
*Tax deductibility of payments for firms**	Yes	No
Control over the firm	No (only in case of bankruptcy)	Yes (voting rights)
Priority in case of bankruptcy	High (senior claimants)	Low (residual claimants)

* For corporate investors, the interest received is taxable, but 70% of the dividend received is tax deductible. For individual investors, both interest and dividend are taxable.

Firm value

How to calculate the value of a firm? ■

- The **value of the firm** is given by:

$$\textit{Value firm} \equiv \textit{Debt} + \textit{Equity}.$$

→ How to calculate the value of debt and the value of equity?

- Corporate Securities can be seen as contingent claims on total firm value.

- The **shareholder's claim on firm value** is the residual amount that remains after the debtholders are paid (Equity ≡ Value firm – Debt). If the value of the firm is less than the amount promised to the debtholders, the shareholders get nothing.

The time value of money

Financial Contracts

- Modern financial markets are platforms that allow exchanging cash-flows between now and the future.
- A financial contract is, in essence, an exchange of cash flow (CF) streams between now and some point in the future.

Simplest financial contract

Interest Rate

- The implicit difference between P, paid today, and F, received tomorrow, is the **interest rate**

$$F = P + Interest = P + r \times P$$

$$= P \times (1 + r), \qquad\qquad r \geq 0$$

- r is determined by the interaction of many agents in financial markets.

One period Case

Example: Joe would like to borrow \$1,000 from you today and pay you back \$1,200 in a year, should you lend the money to him? The current yearly interest rate offered by the bank is 10%.

Future and Present Value in 1-period

- The **Future Value** (FV) or **Compound Value** can be written as:

$$FV = C_0 \times (1 + r),$$

where C_0 is the CF at date 0 and *r* is the ''appropriate'' interest rate.

- The **Present Value** (PV) can be written as:

$$PV = \frac{C_1}{1+r} \quad ,$$

where C_1 is the CF at date 1 and *r* is the ''appropriate'' interest rate.

Keywords:
future value / present value

Future and Present Value in 1-period

Keyword:
Net Present Value

- **Net Present Value (NPV):**

$$NPV = PV\ of\ future\ cash\ inflows - PV\ of\ cash\ outflows$$

- An investment decision is profitable if the NPV is positive.

How to decide whether to undertake an investment/project? ■

- Size, risk and timing of the cash flows are all important.

  Can you see why?

Multi-period case

Suppose you invest \$100 in a bank account paying an interest rate of 10 percent per year.

- At the end of 1 year $\quad \$100 \times (1 + 0.1) = \$110$
- At the end of 2 years $\quad 110 \times (1 + 0.1) = \$100 \times (1 + 0.1)^2 = \$121$
- …
- At the end of *T* years $\quad \$100 \times (1 + 0.1)^T = FV_T$

The process of leaving the money (initial amount + interest earned) in the capital market and lending it for another year is called **compounding.**

Keyword: compounding

Compounding

Example of compounding:

$$1 \times (1+r)^2 = 1 + 2r + r^2$$

- The term *2r* is the two years' worth of interest on $1. It represents the ***simple interest*** over the two years.
- The term r^2 is the ***interest on interest.***

Keywords:
Simple interest vs. compound interest

When cash is invested at ***compound interest***, each interest payment is reinvested.

"Money makes money, and the money that money makes makes more money." (Benjamin Franklin)

Exercise

Example: You own 100$. The interest rate is 10%. How much will you have in 20 years if the interest is simple? And if the interest is compounded?

Simple vs. Compound Interest

	Simple Interest			**Compound Interest**		
Year	Starting Balance	Interest	Ending Balance	**Starting Balance**	**Interest**	**Ending Balance**
1	100	10	110	**100**	**10**	**110**
2	110	10	120	**110**	**11**	**121**
3	120	10	130	**121**	**12.1**	**133.1**
	…	…	…	**…**	**…**	**…**
10	190	10	200	**135.79**	**23.58**	**259.37**
	…	…	…	**…**	**…**	**…**
20	290	10	300	**611.59**	**61.16**	**672.75**
	…	…	…	**…**	**…**	**…**

Future and Present Value in multi-period

- The **Future Value** (FV) at the end of *T* periods can be written as:

$$FV = C_0 \times (1+r)^T$$

where C_0 is the CF at date 0 and *r* is the appropriate interest rate. $(1+r)^T$ is called the **future value factor.**

- The **Present Value** (PV) can be written as:

Keyword: Discount rate

$$PV = \frac{C_T}{(1+r)^T}$$

where C_1 is the CF at date *T* and *r* is the appropriate interest rate (or **discount rate**). $\frac{1}{(1+r)^T}$ is called the **present value factor.**

Discounting

Discounting refers to the process of calculating the present value of an amount to be received in the future.

Example: How much would an investor have to set aside today in order to have $100 five years from now if the current rate is 10%?

Keyword: Discounting

Discounting

- Frequently, an investor will receive more than one cash flow.

- The most important property of discounting is that **value is additive**.

- The **present value** of the set of cash flows is simply the sum of the present values of the individual cash flows.

How to account for timing? ■

$$PV = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \ldots + \frac{C_T}{(1+r)^T}$$

or

$$PV = \sum_{t=0}^{T} \frac{C_t}{(1+r)^t}$$

Compounding

- The **future value** of the set of cash flows at T is simply the sum of the future values of the individual cash flows.

$$FV_T = C_0(1+r)^T + C_1(1+r)^{T-1} + C_2(1+r)^{T-2} + \ldots + C_T$$

- **Net Present Value**:

$$NPV = PV\ of\ future\ cash\ inflow - PV\ of\ cash\ outflow$$

How to calculate the value of an investment? ■

Example 1

Problem

Your firm needs to buy a new $9500 copier. As part of a promotion, the manufacturer has offered to let you pay $10,000 in one year, rather than pay cash today. Suppose the risk-free interest rate is 7% per year. Is this offer a good deal? Show that its NPV represents cash in your pocket.

Solution

If you take the offer, the benefit is that you won't have to pay $9500 today, which is already in PV terms. The cost, however, is $10,000 in one year. We therefore convert the cost to a present value at the risk-free interest rate:

$$PV(\text{Cost}) = (\$10{,}000 \text{ in one year}) \div (1.07 \text{ \$ in one year/\$ today}) = \$9345.79 \text{ today}$$

The NPV of the promotional offer is the difference between the benefits and the costs:

$$NPV = \$9500 - \$9345.79 = \$154.21 \text{ today}$$

The NPV is positive, so the investment is a good deal. It is equivalent to getting a cash discount today of $154.21, and only paying $9345.79 today for the copier. To confirm our calculation, suppose you take the offer and invest $9345.79 in a bank paying 7% interest. With interest, this amount will grow to $9345.79 × 1.07 = $10,000 in one year, which you can use to pay for the copier.

Note: Here we calculate the PV using the risk-free interest rate. Why?

Example 2

Problem

Suppose you started a Web site hosting business and then decided to return to school. Now that you are back in school, you are considering selling the business within the next year. An investor has offered to buy the business for $200,000 whenever you are ready. If the interest rate is 10%, which of the following three alternatives is the best choice?

1. Sell the business now.
2. Scale back the business and continue running it while you are in school for one more year, and then sell the business (requiring you to spend $30,000 on expenses now, but generating $50,000 in profit at the end of the year).
3. Hire someone to manage the business while you are in school for one more year, and then sell the business (requiring you to spend $50,000 on expenses now, but generating $100,000 in profit at the end of the year).

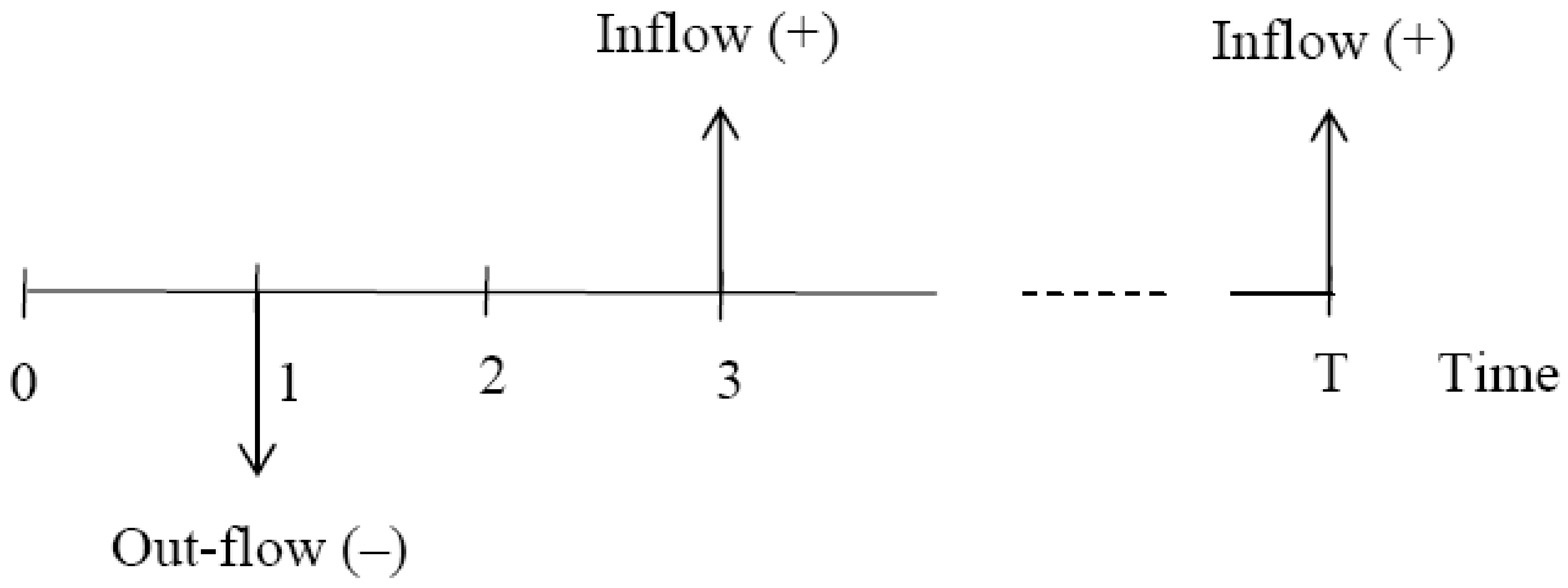
Example 2

	Today	In One Year	NPV
Sell Now	\$200,000	0	\$200,000
Scale Back Operations	−\$30,000	\$50,000 \$200,000	$-\$30{,}000 + \dfrac{\$250{,}000}{1.10} = \$197{,}273$
Hire a Manager	−\$50,000	\$100,000 \$200,000	$-\$50{,}000 + \dfrac{\$300{,}000}{1.10} = \$222{,}727$

Question: Should the interest-rate used be the risk-free interest-rate?

Cash Flow Map

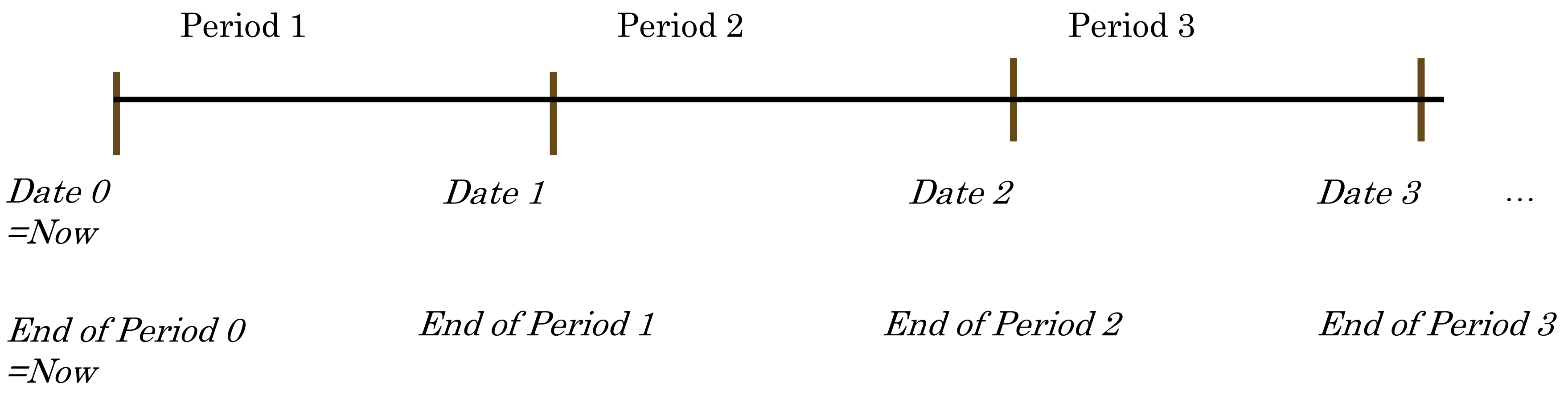
To calculate the value of a stream of cash flows, it’s very useful to first construct a **cash-flow map.** Upward arrows indicate inflows (cash received), downward arrows indicate outflows (cash paid)



Remark: time conventions

Two conventions can be used to refer to time:

- Cash flows occur on exact dates
- Cash flows occur during an interval (period). Unless specifically stated, we assume the cash flows occur at the end of the period (year, month, week, day…).



More importantly: interest rate conventions

Financial institutions quote rates according to certain conventions that differ across markets and across financial products. In many cases, these conventions imply that the rate quoted is **not** the effective rate that the client will receive or pay.

Example: If you invest \$50 at 12% per year compounded semi-annually, your investment will grow to $\$50\times(1+\frac{0.12}{2})=\$53$ after 6 months and $\$50\times(1+\frac{0.12}{2})^2=\$56.18$ at the end of the year. If the investment is for 3 years, then in 3 years it grows to $\$50\times(1+\frac{0.12}{2})^{2\times 3}=\$70.93$.

What if it is compounded quarterly?

Interest rate conventions (cont'd)

Compounding an investment *m* times a year for *T* years provides future value of wealth:

$$FV = C_0\left(1 + \frac{r}{m}\right)^{m \times T}$$

where C_0 is the initial investment and r is the **stated <u>annual</u> interest rate**.

There is a convention to state interest rates on an annual basis. The stated annual interest rate is the annual interest rate without consideration of the compounding.

It's sometimes called **annual percentage rate**.

Interest rate conventions (cont'd)

What is the **Effective Annual Rate of interest** *(EAR)* on the investment in previous example?

$$FV = C_0\left(1+\frac{r}{m}\right)^{m\times T} = C_0(1+EAR)^T$$

$$EAR = \left(1+\frac{r}{m}\right)^{m} - 1.$$

The EAR is the interest rate as if it were compounded once per year period rather than several times per year.

Keyword:
effective annual rate of interest

Interest rate conventions (cont'd)

Typical numbers for *m* are

• *m* = 2	semi-annual payments
• *m* = 4	quarterly payments
• *m* = 12	monthly payments
• *m* = 250	daily payments (working days only)
• *m* = 365	daily payments

The higher *m*, the more often the compounding happens, and the bigger the difference between the stated and the effective rate.

<u>The effective rate is the one that truly matters!</u>

Interest rate conventions (cont'd)

In the limiting case when *m* goes to infinity, i.e., compounding happens every infinitesimal instant, it is called **continuous compounding.**

The limit of $C_0\left(1+\frac{r}{m}\right)^{m\times T}$ when *m* goes to infinity is $C_0 e^{rT}$.

e is the exponential number, approximately equal to 2.718. e^x *is a key on your calculator.*

Future value – General formula

The general formula for the future value of an investment compounded continuously over many periods is written as:

$$FV = C_0 \times e^{rT}$$

Where

- C_0 is a cash flow at date 0,
- r is the stated annual interest rate, and
- T is the number of periods over which the cash is invested

Example

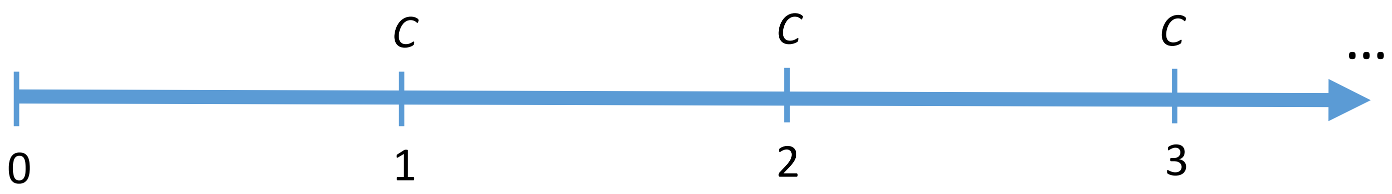
Suppose you are investing $1,000 at a continuously compounded annual rate of 5% for 5 years, what is the value of your investment at the end of 5 years?

Next step: consider different types of contracts and calculate their present value.

Note: Make sure you also know how to calculate their future value at some future date.

Annuities and perpetuities

- **Perpetuity**: a constant stream of cash flows that starts next period and lasts forever.



$$PV = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} + \cdots = \ ?$$

Keyword: perpetuity

Two useful formulas

Geometrical series:

$$a + aq + aq^2 + aq^3 + \cdots aq^n = a(1 + q + q^2 + \cdots + q^n) = a\,\frac{1-q^{n+1}}{1-q}$$

Note: When $|q| < 1$ *and n goes to infinity,* $q^{n+1} \rightarrow 0$, *hence*

$$a + aq + aq^2 + aq^3 + \cdots = \frac{a}{1-q}$$

Note: Important formulas.

Present Value of Perpetuity

Back to calculating the Present Value of a perpetuity:

$$PV = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} + \cdots$$

$$a = \frac{C}{1+r}, q = \frac{1}{1+r}$$

$$PV = \frac{\frac{C}{1+r}}{1-\frac{1}{1+r}} - C = \frac{C(1+r)}{(1+r)r} = \frac{C}{r}$$

C increases → The holder receives higher coupons
→ The perpetuity is worth more.
r increases → The holder would rather have the cash now than in the future, to earn interest on it
→ The perpetuity is worth less.

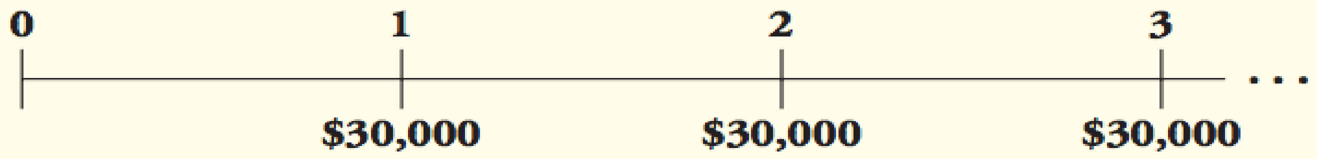
Examples of perpetuity

Problem

You want to endow an annual MBA graduation party at your alma mater. You want the event to be a memorable one, so you budget $30,000 per year forever for the party. If the university earns 8% per year on its investments, and if the first party is in one year's time, how much will you need to donate to endow the party?

Solution

The timeline of the cash flows you want to provide is



This is a standard perpetuity of $30,000 per year. The funding you would need to give the university in perpetuity is the present value of this cash flow stream. From the formula,

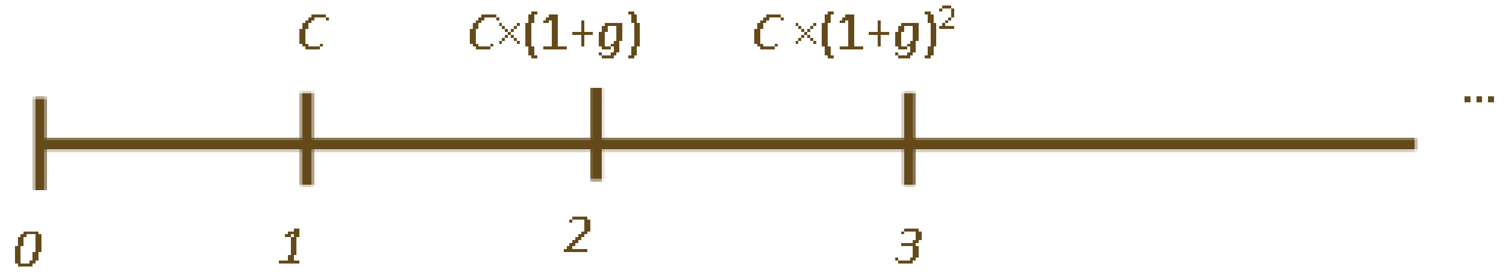
$$PV = C/r = \$30{,}000/0.08 = \$375{,}000 \text{ today}$$

If you donate $375,000 today, and if the university invests it at 8% per year forever, then the MBAs will have $30,000 every year for their graduation party.

Annuities and perpetuities

- **Growing perpetuity**: a stream of cash flows that grows at a constant rate forever after the first date.

Keyword: Growing perpetuity



$g = 0 \rightarrow$ Back to the case of a standard perpetuity.

$$a = \frac{C}{1+r},\ q = \frac{1+g}{1+r}$$

g increases
→ The holder will receive more cash
→ The growing perpetuity is worth more.

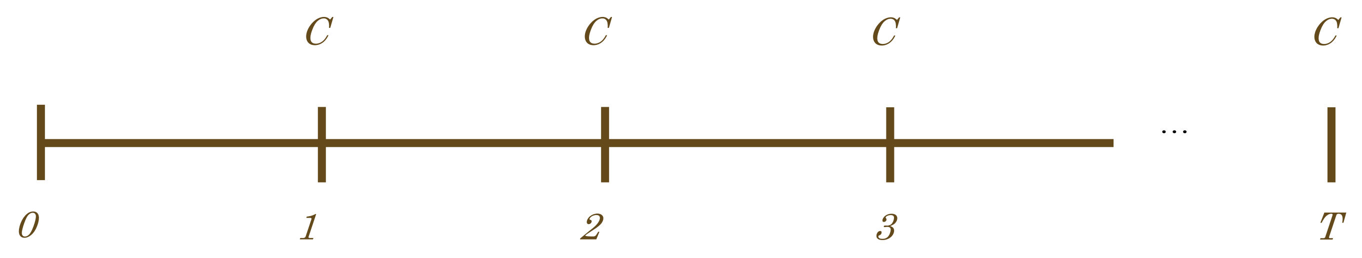
$$PV = \frac{C}{1+r} + \frac{C(1+g)}{(1+r)^2} + \frac{C(1+g)^2}{(1+r)^3} + \cdots = \frac{C}{r-g}$$

Example – Growing perpetuity

Exercise: The expected dividend next year is \$1.30 and dividends are expected to grow at 5% forever. If the discount rate is 10%, what is the present value of this dividend stream?

Annuities and perpetuities

- **Annuity**: a stream of constant cash flows that starts next period and lasts for a fixed number of periods.



Keyword: Annuity

Remember $a + aq + aq^2 + aq^3 + \cdots aq^n = a\frac{1-q^{n+1}}{1-q}$

$$a = \frac{C}{1+r},\ q = \frac{1}{1+r},\ T = n+1$$

$$PV = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} + \cdots \frac{C}{(1+r)^n} = C\underbrace{\left[\frac{1}{r} - \frac{1}{r(1+r)^T}\right]}_{\text{Annuity factor}}.$$

Annuity

- Defined benefit pensions and Social Security are two examples of lifetime guaranteed annuities that pay retirees a steady cash flow until they pass

- An annuity is valued as the difference between two perpetuities: one perpetuity that starts at time *1,* less a perpetuity that starts at time *T* + *1.*

Exercises - Annuity

- *Exercise 1:* If you can afford a \$400 monthly car payment for 3 years, starting in a month, how much can you afford to buy a car if annual interest rates are 7%, monthly compounded, on 3-year loans?
  - Cash flow map?
  - Monthly interest rates?

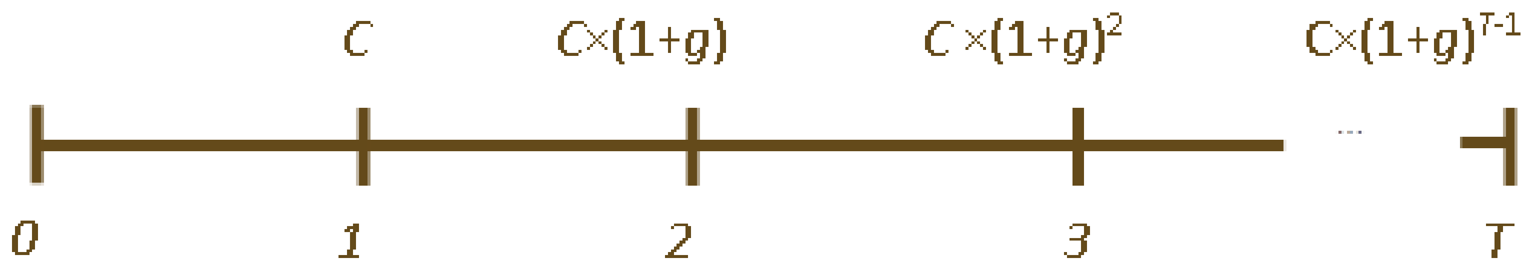
- *Exercise 2:* You will receive an annuity of \$300 once every two years. The annuity stretches out over 10 years. The first payment occurs today. The annual interest rate is 5%. What is the present value of this contract?
  - 2-year interest rate?
  - Don't forget the upfront money!

Always watch out when the payments start before applying the formulas! You may need to adjust them.

Annuities and perpetuities

- **Growing annuity**: a stream of cash flows that grows at a constant rate for a fixed number of periods.

Keyword: Growing annuity



- $PV = \frac{C}{1+r} + \frac{C(1+g)}{(1+r)^2} + \cdots \frac{C(1+g)^{T-1}}{(1+r)^T} = \frac{C}{r-g}\left[1 - \left(\frac{1+g}{1+r}\right)^T\right]$

g=0 → back to a standard annuity

Security Valuation – General principles

Arbitrage

- The practice of buying and selling equivalent goods in different markets to take advantage of a price difference is known as ***arbitrage***.
  $\rightarrow Example?$

- More generally, we refer to any situation in which it is possible to make a profit without taking any risk or making any investment as an ***arbitrage opportunity***.
  $\rightarrow Idea\text{: } Make\ money\ out\ of\ nothing.$

Keyword:
Arbitrage / arbitrage opportunity

Law of one price

If equivalent investment opportunities trade simultaneously in different competitive markets, then they must trade for the same price in both markets.

We can use the Law of One Price to value a security if we can find another equivalent investment whose price is already known.

No-Arbitrage and Security Price

Example: Consider a simple security that promises a one-time payment to its owner of $1000 in one year. Suppose there is no risk that the payment will not be made. If the risk-free rate is 5%, what can we conclude about the price of this security?

- To answer this question, consider an alternative investment: suppose we invest money at the bank at the risk-free rate. How much do we need to invest today to receive $1000 in one year? *PV = 1000/1.05 = 952.38.*

- Now we have two ways to receive the same cash flow: (1) buy the above security or (2) invest $952.38 at the 5% risk-free rate in the bank. According to the Law of One Price: Price = $952.38.

No-Arbitrage and Security Price

The Law of One Price is based on the possibility of arbitrage. Suppose the above security trades for a price of $940. How can we profit in this situation?

	Today ($)	In One Year ($)
Buy the bond	−940.00	+1000.00
Borrow from the bank	+952.38	−1000.00
Net cash flow	+12.38	0.00

No-Arbitrage and Security Price

Now suppose the security price is $960. What should we do?

	Today ($)	In One Year ($)
Sell the bond	+960.00	−1000.00
Invest at the bank	−952.38	+1000.00
Net cash flow	+7.62	0.00

Exercise

Problem

Consider a security that pays its owner \$100 today and \$100 in one year, without any risk. Suppose the risk-free interest rate is 10%. What is the no-arbitrage price of the security today (before the first \$100 is paid)? If the security is trading for \$195, what arbitrage opportunity is available?

Solution

We need to compute the present value of the security's cash flows. In this case there are two cash flows: \$100 today, which is already in present value terms, and \$100 in one year. The present value of the second cash flow is

$$\$100 \text{ in one year} \div (1.10 \text{ \$ in one year/\$ today}) = \$90.91 \text{ today}$$

Therefore, the total present value of the cash flows is \$100 + \$90.91 = \$190.91 today, which is the no-arbitrage price of the security.

If the security is trading for \$195, we can exploit its overpricing by selling it for \$195. We can then use \$100 of the sale proceeds to replace the \$100 we would have received from the security today and invest \$90.91 of the sale proceeds at 10% to replace the \$100 we would have received in one year. The remaining \$195 − \$100 − \$90.91 = \$4.09 is an arbitrage profit.

An Old Joke

There is an old joke that many finance professors enjoy telling their students. It goes like this:

> *A finance professor and a student are walking down a street. The student notices a $100 bill lying on the pavement and leans down to pick it up. The finance professor immediately intervenes and says, "Don't bother; there is no free lunch. If that were a real $100 bill lying there, somebody would already have picked it up!"*

This joke invariably generates much laughter because it makes fun of the principle of no arbitrage in competitive markets. But once the laughter dies down, the professor then asks whether anyone has ever *actually* found a real $100 bill lying on the pavement. The ensuing silence is the real lesson behind the joke.

This joke sums up the point of focusing on markets in which no arbitrage opportunities exist. Free $100 bills lying on the pavement, like arbitrage opportunities, are extremely rare for two reasons: (1) Because $100 is a large amount of money, people are especially careful not to lose it, and (2) in the rare event when someone does inadvertently drop $100, the likelihood of your finding it before someone else does is extremely small.

No-Arbitrage Price of a Security

How to value securities? ■

No-Arbitrage Price of a Security:

Price(Security) = PV of all cash flows to be paid.

To value a security, we need to:

- Estimate future cash flows: Size (how much) and Timing (when).
- Discount future cash flows at an appropriate ***effective*** rate: The rate should be appropriate to the risk of the cash flow presented by the security. It is investors' required rate of return.

Conclusion

At this stage you should know:

- What the main goals of corporate finance are.
- How to discount and compound cash flows.
- How to calculate the Net Present Value of a stream of cash flows.
- The definitions of an annuity and perpetuity, and how to value them.

Videos to watch for next week:

- Bond valuation
- Stock valuation