Summary Fundamentals of Corporate Finance complete

Corporate Finance (Radboud Universiteit Nijmegen)

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chapter one: introduction to Corporate Finance

1.1. Corporate Finance and the Financial Manager

What is Corporate Finance? Three main questions need to be answered.

1. What long-term investments should you make? That is, what lines of business will you be in, and what sorts of building, machinery and equipment will you need?
2. Where will you get the long-term financing to pay for your investment? Will you bring in other owners, or will you borrow the money?
3. How will you manage your everyday financial activities, such as collecting from customers and paying suppliers?

Corporate Finance is the study of ways to answer these three questions.

The Financial Manager

A striking feature of large corporations is that the owners (the shareholders) are not usually directly involved in making business decisions, particularly on day-to-day business. →Managers are hired to represent the owner's interests and make decisions on their behalf.
→In large corporation the financial manager would be in charge of answering the three questions.

The financial management function is usually associated with a top officer of the firm, such as a finance director (FD) or chief financial officer (CFO). →Coordinates the activities of the treasurer and the controller.
→***Controller:*** handles cost and financial accounting, tax payments, and management information systems.
→***Treasurer:*** responsible for managing the firm's cash and credit, its financial planning and its capital expenditures.
→***Finance function:*** is related to the three general questions above.
→**Accounting function:** takes all the financial information and data that arises as a result of ongoing business activities, and presents this in ways that allow management to assess the performance and risk of their firms (financial accounting) and make informed decisions on further corporate activity (management accounting). →For comparable information, generally accepted accounting standards.

Financial Management Decisions

Capital budgeting: the process of planning and managing a firm's long term investments (so related to question 1). The financial manager tries to identify investment opportunities that are worth more to the firm that they cost to acquire (value of the cash flow generated by an asset exceeds the cost of the asset). They types of investment opportunity that would typically be considered depend in part on the nature of the firm's business. Financial management must always not only be concerned with how much cash they expect to receive, but also with when they expect to receive it, and how likely they are to receive it. →Size, timing, risk of future cash flows evaluation is the essence of capital budgeting.

Capital Structure: the mixture of long-term debt and equity maintained by a firm (second question: ways in which the firm obtains and manages the long-term financing it need to support its long-term investments). *Equity*: the amount of money raised by the firm that comes from the owners' investment.

Long-term debt: long-term borrowing by the firm (longer than one year) to finance its long-term investments.
→Two concerns in this area:

1. How much should the firm borrow, so which mixture of debt and equity is best? This choice will affect both risk and the value of the firm.
2. What are the least expensive sources of funds for the firm?

→Pie and shareholders and creditors from percentage of the cash flow.
→Firms have great flexibility in choosing a financial structure. *Which one is best (*main question*)?*
→Besides deciding on the financing mix, the financial manager has to decide exactly how and where to raise the money. →Expenses associated with long-term financing can be considerable, and corporations borrow money from a variety of lenders in a number of different (sometimes exotic) ways. Choosing among lenders and loan types is another hob handled by the financial manager.

Working Capital Management
Working Capital: a firm's short term assets and liabilities.
→Concerned with the third question. Managing working capital is a day-to-day activity which ensures that the firm has sufficient resources to continue its operations and avoid costly interruptions. This involves a number of activities related to the firm's receipt and disbursement of cash.
→Some questions about working capital that need to be answered:

1. How much cash (having too much cash on hand is also a waste) and inventory should we keep on hand?
2. Should we sell on credit? If so, what terms will we offer, and to whom will we extend them?
3. How will we obtain any needed short-term financing? Will we purchase on credit, or will we borrow in the short term and pay cash? If we borrow in the short term, how and where should we do it?

Conclusion: the three areas of corporate financial management we have described – capital budgeting, capital structure, and working capital management- are very broad categories. Each includes a rich variety of topics.

<u>1.2. The goal of Financial Management</u>
To make money or add value for the owners (for profit making companies).

Possible financial goals:

1. Survive
2. Avoid financial distress and bankruptcy
3. Beat the competition
4. Maximize sales or market share
5. Minimize costs
6. Maximize profits
7. Maintain steady earnings growth.

→Each of these possibilities presents problems as a goal for the financial manger because the actions have to be in the shareholders' best interests.
→Maximize profit most often used, best on 'long-run' or 'average' profits, even though it may be still unclear what this means.
→Goals tend to fall in two classes:

1. Relating to profitability: sales, market share, cost control.
2. Involving bankruptcy avoidance, stability and safety, relate in some way to controlling risk.
   →These two types f goals are somewhat contradictory, a goal that encompasses both is thus needed.

The goal of financial management
The financial manager in a corporation makes decisions for the shareholders of the firm. We thus need to answer a more fundamental question than listing possible goals: from the shareholder's point of view, what is a good financial management decision? →Good decisions increase the value of the equity and vice versa.

→So, acting in the shareholder's best interest. Goal: maximize the **current** value per share of the existing equity. →Avoids the problems stated earlier because there is no ambiguity or difference between long-term and short-term issues.
→Shareholders are the last ones in getting money, so when they are winning, everybody is winning.
→***Corporate finance:*** the study of the relationship between business decisions and the value of the equity in the business.

A more general goal
:Maximize the market value of the existing owner's equity. →apply for nearly every forms of business.
The financial manager best serves the owners of the business by identifying goods and services hat add value to the firm because they are desired and valued in the free market place (and not un-ethical or illegal).

1.3. Financial market and the corporation
Even if the firm is not traded at the stock exchange, the stock market is important because it can inform management of the performance of their competitors, suppliers, customers and the economy as a whole. The primarily advantage of financial markets is that they facilitate the flow of money from those that have surplus cash to those that need financing.

Cash flows to and from the firm
See figure 1.2 to see the passage of cash from the financial markets to the firm, and from the firm back to the financial markets.
→also, 'your' money plays a role here because the financial institutions invest in the financial markets.
→The difference between what financial institutions earn in the financial markets and what they have to pay you (in terms of monthly interest, random insurance payouts, and pensions) is their profit.
→Financial market brings as every market buyers and sellers together. Here it are debt and equity securities that are bought and sold, and the markets differ in detail. The most important differences concern the types of security that are traded, how trading is conducted, and who the buyers and sellers are.

Primary versus secondary markets
Primary market: the original sale of securities by governments and corporations.
Secondary markets: those markets in which these securities are bought and sold after the original sale.
→Equities are issued solely by corporations. Debt securities are issued by both government and corporations.

Primary market: the corporation is the seller, and the transaction raises money for the corporation.
→Two types of primary market transactions:
1. Public offering and private placements, involves selling securities to the general public
2. Private placement is a negotiated sale involving a specific buyer.

→By law, public offerings of debt and equity must be registered with the securities regulator in the country where the offerings are made. Registration requires the firm to disclose a great deal of information before selling any securities. The accounting, legal and selling costs of public can be considerable.
→Partly to avoid the various regulatory requirements and the expense of public offerings, debt and equity are often sold privately to large financial institutions such as life insurance companies of mutual funds. Such private placements do not normally have to be registered with securities regulators, and do not require the involvement of underwriters (investment banks that specialize in selling securities to the public).

Secondary market: involves one owner or creditor selling to another. Therefore the secondary markets provide the means for the transferring ownership of corporate securities. Although a corporation is directly involved only in a primary market transaction (when it sells securities to raise cash), the secondary markets are still critical to large corporations. The reason is that investors are much more willing to purchase securities in a primary market transaction when they know that those securities can later be resold if desired.

Dealer versus auction markets →in secondary markets
Dealers buy and sell for themselves, at their own risk. →in tegenstelling tot brokers and agents.
→Dealer markets in equities and long-term debt are called over-the-counter (OTC) markets. Most trading in debt securities takes place over the counter. But now electronically.
→Auction markets differ from dealer markets in two ways:

1. An auction market (or exchange) has a psychical location.
2. Try to match those who wish to sell with those who wish to by, dealers play a limited role.

Trading in corporate securities
The equity shares of most large European firms trade in organized auction markets.

Listing
Securities that trade on an organized exchange are said to be listed on that exchange. To be listed, firms must meet certain minimum criteria concerning, for example, asset size and number of shareholders. These criteria differ from one exchange to another. London rather easy.

Chapter two: Corporate Finance

Corporate Finance is concerned with how firms manage themselves, and the way in which this performance is monitored when shareholders hire professional mangers to run their company, it is important to ensure that business decisions are made that maximize the wealth of shareholders, and not the personal wealth of the managers.

Forms of Business Organization
Large European firms are almost all organized as corporations. There are three legal forms of business organization, which all have distinct advantages and disadvantages for the life of the business, the ability of the business to raise cash, and how it is taxed. A key observation is that when a firm grows, the advantages of the corporate form may come to outweigh the disadvantages.

Sole Proprietorship
This is a business owned by one person. This is the simples type of business to start, and is the least regulated form of organization. For this reason, there are substantially more sole proprietorships than any other type of business, and many large organizations have started as a sole proprietorship.
→The owner keeps all the profits, but ahs unlimited liability (outside the business' assets to personal).
→There is no distinction between personal and business income, so all business income is taxed as personal income.
→Life of the business is limited to the owner's lifespan, and the amount of equity that can be raised is limited to the amount of the proprietor's personal wealth. This often disables new opportunities because of insufficient capital.
→Ownership may be difficult to transfer because this transfer requires the sale of the entire company to a new owner.
→These companies are often called *micro companies* (between one and 9 employees).

Partnership
Is similar to a proprietorship except that there are two more owners (partners).
→In a *general partnership*, all the partners share in gains or losses, and all have unlimited liability for all partnership debts (so not just some particular share). The way partnerships gains (losses) are divided is described in the ***partnership agreement*** (can be both formal or informal).
→In a *limited partnership*, one or more *general* partners will run the business and have unlimited liability, but there will be more *limited partners*, who will not actively participate in the business. A limited partner's liability for the business debts is limited to the amount that the partner contributes to the partnership.
→this type is common in law and accounting firms.
→The advantages and disadvantages are basically the same as those for a sole proprietorship.

→Partnerships bases on a relative informal agreement are easy and inexpensive to form.
→Selling out.
→All income is taxed as personal income, and the amount of equity is shared wealth.
→Ownership of a general partnership is not easily transferred because a transfer requires that a new partnership is formed. A limited partner's interest can be sold without dissolving the partnerships, but it may be difficult to find a buyer.

→Because every partner in a general partnership is headily responsible for all partnership's debts, it is very important to have a written agreement.
→Also, if you are limited partner, you must not become deeply involved in business decisions unless you are willing to assume the obligations of a general partner (and so seen as this).
→See page 16 for UK and Germany.
→The primary disadvantages of a sole proprietorship and a partnership are:

1. Unlimited liability for business debts on the part of owners.
2. Limited life of the business.
3. Difficulty of transferring ownership.
4. The ability of such business to grow can be seriously limited by an inability to raise cash for investment.

Corporation

Is a business created as a distinct legal entity composed of one or more individuals or entities. It is in size the most important form of business organization.
→It is a legal person, and so distinct from its owners, and has its own rights, duties and privileges. →A corporation can even be a general or limited partner in a partnership, and can own equity in another corporation.
→Starting a corporation is more complicated than starting the previous two. It involves preparing *articles of incorporation* (or a charter), and a *memorandum of association*. The articles of incorporation must cotain a number of things, including the corporation's name, its intended life (which can be forever), its business purpose, and the number of shares that can be issued. This normally has to be supplied to the country of origin. For most legal purposes the corporation is a 'resident' of that country.
→The memorandum consists of rules describing how the corporation regulates its existence, e.g. the election of directors. The memorandum may be amended or extended from time to time by the shareholders.
→In large corporations, the shareholders and managers are usually separate groups. In Europe, there are two main ways in which directors of a company are elected:

-In single-tier board countries (e.g. UK) the shareholders elect the board of directors, who then select the board of directors.
-In two-tier board countries (The Netherlands), there are two boards. The executive board manages the day-to-day operations of the company, and they report to the supervisory board who monitors their performance. The supervisory board will normally consist of representatives of major shareholders, creditors and employee groups.
→In both systems, managers are charged with the running of the corporation because they elect the directors either directly or through a supervisory board.

→Several advantages due to the separation of ownership and management:

1. Ownership (represented by shares of equity can be readily transferred
2. Life of the corporation is not limited
3. The company borrows money in its own name→so, limited liability (own investment).
4. The three points above make this form the best form for raising cash.

→Disadvantages:

1. It must pay taxes because it is a legal person, and money paid to shareholders in the form of dividend is taxed again as income to the shareholders. This is *double taxation*. Thus, taxation at the corporate and personal level.

→Corporations are also called joint stock companies, public limited companies or limited liability company.

<u>The agency problem and control of the corporation</u>

The dispersion of ownership over many shareholders means that management must effectively control the firm, so is management not acting at its own expense? (this occurs particularly in US, UK and Ireland)
→In many European firms, there is one dominant shareholder with a very large ownership stake. Primarily, these shareholders are family groups, banks, or governments. In this firms, it is possible that corporate

objectives will be directed by only one individual or group at the expense of the other smaller ones. In this case, managers are acting in the interest of only a subset of the company's owners.
→These problems stated above are agency problems.

Type 1 agency problems

This is the possibility of conflict of interest between the shareholders and management of a firm. Such a relationship exists whenever someone (the principal) hires another (the agent) to represent his interests.

Management goals

An agency problem can occur e.g. when considering a new, risky investment. The management won't invest because of the possibility of losing jobs, while the shareholders will invest for the rising share value.
The term ***agency cost*** refers to the cost of the conflict of interest between shareholders and management (or later the conflict between majority and minority shareholders). These costs can be direct or indirect. An ***indirect*** cost is a lost opportunity. ***Direct*** agency cost comes in two forms:

1. A corporate expenditure that benefits management, but costs the shareholder (e.g. expensive expenses).
2. An expense that comes from the need to monitor management actions, e.g. paying outside auditors.

→It is sometimes argued that managers would tend to maximize the amount of resources over which they have control or corporate power or wealth. E.g. overpayment that does not benefit the shareholders.
→Management may tend to overemphasize organizational survival to protect job security. Also, management may dislike outside interference, so independence and corporate self-sufficiency may be important goals.

Do managers act in the shareholders' interest?

This depends on two factors:

1. How closely are management goals aligned with shareholder goals? Relates to the way in which managers are compensated.
2. Can managers be replaced if they do not pursue shareholders goals? This relates to control of the firm.

→But there are a number of reasons to act in the interest of shareholders, even in big firms.

Managerial compensation

Management will frequently have a significant incentive to increase share value, for two reasons:

1. Managerial compensation, particularly at the top, is usually tied to financial performance in general, and often to share value in particular. For example, managers (and other employees) are frequently given the option to buy equity at a bargain price. The more equity is worth, the more valuable this option is. In this way, employees get a significant stake in its share price, and achieving a better alignment of employee and shareholder interests.
2. The second incentive managers have relates to job prospects. Better performers within the firm will tend to get promoted. More generally, managers who are successful in pursuing shareholder goals will be in greater demand in the labor market, and thus command higher salaries.

Control of the firm

Control of the firm ultimately rests with shareholders. They elect the board of directors, who in turn hire and fire managers.

Shareholder rights

The conceptual structure of the corporation assumes that shareholders elect directors, who in turn hire managers to carry out their directives. Shareholders therefore control the corporation through the right to elect the directors. In countries with single-tier boards, only shareholders have this right, and in two-tier countries the supervisory board undertakes this task.

→In the two-tier board systems, the supervisory board (which consists of the main shareholder representatives, major creditors, and employee representatives) chooses the executive the board of directors.
→In single-tier companies, boards directors are elected each year at an annual meeting. Although there are exceptions, the general idea is that 'one share, one vote'. Directors are elected at an annual shareholders' meeting by a vote of the holders of a majority f shares who are present and entitled to vote. But there are differences, the most important difference is between cumulatively and straight voting.
→***Cumulative voting:*** a procedure in which a shareholder may cast all votes for one member of the board of directors. The effect is to permit minority participation. The total number of votes that each shareholder may cast is determined first. This is usually calculated as the number of shares (owned or controlled) multiplied by the number of directors to be elected. All the directors are elected at once. In general, if there are N directors up for election then $\frac{1}{N+1}$ per cent of the shares plus one share will guarantee your seat. So, the more seats that are up for election at one time, the easier (and cheaper) it is to win one.
→***Straight voting:*** a procedure in which a shareholder may cast all votes for each member of the board of directors. The directors are elected one at time. The only way to guarantee a seat is to own 50% plus one share. This also guarantees that you will win every seat, and freezes out minority shareholders. That is why many companies have mandatory cumulative voting, devices have been worked out here to minimize its impact.
→A device to minimize its impact is: stagger the voting for the board of directors. Only a fraction of the directorships are then up for election at a particular time. It has two basic effects:

1. Staggering makes it more difficult for a minority to elect a director when there is cumulative voting because there are fewer directors to be elected at one time.
2. Staggering makes takeover attempts less likely to be successful because it makes it more difficult to vote in a majority of new directors.

→Staggering may serve a beneficial purpose, it provides 'institutional memory': continuity n the board of directors. This may be important for corporations with significant long-range plans and projects.

→***Proxy voting:*** a grant of authority by a shareholder allowing another individual to vote his shares. For convenience, much of the voting in large corporations is done in this way. In single-tier board environments, shareholders can come to the annual meeting and vote in person, or they can transfer their right to vote to another party. Management always tries to get as many proxies as possible transferred to it. However, if shareholders are not satisfied with management, an 'outside' group of shareholders can try to obtain votes via proxy. They can vote by proxy to in an attempt to replace management by electing enough directors. This resulting battle is called a ***proxy fight***.

→Some firms have more than one class of ordinary equity. Often the classes are created with unequal voting rights. A primary reason for creating dual or multiple classes of equity has to do with control of the firm. If such shares exist, management of a firm can raise equity capital by issuing non-voting or limited-voting shares while maintaining control. However, it is a controversial subject.

→The value of a share in a corporation is directly related to the general rights of shareholders. In addition to the right to vote for directors, shareholders usually have the following rights:

1. The right to share proportionally in dividends paid
2. The right to share proportionally in assets remaining after liabilities have been paid in a liquidation
3. The right to vote on shareholder matters of great importance, such as a merger. Voting is usually done at the annual meeting or a special meeting
4. Shareholder sometimes (!) have the right to proportionally in any new equity sold. This is called the ***pre-emptive right***. This means that a company that wished to sell equity must first offer it to the existing shareholders before offering it to the general public. The purpose of this is to give shareholders the opportunity to protect their proportionate ownership in the corporation.

→***Dividends:*** payments by a corporation to shareholders, made in either cash or shares. The payment of dividends is at the discretion of the board of directions. Some important characteristics of dividend are:

1. Unless a dividend is declared by the board of directors of a corporation, it is not a liability of the corporation. So, they cannot become bankrupt of it. The amount of dividend and even whether it is paid are decisions based on the business judgment of the board of directors.
2. The payment of dividend by the corporation is not a business expense. It is not deductible for corporate tax purposes. In short, dividends are paid out of the corporation's after tax profits.
3. Dividends received by individual shareholders are taxable.

→There is a common belief that shareholders prefer companies to issue dividends because it imposes a form of discipline n incumbent managers. If a company has many cash, it can invest better.

Type II agency problems (between controlling stakeholders and minority)

This is the possibility of conflict of interest between controlling and minority stakeholders. Such relationships exist whenever a company has a concentrated ownership structure, which is common in many countries. The controlling shareholders then have the ability to make the firm's objectives aligned to their personal objective. E.g. a dominant shareholder may benefit more from having one of her firms trading at advantageous price with another firm she owns, this is called ***related party transaction***.

Conclusion

Shareholders control the firm and shareholder wealth maximization is the relevant goal of the corporation. Even so, there will undoubtly be times when management goals are pursued at the expense of some or all shareholders, at least temporarily.

Stakeholders

This is someone, other than a shareholder or creditor, who potentially has a claim on the cash flows of the firm. E.g. employees, customers, suppliers, government. Such groups will also attempt to exert control over the firm, perhaps to the detriment of the owners.

International corporate governance

Variations in economic, social and religious culture can lead to differences in the way that companies are run. Even inside the European Union.

Investor protection: the legal environment

The legal environment in which a corporation does business can have a big impact on its decisions. In a ***common law*** system, the law evolves a result of the judgment decisions of courts, where in a ***civil law*** systems judges interpret the law and cannot change it. The third form of legal system is based on religious principles, ***Canon law*** for Christianity, ***Halaka*** for Judaism, and ***Sharia*** for Islam. Under religious law, specific religious principles form the basis of legal decisions. This can have a considerable impact on business activity, especially when religion forbids specific activities. E.g. Islam forbids the use of interest in any economic transaction, and so financial loans are not allowed. The legal system of a country can be a hybrid form. Because the corporate environment must respond quickly to different economic events, common law systems are able to adapt faster to these changes. Courts can adapt than quickly to the change, while in civil law systems any changes in regulation must be enacted through government statute, which can take a much longer time to process.

→The inherent flexibility of common law legal environments ensures that shareholders and outside stakeholders are better protected than in civil law countries. This constraint the activities of corporate managers, and as a result they are held more accountable to shareholders. In addition, because investor protection is better in common law environments, it would be expected that raising capital through the equity markets would be more popular in these countries.

→Adherence to the rule of law and efficiency of law enforcement can have a major impact on corporate decision-making and regulatory compliance. →Corruption→ this is often more in emerging markets.

The financial system: bank-based and market-based countries

In a ***bank-based*** financial system, banks play a major role in facilitating the flow of money between investors with surplus cash and organizations that require funding. In ***market-based*** systems, financial markets take on the role of the main financial intermediary. Corporations with very well-developed financial markets prefer issuing debt and equity to the public rather than through borrowing. Countries with bank-based systems have very strong banks that actively monitor corporations and are often involved in long-term strategic decisions. See page 27 for some elaboration. Shorter term in market because of emphasis on share price and market performance. Bank based longer because of longer investment horizons and be less willing to take risks.

Ownership structure

This can affect business decision making and corporate objectives. This is the make-up an constitution of shareholdings in a firm. In environment where no single shareholder has a large ownership stake in a firm, type I agency problems dominate (this is in the UK and US). The rest of the world is characterized by closely held firms, where governments, families and banks are the main shareholders in a firm. Type II agency problems are more important in closely held firms, and their corporate governance structure reflects this.
→Corporate structure has a massive impact on corporate objectives. Whereas all shareholders wish to maximize the value of their investment, how value s assessed differs according to the individual.

→Market based: maximizing share price performance

→Families: also the descendents of the current stakeholders have to be considered. This would suggest that managers of family firms would have a longer-term perspective than other firms, which would influence the types of investment and funding they choose.

→Governments: these firms will have to consider political objectives, in addition to maximizing share value.

Bringing it all together

The basis of all good corporate finance decisions is a sound framework of corporate governance. Corporate executives are acting in the interest of the shareholders. When a company does not have strong corporate governance, it may make decisions that do not maximize share value. Transparency and timely information disclosure are major aspects of good governance. Without these, investors would find it extremely difficult to value a firm or asses risk of its operations. Share prices will be, when transparency and disclosure is not well, uninformative and risk assessment would be meaningless. Most countries have their own code of corporate governance that guides companies on how they should be governed. Largely, they are very similar, with only slight country-level differences.

Chapter 3: financial analysis and planning

The annual report

→In addition to information relating to the performance and activities of the firm over the previous year, the annual report presents three financial statements:

1. The statement of financial position, or balance sheet
2. The income statement
3. The statement of cash flows

The statement of financial position

→***Statement of financial position***: financial statement showing a firm's accounting value on a particular date.
→It is a convenient means of organizing and summarizing what the firm owns (its assets) and what the firm owes (its liabilities), and the difference between the two (its equity).

Assets: the left side

→***Non current asset***: an asset that has a relatively long life (greater than 12 months). They can be either tangible (e.g. truck/ computer) or intangible (e.g. trademark/ patent).

→A ***current asset*** has a life of less than one year. This means that he asset will convert to cash within 12 months (e.g. inventory, cash, trade receivables).

Liabilities and owners' equity: the right side
→The firm's liabilities are the first thing listed on the right side of the balance sheet.
→***Current liabilities***: have a life less than one year, e.g. trade payables.
→***Non current liabilities***: debts that are not due in the coming year. E.g. bonds.

Chapter four: Introduction to valuation: the time value of money

Time value of money refers in the most general sense to the fact that the euro today is worth more than an euro promised at some time in the future. E.g. because of missed interest ('growing money'). It thus depends on the rate you can earn by investing.

Future value and compounding
Future value (FV): the amount of money an investment will grow to over some period of time at some given interest rate.

Investing for a single period
If you invest for one period at an interest rate of *r*, your investment will grow to (x+(x*r)).

Investing in more than one period
Compounding is the process of accumulating interest on an investment over time to earn more interest.
Interest on interest: interest earned on the reinvestment of previous interest payments.
Compound interest: interest earned on both the initial principal and the interest reinvested from prior periods.
Simple interest: interest earned only on the original principal amount invested.
The four terms above show that by investing in more periods, the amount of money after interest consists of four compounds. The original principle (the original money invested), the interest of the last year, the interest of this year on the original principle, and the interest over the interest of the last year.

$$FV = x * (1 + r)^t$$

The expression $(1 + r)^t$ is sometimes called the ***future value interest factor (future value factor)***.
→The abbreviation of this is FVIF(r, t)
→See page 91 table 4.1 for a table of interest. Simple interest is the part of the interest over the original principle times the number of periods and the compound interest is total interest – simple interest or for every period the beginning amount – the original amount times the interest.
→So, the simple interest is constant over the year (linear relationship), and the amount of compound interest keeps increasing because more and more interest has been build up (progressive relationship).
→Future values depend critically on the assumed inter rated, particularly for long-lived investments. (denk aan het progressieve verband voor groei!!)

A note about compound growth
The interest rate is the rate at which your money grows, when you do not take it of the bank. You can apply this method also on other things like population growth, dividend growth etc.

Present value and discounting

The single-period case
Present value (reverse of the future value) is the current value of future cash flows discounted at the appropriate discount rate. ***Discount:*** calculate the present value of some future amount.
→$PV = \frac{€x}{1+r}$

Present values for multiple periods

→$PV = \frac{€x}{(1+r)^t}$
→The $\frac{1}{(1=r)^t}$ is often called a discount factor. And the rate used to calculate the present value of future cash flows is called the ***discount rate***. The quantity in the brackets is also called the ***present value interest factor (present value factor)*** for a € x at r per cent for t periods, and is sometimes abbreviated as PVIF(r, t).
→***Discounted cash flow (DCF) valuation:*** calculating the present value of a future cash flow to determine its value today.
→As the length of time until payment grows, present values decline. Also, for a given length of time, the higher the discount rate, the lower the present value. →Thus, present values and discount rates are inversely related. Increasing the discount rate decreases the PV and vice versa.

Present versus future value
One can also state the PV-formula in another way, which is called the ***basis present value equitation.***
→$PV = FVt * (1 + r)^{-t}$

Determining the discount rate
→***Rate of return (return)***: outcome/ input
→***The Rule of 72:*** for reasonable rates of return, the time it takes to double your money is given approximately by $\frac{72}{r\%}$ →This rule is fairly accurate for discount rates in the range 5 to 20%.

Finding the number of periods
Logarithmics!

Chapter 5: Discounted cash flow valuation

Future values of multiple cash flows
→Draw a time line to see what is happening.
→There are two different ways of calculating future values:

1. Compound the accumulated balance forward one year at a time.
2. Calculate the future value of each cash flow first and then add them up.

Present value with multiple cash flows
Also the two different ways for calculating.

A note about cash flow timing
→It is implicitly assumed that the cash flows occur at the end of each period.

Valuing level cash flows: annuities and perpetuities
An ***annuity*** (ordinary annuity form) is a level stream of cash flows for fixed period of time.

Present value for annuity cash flows
→$annuity\ present\ value = C * \left[\frac{1-present\ value\ factor}{r}\right]$
Or: $C * \left\{(1 - \frac{\left[\frac{1}{(1+r)^t}\right]}{r}\right\}$

Or: $C * \left\{\frac{1}{r} - \frac{1}{r(1+r)^t}\right\}$

→The term in parentheses on the first line is sometimes called the ***present value interest factor for annuities*** and abbreviated as PVIFA(r, t)

Future value for annuities

→$Annuitity\ FV\ factor = \frac{future\ value\ factor - 1}{r}$

Or: $\frac{(1+r)^t - 1}{r}$

Or: $\frac{(1+r)^t}{r} - \frac{1}{r}$

→This one is used when you add a certain amount of money every year and to see what you will get from it in the end.

A note about annuities due

→With an ordinary annuity, the cash flows occur at the end of each period.

→A lease (and other forms of prepay) is an example of an ***annuity due***: this is an annuity for which the cash flows occur at the beginning or the period.

Perpetuity

A ***perpetuity*** is an annuity in which the cash flows continue forever. Perpetuities are also called consoles, particularly in the UK. $Present\ value\ for\ perpetuity = \frac{C}{r}$

→Preference shares are an important example of a perpetuity.

Growing annuities and perpetuities

→The symbol g is used to represent the growth rate.

→$Growing\ annuity\ present\ value = C * \left[\frac{1 - \left(\frac{1+g}{1+r}\right)^t}{r-g}\right]$

→$Growing\ perpetuity\ present\ value = C * \left[\frac{1}{r-g}\right]$ or: $\frac{C}{r-g}$

Effective annual percentage rates and compounding

→compounded semi-annually means that you get paid (based on compounding) twice a year.

→***Nominal, stated,*** or ***quoted interest:*** the interest rate expressed in terms of the interest payment made each period.

→***Effective annual percentage rate (EAR):*** is the interest rate expressed if it were compounded ones a year. This is the actual rate you will earn.

Calculating and comparing effective annual rates

→15.5 per cent compounded quarterly means 0.155/4 = 3.865 per cent per quarter.

→The highest quoted rate is not necessarily the best.

→Compounding during the year can lead to a significant difference between the quoted rate and the effective rate.

→Calculating EARs:

1. Divide the quoted rate by the number of times that the interest is compounded.
2. Add one to the result of 1 and raise it to the power of the number of times the interest is compounded.
3. Subtract the one again.

→So, if we let m be the number of times the interest is compounded during the year, these steps can be summarized to: $EAR = \left[1 + (Quoted\ \frac{rate}{m}\right]^m - 1$

The annual percentage rate

Due to the fact of all those different ways in which interest rates can be presented, the European Union has introduced a directive in 2010 that harmonized the way in which interest rates in any credit agreement for under €75,000 are presented. This harmonized interest rate is the ***annual percentage rate (APR)***, and it expresses the total cost of borrowing or investing as a percentage interest rate.

→$PV = C0 + \sum_{i=1}^{T} Co + \frac{Ci}{(1+APR)^i}$

Taking it to the limit: a note about continuous compounding
→Limit of the EAR: $e^q - 1$ where q stands for the quoted rate.
→When you fill in a certain quoted rate, the answer is the EAR in which the money is continuously, or instantaneously, compounded.

Loan types and loan amortization
A loan can be repaid in equal instalments or in a single lump sum. There are three basic types of loan:

1. Pure discount loans
2. Interest only loans
3. Amortized loans

Pure discount loans
This is the simplest form of loan. With such a loan, the borrower receives money today, and repays a single lump sum at some time in e future.
→This form is common when the loan term is short, say a year or less, but in recent years they have become increasingly common for much longer periods.
→e.g. Treasury bills (T-bills).

Interest only loans
Interest is paid each period and to repay the entire principal (the original loan amount) at some point in the future. →When there is only one period, a pure discount loan is the same as an interest only loan.
→Most corporate bonds have this form.

Amortized loans
With this type, the lender may require the borrower to repay the parts of the loan amount over time. The process of providing for a loan to be paid off by making regular principal reduction is called ***amortizing*** the loan.
→E.g. medium term business loans use paying the interest and a certain fixed amount to be paid.
→The total payment will then decline each year
→One can make a simple *amortization schedule*. See page 129.
→The interest paid is given by the beginning balance multiplied by the interest rate.
→The beginning balance is given by the ending balance from the previous year.
→The most common way of amortizing a loan is to have the borrower make a single, fixed payment every period. Almost all consumer loans and mortgages work this way. The payments are found by:

$$€loan = C * \left\{ \frac{\left[1 - \left(\frac{1}{1.0r^t}\right)\right]}{0.0r} \right\}$$

→The interest paid declines every period.

Chapter 6: bond valuation

→Bond values depend in large part on interest rate.

Bonds and bond valuation
→When a corporation or government wishes to borrow money from the public on a long term basis, it usually does so by issuing or selling debt securities that are generically called ***bonds***.

Bond features and prices

→A bond is normally an interest-only loan, meaning that the borrower will pay the interest every period, but none of the principal will be repaid until the end of the loan.
→***Coupons:*** the stated interest payment made on a bond. The coupon constant and paid every period, thus the type of bond we are describing is sometimes called a ***level coupon bond***.
→The amount that will be repaid at the end of the loan is called the bond's ***face value (par value)***. Thus, the principal amount of a bond that is repaid at end of the term. A bond that sells for its par value is called a ***par value bond***. Government bonds frequently have much larger face values.
→The annual coupon divided by the face value is called the ***coupon rate***.
→The number of years until the face value is paid is called the bond's time to ***maturity*** : the specified date on which the principal amount of a bond is paid. A corporate bond will frequently have a maturity of 30 years when it originally issued, but this varies.

Bond values and yields
→As time passes, interest rates change in the marketplace. The cash flows from a bond, however, stay the same. →The value of the bond will thus fluctuate. →When interest rates rise, the present value of the bond's remaining cash flows declines and the bond is worth less. When interest rates fall, the bond is worth more.
→To determine the value of a bond at a particular point in time, we need to know the number of periods remaining until maturity, the face value, the coupon, and the market interest rate for bonds with similar features. The interest rate required in the market on a bond is called the bond's ***yield to maturity (yield)***. We thus can calculate the present value of the cash flows as an estimate of the bond's current market value.
→Bonds' cash flows have an annuity component (the coupons) and a lump sum (the face value paid at maturity). One has to calculate the present value for both and add them.
→"This bond, with its …% per cent coupon, is priced to yield …% per cent at € …".
→When a bond sells for less than face value, it is said to be a ***discount bond***. This is the case when the market interest rate is higher than the coupon rate. →It has a built in gain: because you pay less than the face value, but receive the face value at maturity.
→It can also be the case that a newer bond has a higher coupon. The present value of the missed coupons is equal to the discount on the bond.
→There are also bonds which are sold at a ***premium*** , when the market interest rates drops below the interest rate of the bond. Such a bond is called a ***premium bond***.
→Thus, the general expression for a bond, when it has (1) a face value of F paid at maturity, (2) a coupon of C paid per period, (3) t periods to maturity, and (4) a yield of r per period, its value is:

$$Bond\ value = \underbrace{C * \left[\left(1 - \left(\frac{\frac{1}{(1+r)^t}}{r}\right)\right)\right]}_{} + \underbrace{\frac{F}{(1+r)^t}}_{}$$

1. 2
1. Present value of the coupons
2. Present value of the face amount

→**Bond prices and interest rates always move in the opposite direction.** When interest rates rise, a bond's value, like any other present value, will decline. When interest rates fall, bond values rise.

Interest rate risk
→The risk that arises for bond owner from fluctuating interest rates is called ***interest rate risk***.
→The amount of interest rate risk depends on how sensitive its price is to interest rate changes. This sensitivity depends on two things:

1. The time to maturity. (The longer the time to maturity, the greater the interest rate risk)
2. The coupon rate. (The lower the coupon rate, the greater the interest rate risk)

→Interest rate risk increases at a decreasing rate.
→2. Is the case because bonds with the higher coupon have a larger cash flow early in its life, so its value is less sensitive to changes in the discount rate (the lower one depends more on the present value of the face value).

→Bonds are rarely issued with maturities longer than 30 years. However, low interest rates in recent years have led to the issuance of much longer term issues. These countries which make longer maturities evidently wanted to lock in the historically low interest rates for a long time.

Finding the yield to maturity: more trial and error

→We often want to know a bond's price, coupon rate, and maturity date, but not its yield to maturity.
→A bond's yield to maturity should not be confused with its ***current yield***, which is simply a bond's annual coupon divided by its price.

More about bond features

→Securities issued by corporations may be classified roughly as ***equity securities*** or ***debt securities***.
→The person or firm making the loan is called the ***creditor/ lender***. The corporation borrowing the money is called the ***debtor/ borrower***. From a financial point of view, the main differences between debt and equity are:

1. Debt is not an ownership interest in the firm. Creditors generally do not have voting power.
2. The corporation's payment of interest on debt is considered a cost of doing business, and is fully tax deductible. Dividends are paid to shareholders and not tax deductible.
3. Unpaid debit is a liability of the firm. If it is not paid, the creditors can legally claim the assets of the firm. This action can result in liquidation or reorganization, tow of the possible consequences of bankruptcy. Thus one of the costs of issuing debt is the possibility of financial failure. This possibility does not arise when equity is issued.

Is it debt or equity

Sometimes this becomes a legal and semantic issue: courts and tax authorities would have the final say.
→Corporations are adept at creating exotic, hybrid securities that have many features of equity but are treated as debt. Obviously, the distinction between debt and equity is important for tax purposes. →So, one reason why corporations try to create a debt security that is really equity is to obtain the tax benefits of debt and the bankruptcy benefits of equity.
→As general rule, equity represents an ownership inters and it is a residual claim. Thus, the risk and benefits associated with owning debt and equity differ.

Long term debt: the basics

→All long term debt securities are promises made by the issuing firm to pay principal when due, and to make timely interest payments on the unpaid balance. Beyond this, a number of features distinguish these securities from another:

1. The maturity of a long term debt instrument is the length of time the debt remains outstanding with some unpaid balance. Debt securities can be ***short term*** (with maturities within on e year) or ***long term*** (with maturities of more than one year). Short time debt is sometimes called ***unfunded debt***.
2. Debt securities are typically called ***notes, debentures, bonds***. Strictly speaking, a bond is a secured debt. However, in common usage, the word bond refers to all kinds of secures and unsecured debt. →Usually, the only difference between a bond and a note is the original maturity. Issues with an original maturity of 10 years or less are often called notes.
3. The two major forms of long term debts are public issue and privately placed. The main difference is that the latter is placed directly with a lender and not offered to the public. Because this is a private transaction, the specific terms are up to the parties involved.

The indenture

The ***indenture*** is the written agreement between the corporation and the lender detailing the terms of the debt issue. It is sometimes referred to as ***deed of trust***. Usually, a ***trustee*** (e.g. a bank) is appointed by the corporation to represent the bondholders. The trust company must:

1. Make sure the terms of the indenture are obeyed
2. Manage the sinking fund

3. Represent the bondholders in default, thus if the company defaults on its payments to them.

→The bond indenture is a legal document. It includes the following provisions:

1. The basic terms of the bonds
2. The total quantity of bonds issued
3. A description of property used as security
4. The repayment arrangements
5. The call provisions
6. Details of the protective covenants

Terms of a bond

→Corporate bonds usually have a face value (a ***denomination***) in multiples of 1,000. The ***principal value*** is stated on the bond certificate. The par value is of a bond is almost always the same as the face value, and the terms are used interchangeably in practice.

→Corporate bonds are usually in ***registered form*** : the form or bond issue in which the registrar of the company records ownership of each bond; payment is made directly to the owner of record. There is a register that records the ownership of each bonds and records any changes in ownership.

→A corporate bond may be registered and have attached 'coupons'. To obtain an interest payment, the owner must separate a coupon from the bond certificate and send it to the company registrar (the paying agent).

→Alternatively, the bond could be in ***bearer form*** : the form of bond issue in which the bond is issued without cord of the owner's name; payment is made to whomever holds the bond. This means that the certificate is the basis of ownership, and the corporation will pay the bearer. Ownership is not otherwise recorded, the holder of the bond certificate detaches the coupons and sends them to the company to receive payment. This has two drawbacks:

1. They are difficult to recover if they are lost or stolen
2. Due to the fact that the company does not know who owns its bonds, it cannot notify bondholders of important events.

Security

→Debt securities are classified according to the collateral and mortgages used to protect the bondholder.

→***Collateral*** is a general term that frequently means securities e.g. bonds and equities) that are pledged as security for payment of debt. An asset pledged on a debt.

→***Mortgage securities*** are secured by a mortgage on the real property of the borrower. (often real estate)

→The legal document that describes the mortgage is called a ***mortgage trust indenture (trust deed).***

→A ***blanket mortgage*** pledges all the real property owned by the company.

→Bonds often represent unsecured obligations of the company. An ***unsecured bond*** is a bond in which no specified pledge of property is made. The term ***note*** is used for an unsecured debt security, usually with a maturity under 10 years. →Unsecured bondholder have a claim only on property not otherwise pledged, thus property that remains after mortgages and collateral trust are taken into account.

→Bonds ('gilts') issued by the British government are called treasury 'stock'.

→In the UK, a debenture is a secured obligation, whereas in the US it is an unsecured obligation. Public bonds issued in Europe by industrial and financial companies are typically unsecured.

Seniority

→In general terms, ***seniority*** indicates preference in position over other lenders, and debts are sometimes labeled as ***senior*** or ***junior*** to indicate seniority. Some debt is ***subordinated***, this type of debt must give preference to other specified creditor. However, debt cannot be subordinated to equity.

Repayment

→Early repayment is in some form more typical than repay at maturity or in terms, and is often handled through a ***sinking fund***: an account managed by the bond trustee for early bond redemption, thus for repaying the bonds. The company makes annual payments to the trustee, who then uses the funds to retire

a portion of the debt. The trustee does this either by buying up some of the bonds in the market, or by calling in a fraction of the outstanding bonds.
→There are many different kinds of sinking fund arrangement, e.g.

1. Some sinking funds start about 10 years after the initial issuance.
2. Some sinking funds establish equal payments over the life of the bond
3. Some high-quality bond issues establish payments to the sinking fund that are not sufficient to redeem the entire issue. As a consequence, there is a possibility of a large 'balloon payment' at maturity.

The call provision
A ***call provision*** is an agreement giving the corporation the option to repurchase ('call') a bond at a specified price prior to maturity. Corporate bonds are usually callable.
→Generally, the call price is above the bond's stated value (the par value). The difference between the call price and the stated value is the ***call premium*** . This amount becomes smaller over time. One arrangement is initially to set the call premium equal to the annual coupon payment and then make it decline to zero as the call date moves closer to the time of maturity.
→A ***deferred call provision*** is the prohibiting the company of redeeming a bond prior to a certain date. During this period, the bond is said to be ***call protected***.
→In recent years, a new type of call provision, a 'make-whole' call , has become widespread in the corporate bond market. With such a feature, bondholders receive approximately what the bonds are worth if they are called. Bondholders so do not suffer a loss in the event of a call, they are made a whole.

Protective covenants
A ***protective covenant*** is that part of the indenture or loan agreement that limits certain actions a company might otherwise wish to take during the term of the loan. They can be classified in tow types:

2. ***Negative covenants:*** a 'thou shalt not' type. It limits or prohibits actions the company might take, e.g.
   -The firm must limit the amount of dividends it pays according to some formula
   -The firm cannot pledge any assets to other lenders
   -The firm cannot merge with another firm
   -The firm cannot sell or lease any major assets without approving of the lender
   -The firm cannot issue additional long term debt
2. ***Positive covenant:*** a 'thou shalt' type. It specifies an action the company agrees to take, or a condition the company must abide with, e.g.
   -The company must maintain its working capital at or above some specified minimum level
   -The company must periodically furnish audited financial statements to the lender
   -The firm must maintain any collateral or security in good condition.

<u>Bond ratings</u>
The three leading bond-rating firms are Moody's, Standard & Poor's, and Fitch. The debt rating are an assessment of the creditworthiness of the corporate issuer. ***Creditworthiness*** is based on how likely the firm is to default, and on the protection that creditors have in the event of a default.
→Bond rating are concerned only with the possibility of default, and so the price of a highly rated bond can still be quite volatile.
→The highest rating is AAA: such a debt is judged to be the best quality and to have the lowest degree of risk.
→A large part of corporate borrowing takes the form of low grade, or junk bonds. If these low grade corporate bonds are rated at all, they are rated below investment grade y the major rating agencies. Investment grade bonds are rated at least BBB by S&P and Fitch, and Baa by Moody's.
→A bond's credit rating can change as the issuer's financial strength improves or deteriorates.
→Bonds that drop into junk territory are called ***fallen angles***.

Determinants of credit rating

→Sovereign bonds (bonds issues by governments in local or foreign currency): political risk, economic strength, growth prospects, debt, and monetary and fiscal flexibility. See page 161 for explanation about these definitions.

→Corporate bond rating: financial risk, ability to meet debt payments, the company's debt burden, growth rate, planned and committed capital expenditures and forecast earnings, microeconomic factors(inflation, oil, the country's currency)

Some different types of bond

Government bonds

→The biggest borrowers in the world are governments.

→When a government wishes to borrow money for more than one year, it sells what are known as ***treasury notes*** and bonds to the public.

→The original maturities range from 2 to 100 years.

→Most treasury issues are just ordinary coupon bonds. Some older issues are callable, and a few have some unusual features. There are two important things to keep in mind:

1. Most government treasury issues, unlike essentially all other bonds, have no default risk because governments can always come up with the money to make the payment (even printing more money). Countries in the EMU are an exception because the ECB decides on money supply which means that individual countries in the EMY can have default risk.
2. Many treasury issues are exempt from income taxes.

→In some countries, state and local governments can also borrow money be selling notes and bonds: ***municipal notes*** (***munis***). Munis have varying degrees of default risk, and in fact they are rated much like corporate issues, and they are almost always callable.

Zero coupon bonds

A bond that makes no coupon payments and is thus initially priced at a deep discount (thus under its stated value). Also called ***pure discount bonds***.

→The total interest is: $face\ value - initial\ price$ thus the interest rate can be calculated too.'

→For tax purposes, the issuer of a zero coupon bond deducts interest every year even though no interest is actually paid. Similarly, the owner must pay taxes on interest accrued every year, even though no interest is actually received. The way in which yearly interest on a zero coupon bond is calculated is governed byte tax law existing in each country.

→Some bonds are zero coupon bonds for only part of their lives.

Floating-rating bonds

With ***floating-rate bonds (floaters)***, the coupon payments are adjustable. The adjustments are tied to an interest rate index such as the treasury bill interest rate or the 30-year treasury bond rate. The value of a floating-rate bond depends on exactly how the coupon payment adjustments are defined. In most cases, the coupon adjusts with a lag to some base rate. The majority of floaters have the following features:

1. The holder has the right to redeem the note at par on the coupon payment date after some specified amount of time. This called a ***put*** provision.
2. The coupon rate has a floor and a ceiling, meaning that the coupon is subject to a minimum and a maximum. The boundaries are sometimes called ***collars***, and the coupon rate is said to be ***capped***.

Other types of bonds

→***Catastrophe (cat bonds)*** provide an interesting example: the investors would have received a high return if not trigger event occurred, and otherwise they would lose their full investment. →They seem rather risky, but till today they seem not to be that risky.

→***Warrant***: this bond gives the buyer the right to purchase shares of equity in the company at a fixed price. This would be very valuable if the share price climbed substantially. Because of the value of this feature, bonds with warrants are often issued at a very low coupon rate.

→***Income bonds*** are similar to conventional bonds, except that coupon payments depend on company income. Specifically, coupons are paid to bondholders only if the firm's income is sufficient. Not very common.
→***Convertible bond*** can be swapped for a fixed number of shares of equity any time before maturity at the holder's option. Were relatively common.
→***Put bond*** allows the holder to force the issuer to buy back the bond at a stated price.
→***CoCo (coupon payment) and NoNo (zero coupon) bonds***: contingent convertible, puttable, callable, subordinated.

How bonds are bought and sold
→Most trading in bonds takes place over the counter (OTC), which means that there is no particular place where buying and selling occurs. Instead, dealers around the world stand ready to buy and sell. The various dealers are connected electronically.
→One reason why the bond markets are so big is that the number of bond issues far exceeds the number of equity issues. There are two reasons for this:

1. A corporation would typically have only one ordinary equity issue outstanding. However, a single large corporation easily has a dozen or more note and bond issues outstanding.
2. Governments and local borrowing is simply enormous.

→Only a fraction of the total bond issues that exist actually trade on a given day, and there is a lack of transparency in the bond market, thus it is difficult to get up-to-date prices on individual bonds, especially the ones from smaller corporations or municipally issues.

Bond price reporting
In recent years, transparency in the corporate bond market has improved dramatically, e.g. through the internet. Prices and volumes are better known. Stock exchanges provide a daily snapshot of trading the most active issues.
A note about bond price quotes
→If you buy a bond between coupon payment rates, the price you pay is usually more than the price you are quoted. The ***clean price*** is the price of a bond net of accrued interest, this is the price that is typically quoted. The ***dirty price*** is the price of a bond including accrued interest, also known as the ***full/ invoice price***. This the price a buyer actually pays.
→Accrued interest: $\frac{time\ passes\ between\ two\ coupons}{total\ time\ between\ coupons} * €next\ coupon$

Inflation and interest rates

Real versus nominal rates
→***Real rates*** are interest rates or rates of return that have been adjusted for inflation. →***Deflating*** which means removing the effect of future. →This rate reflects ***buying power***
→***Nominal rates*** have not been adjusted for inflation.

The Fisher effect
The ***Fisher effect*** is the relationship between nominal return, real returns and inflation.
→Due to the fact that investors are ultimately concerned with what they can buy with their money, they require compensation for inflation.
→R is the nominal rate and r for the real rate. h is the inflation rate.
→The relationship by Fisher is: $1 + R = (1 + r) * (1 + h)$ rewriting gives: $R = r + h + r * h$
→Thus, the nominal rate has three components:'

1. The real rate on the investment, r
2. The compensation for the decrease in the value of money originally invested because of inflation, h
3. The compensation for the fact that money earned on the investment is also worth less because of the inflation. This third component is usually small and so often dropped →$R \approx r + h$

→Financial rates, such as interest rates, discount rates and rates of return are almost always quoted in nominal terms.

Inflation and present value

→The basic principle is: either discount nominal cash flows at a nominal rate, or discount real cash flows at a real rate.

The term structure of interest rate

→***Term structure of interest rates*** is the relationship between nominal interest rates on default-free, pure discount securities and time to maturity, so showing the pure time value of money. It shows the relationship between short and long term interest rates.

→When long term rates are higher than short term, the term structure is ***upward sloping***

→When short term rates are higher, we say it is ***downward sloping***.

→The term structure can also be humped. When this occurs, it is usually because rates increase at first, but then begin to decline as we look at longer and longer term rates.

→The common shape of the term structure (particularly in common terms) is upward sloping, but the degree of steepness has varied quite a bit.

→There are three basic components which determine the shape of the term structure:

1. The real rate of interest: the compensation that investors demand for forgoing the use of their money. It can be thought of as the pure time value of money after adjusting for the effects of inflation. It is the basic component underlying every interest rate, regardless to the time to maturity. When the real rate is high, the interest rate will tend to be higher and vice versa. **Thus: the real rate does not really determine the shape of the term structure, it mostly influences the overall level of interest rates**.
2. The rate of inflation: this strongly influences the shape of the term structure. As a result of inflation, investors demand compensation for this loss in the form of higher nominal rates: ***inflation premium***. →An upward sloping term may reflect anticipated increases in inflation. Similarly, a downward sloping term structure probably reflect deflation.
3. Interest rate risk. Longer term bonds have much greater risk of loss resulting from changes in interest rates than do shorter term bonds. Investors recognize this risk, and they demand extra compensation in the form higher rates for bearing it: ***interest rate risk premium***. It increases with maturity, but because the interest rate risk increases at a decreasing rate, so does the interest rate risk premium.

Bond yields and the yield curve: putting it all together

→***Treasury yield curve***: a plot of the yields on treasury notes and bonds relative to maturity. It is almost the same thing as the term structure of interest rates. The only difference is that the term structure is based on pure discount bonds, whereas the yield curve is based on coupon bond yields.

→Treasury notes have three important features:

1. Default-free
2. Taxable
3. Highly liquid

→***Credit risk*** is the possibility to default. The ***default risk premium*** is the portion of a nominal interest rate or bond yield that represents compensation for the possibility of default.

→The lower rated bonds have higher yields.

→Bond's yield is calculated assuming that all the promised payments will be made. So, it is really a promised yield, and it may not be what you will earn.

→***Taxability premium***: the portion of a nominal interest rate or bond yield that represents compensation for unfavorable tax status.

→Bonds are having varying degrees of liquidity. Investors prefer liquid assets to illiquid ones, so they demand ***liquidity premium*** on top of all the other premiums. This is the portion of a nominal interest rate of bond yield that represents compensation for the lack of liquidity.

Conclusion:

→Bond yields represent the combined effect of six things:

1. Real rate of interest
2. Expected future inflation
3. Interest rate risk
4. Default risk
5. Taxability
6. Lack of liquidity

Chapter 7: Equity valuation

Share valuation

→Share prices are more difficult to value in practice than a bond, for at least three reasons:

1. With equity, not even the promised cash flows are known in advance.
2. The life of the investment is essentially for ever because equity has no maturity
3. There is no way to easily observe the rate of return that the market requires.

Cash flows

→Maximum amount you will pay for a share (its present value), with P_O is the current share price, P_1 the price in one period. D_1 is the cash dividend paid at the end of the period, and R the required rate of return in the market on this investment: $Po = \frac{D1+P1}{1+R}$

→But often you do not know the future price P1

→For a two period dividend: $P1 = \frac{D2+P2}{1+R}$, $Po = \frac{D1+P1}{1+R}$, $= Po = \frac{D1+\frac{D2+P2}{1+R}}{1+R} = Po = \frac{D1}{(1+R)^1} + \frac{D2}{(1+R)^2} + \frac{P2}{(1+R)^2}$

→If you add periods, you just adjust the formula above: another Dx and the P in the last period and discounted back. →But this will fall to zero if you take many periods.

→**Thus, the current price of the equity can be written as the present value of the dividends beginning in one period and extending out for ever** $P0 = \frac{D1}{1+R} + \frac{D2}{(1+R)^2} + \ etc.$

→But we do not know the number of periods, so this is often impossible, but sometimes it is possible. We will discuss this now.

Some special cases

→In a few useful special cases, we can come up with a value for the equity, we then have to make some simplifying assumptions about the pattern of future dividends.

→The three cases we consider are the following:

1. The dividend has a zero growth rate
2. The dividend grows at a constant rate
3. The dividend grows at a constant rate after some length of time.

Zero growth

→A share of equity in a company with a constant dividend is much like a preference share: $D1 = D2 = D3 = Dx = constant$ →The share price can thus be viewed as an ordinary perpetuity with a cash flow equal to D every period. The per share value is thus given by: $po = \frac{D}{R}$ where R is the required return.

Constant growth

→$Ct = Do * (1+g)^t$ →This is called the ***growing perpetuity*** : an asset with cash flows that grow at a constant rate for ever.

→As long as the growth rate g is less than the discount rate r, the present value of this series of cash flows can be written as $Po = \frac{Do*1+g}{R-g} = \frac{D1}{R-g}$ →This is the ***dividend growth model***: a model that determines the current share price.

→One can also use this at other points in time: $Pt = \frac{Dt*(1+g)}{R-g} = \frac{Dt+1}{R-g}$

→You first have to calculate the dividend paid at Dt : $Dt = x * 1.r^t$

→This model thus assumes that the share price will grow at the same constant rate as the dividend. This really isn't too surprising. What it tells us is that if the cash flow on an investment grows at a constant rate through time, so does the value of that investment.

→Present value of every growing perpetuity: $PV = \frac{C1}{R-g} = \frac{Co*(1+g)}{R-g}$

Non-constant growth

→To avoid the problem of having to forecast and discount an infinitive number of dividends, we shall require that the dividends start growing at a constant rate at some time in the future.

→You have to use the formula $Px - 1 = \frac{Dx}{R-g}$ to find the present value of the growing perpetuity and discount this with the other dividends back on the normal base.

Two stage growth

→This is a special case of non constant growth. ***Two-stage growth*** represents the idea that the dividend will grow at a rate of g_1 for t years and then grow at a rate of g_2.

→The value of equity can be written as $Po = \frac{D1}{R-g1} * \left[1 - (\frac{1+g1}{(1+R)^t}\right] + \frac{Pt}{(1+R)^t}$

→Where Pt is calculated as follows $Pt = \left(Dt + \frac{10}{R-g2}\right) = D0 * \frac{(D0*91+g1)^t*(1+g2)}{R-g2}$

→In the first stage, g may be greater than R, but in the second stage, R has to be greater.

→Competition is by far the most common reason for changes in growth rates.
→A change in dividend payout policy.
→See page 192 for another explanation about it

<u>Components of the required return</u>

→If you want to now R, a way to do this is $R = \frac{D1}{po+g}$

→This tells us that the total return R has two components.

→$\frac{D1}{P0}$ is called the ***dividend yield***: an equity's expected cash dividend by its current price. Because of this definition, it is conceptually similar to the current yield on a bond.

→g, the growth rate. We know that eh dividend growth rate is also the growth rate at which the share price grows. Thus, this growth rate can be interpreted as the ***capital gains yield***: the rate at which the value of the investment grows. $\frac{amount\ of\ groth}{initial\ price}$

<u>The price-earnings ratio</u>

→Share price/ earnings per share: $\frac{P}{E}$

→Companies with high growth opportunities will have higher P/E ratios.

→***TTM*** means 'trailing twelve months' and it says that the data (earnings and sales) should be taken from the most recent financial report from the past year.

→P/E ratios are also called ***multiples***.

<u>Some feature of ordinary and preference shares</u>

Ordinary equity features

The term ***ordinary equity*** means equity that has no special preference either in receiving dividends or in bankruptcy.

Preference share features

Preference shares differ from ordinary equity because they have preference over ordinary equity in the payment of dividends and in the distribution of assets in the event of liquidation

→***Preference*** means that the holder of the preference share must receive dividend before holders of ordinary shares are entitles to anything.
→Holders of preference shares sometimes have not voting privileges.

Stated value**:** preference shares have a stated liquidating value. The cash dividend is described as a percentage of stated value.

Cumulative and non-cumulative dividends
→Most preference shares are cumulative
→If preferred dividends are cumulative and are not paid in a particular year, they will be carried forward as an arrearage. Usually, both the accumulated and the current preferred dividends must be paid before the ordinary shareholders can receive anything.
→BUT: unpaid dividends are not debts, and they get no interest on not already paid ones.

→See page 196 at the bottom again!! Important…

The stock markets
→The most important European stock exchanges are: London Stock Exchange, Euronext and Deutsche Börse.
→A***primary*** (the market in which new securities are originally sold to investors), and ***secondary*** (the market in which previously issued securities are traded among investors).
→In the primary market, companies sell securities to raise money.

Dealers and brokers
→***Dealer***: an agent who buys and sells securities from inventory. He stands ready to sells at any time from its inventory and buys at any time. →The price the dealer is willing to pay is the ***bid price*** and the price at which the dealer will sell is called the ***ask price/ offering price***. The difference between the bid and the ask price is the ***spread***, and is the basic source of dealer profits.
→***Broker***: an agent who arranges security transactions among investors. He thus brings buyer and seller together, but does not maintain inventory. →Facilitating trades by others is their business, they do not buy or sell securities for their own goods.

Stock market reporting
→Movement to the internet.
→***Market gap*** is the number of shares outstanding multiplied by the current price per share.
→The yield is here the dividend divided by the previous day's closing share price.

Chapter 8: Net present value

In this chapter, we will deal with the capital budgeting decision.
→It does not only contain buying a non-current asset, but also questions whether to launch a new product or enter a new market or not. →Questions as these determine the nature of a firm's operations and products for years to come.
→The most fundamental decision a business must make concerns its product line. What product, markets, which new products to introduce? →All these strategic issues fall under capital budgeting. Capital budgeting can so also be named as ***strategic asset allocation.***
→The capital budgeting decision is probably the most important issue in corporate finance. →How a firm chooses to finance its operations (the ***capital structure decision***) and how a firm manages its short-term operating activities (the ***working capital question***) are certainly issues of concern, but the non-current assets define the business of the firm.

Net present value
→In chapter one, we have seen that the goal of the financial management is to create value for the shareholders. →Investments should reflect this.

→In the most general sense, we create value by identifying an investment worth more in the marketplace than it costs us to acquire by ***adding value***.
→Budgeting is identifying ahead of time whether an investment can add value and which one can add the most.
→The difference between an investment's market value and its cost is called the ***net present value (NPV)***. It is thus a measures that identifies the added value of the investment.
→Capital budgeting becomes more difficult when we cannot observe the market price for at least roughly comparable investments, we then have to use indirect market information, but this is often reality.

Estimating net present value
→***Discounted cash flow (DCF) calculation***, which is the process of valuing an investment by discounting its future cash flows, is used.
→$NPV = PV - aqcuiring\ cost$ →The outcome must be at least positive. →The amount lost or created is shared across the shares so that their value will rise or fall.
→Stated in the book: an investment should be accepted if the net present value is positive, and rejected when it is negative. But two things have to be kept in mind:

1. The rate at which you discount is very important.
2. The outcome (NPV) is an estimate, so it can be in fact higher or lower.

The payback rule
Loosely, the ***payback*** is the length in time it takes to recover our initial investment. The ***payback period*** is the amount of time required for an investment to generate cash flows sufficient to recover its initial cost.
→Based on the payback rule, an investment is acceptable if its accumulated payback period is less than some pre-specified number of years.

Disadvantages of the rule

1. Ignores the time value of money
2. Requires an arbitrary cut-off point
3. Ignores cash flows beyond the cut-off date
4. Biased against long-term project, such as R&D, and new projects.

Qualities of the rule
→Often used for making relatively minor decisions.
→Used when costs of analyzing exceed the possible loss of a mistake.
→As a practical matter, it can be said that an investment that pays back rapidly and has benefits extending beyond the cut-off point periods probably has a positive NPV.
→The *concept* of the payback rule is both intuitive and easy to understand, but is still hard to come up with the cash flows first.

1. Easy to understand
2. Adjusts for uncertainty of later cash flows (it does not take them into account after the payback point)
3. Biased towards liquidity, making money 'free' for other projects (this one is more important for small companies then for large ones).

Summary of the rule
→It is a kind of break-even measure.
→Because time value is ignored, you can think of the payback period as the length of time it takes to break even in an accounting sense, not an economic sense.
→It does not ask the right question: what is the impact of the investment on the value of equity.
→Easy to use.

The discounted payback

A ***discounted payback*** is the length of time required for an investment's discounted cash flows to equal its initial cost. →It thus solves the problem of the payback method.
→An investment is accepted if its discounted payback is less than some pre-specified number of years.
→This is the economic or financial sense, it does not only take into account when the money is received back, but also the interest we could have earned elsewhere during this period.
→If an investment ever pays back on a discounted basis, then is must have a positive NPV. →The NPV is zero when the um of the discounted cash flows equal the initial investment. →Every € after this point is a positive NPV.
→It is a compromise between the payback method and the NPV-method, but it lacks the simplicity of the first and the conceptual rigor of the second. But in the sense of taking value of money into account, it is better than the normal payback method.

Advantages

1. Includes time value of money
2. Easy to understand
3. Does not accept negative estimated NPV investments
4. Biased towards liquidity

Disadvantages

1. May reject positive NPV investments
2. Requires an arbitrary cut-off point
3. Ignores cash flows beyond the cut-off date
4. Biased against long-term projects, such as R&D and new projects

The average accounting return

:An investment's average net income divided by its average book value.

→AAR: $\frac{some\ measure\ of\ average\ accounting\ profit}{some\ measure\ of\ average\ accounting\ value}$ →$\frac{average\ net\ income}{average\ book\ value}$

→Average book value $\frac{initial\ value+residu\ value}{2}$

→Average net income $\frac{sum\ of\ the\ incomes}{number\ of\ incomes}$

→***The average accounting return rule*** states that a project is acceptable if its average accounting return exceeds a target average accounting return.

Disadvantages of the rule

1. It is not a rate of return in any meaningful economic sense. Instead, it is the ratio of two accounting numbers, and it is not comparable to the returns offered in financial markets.
   →It ignores time value of money (all the futures treated in the same way, e.g. no discounting).
2. It needs an arbitrary cut-off period. Due to the fact that the AAR is not comparable to a market return, the target AAR must somehow be specified, but there is no agreed way to do this. One way of doing this is calculating the AAR for the whole firm and using this as a benchmark.
3. (perhaps the worst) It does not look at the right things. Instead of cash flow and market value, it uses net income and book value. As a result, it does not tells us what we really want to know.

Advantages

1. It can always be computed because accounting information is almost always available.
2. Easy to calculate.

The internal rate of return

This one is the most important alternative of the NPV, the ***internal rate of return (IRR)***. Is the discount rate that makes the NPV over an investment horizon. One tries to find a single rate of return that summarizes the merits of a project, and we want this rate to be 'internal' in the sense that it depends only on the cash flows of a particular investment.

→The ***IRR rule*** states that an investment is acceptable if the IRR exceeds the required return. It should be rejected otherwise.
→One can find the break-even discount rate when the NPV is set to zero. You then find the return on investment (R). So, the IRR on an investment is the required return on investment that results in a zero NPV when it is used as the discount rate.
→The IRR is sometimes called the ***discounted cash flow return (DCF return)***.
→One can show the relationship between the NPV and the IRR on a ***net present value profile***, which has the NPV's on the y-axes and the discount rates on the x-axes.
→The IRR and the NPV rules always lead to the same decisions as long as two important conditions are met:

1. The project's cash flows must be ***conventional***, which means that the first cash flow (the initial investment) is negative and all the others positive.
2. The project must be ***independent***, meaning that the decision to accept or reject this project does not affect the decision to accept or reject another. (this one is often not met).

→Problems can arise when one or both of these conditions are not met.

Problems with the IRR

Non conventional cash flows
→Then, there are two R's for which the NPV is zero, so there are ***multiple rates of return***.
→Many software packages only show the first R, while this answer is not better than the other.
→Descartes Rule of Sign states that the maximum number of IRRs that there can be is equal to the number of the number of times that the cash flows change sign form positive to negative and vice versa, but it may be less.

Mutually exclusive investments
Mutually exclusive investment decisions is a situation in which taking one investment prevents the taking of another. When two investments are not mutually exclusive, then they are ***independent***. →So, often you have to ask: which investment is the best? The answer is the one with the highest NPV, not the one with the highest return. →So, when you have mutually exclusive projects, we should not rank them based on their returns. →More generally, looking at the IRRs can be misleading because it can have a higher IRR, but can pay out slower.

Calculating the crossover rate
This is the discount rate that makes the NPVs of two projects equal.
→You can find the crossover rate by taking the difference in the cash flows and calculating the IRR using the difference, it does not make any difference which one you subtract from which.
→$NPV(A-B) = \frac{extra}{less}\, investment + \left[\frac{additional\ cash\ flow}{1+R}\right] + \left[\frac{additional\ cash\ flow}{1+R}\right] + etc$

Investing or financing
When a project has first a positive cash flow and then a negative, the IRR is a rate that you are paying, not receiving. For this reason we say that the project is has ***financing type*** cash flows, whereas the vice versa form has ***investing type*** cash flows. You should take a project with financing type cash flows only if it is an inexpensive source of financing, meaning that its IRR is lower than your required return.

Redeeming qualities of the IRR
→It fills a need that the NPV does not. In analyzing investments people like to talk about rates of return rather than cash values.
→You can estimate the IRR, but not the NPV.

1. Closely related to the NPV, often leading to identical decisions.
2. Easy to understand and communicate.

Disadvantages

1. May result in multiple answers, or not deal with non-conventional cash flows.
2. May lead to incorrect decisions in comparison of mutually exclusive investments.

The modified internal rate of return (MIRR)

Method 1: the discounting approach
The idea is here to discount all negative cash flows back to the present at the required return and add them to the initial cost, and then calculate the IRR. Because only the first modified cash flow is negative, there will only be one IRR. →The rate can be the required return or another rate.

Method 2: the reinvestment approach
We compound all cash flows (negative and positive) except the first out to the end of the project's life, and then calculate the IRR. We are thus reinvesting the cash flows, and not taking them out of the project until the very end. →The rate can be again the required return or another rate.

Method 3: the combination approach
Negative cash flows are discounted back to the present, and positive cash flows are compounded to the end of the project. →Different discounting rates can be used, but we will stick to the project's return rate.

MIRR or IRR: which is better/
MIRRs are controversial. Two 'problems' with the MIRR
1. If we have the relevant discount rate, why not calculate the NPV?
2. The MIRR depends on an externally supplied discount rate, so the answer is not really internal.
→There is generally no need to consider reinvestment of interim cash flows because it is of no matter how the cash flows are spent in the future affecting the value of today.

The profitability index
The ***profitability index (PI/ benefit cost ratio)*** is the present value of an investment's future cash flows divided by its initial cost.
→If a project has a positive NPV, the present value of the future cash flows must bigger than the initial investment. The profitability index is thus bigger than one for a positive NPV investment and less than one for a negative NPV investment.
→The profitability index measures the value created per cash unit invested. Due to this, it is often proposed as a measure of performance for government or other non-profit organizations.
→When capital is scarce, it may make sense to allocate it to the projects with the highest PIs.

Advantages
1. Closely related to the NPV, generally leading to identical decisions
2. Easy to understand and communicate
3. May be useful when available investment funds are limited.

Disadvantages
1. May lead to incorrect decisions in comparisons of mutually exclusive investments.

The practice of capital budgeting
Because these methods estimate the future, multiple measures are often used to assess if the estimated NPV is reliable.

Chapter 9: Project cash flow: a first look

Relevant cash flows

→***Incremental cash flows***: consist of any and all changes in the firm's future cash flows that are a direct consequence of taking the project.. These are the cash flows that matter because the make a change to the existing cash flows.

The stand alone principle

→The ***stand alone principle***: the assumption that evaluation of a project may be based on the project's incremental cash flows.

Sunk costs

→***Sunk costs*** are costs that have been incurred (you have already paid or you have the liability to pay) and cannot be removed, and which therefore should not be considered in an investment decision. These cost are there, no matter you choose for the project or not.

Opportunity costs

→***Opportunity costs*** are the most valuable alternative that is given a particular investment is taken.

Side effects

→***Erosion***: the cash flow of a new project that come at the expense of a firm's existing projects. Erosion is relevant only when the sales would not otherwise be lost.

Net working capital

The firm's investment in project net working capital closely resembles a loan. H firm supplies working capital at the beginning and recovers toward the end.

Financing costs

→In analyzing a proposed investment, we shall not include interest paid or any other financing costs such as dividends or principal repaid because we are interested in the cash flow generated by the assets of the project.

→Interest paid is a component of cash flow to creditors, not cash flow from assets.

Other issues

We want to measure after tax cash flows when they actually occur.

Pro forma financial statements

→***Pro forma financial statements***: financial statements projecting future year's operations.

→Needed are estimates of quantities such as unit sales, the selling price per unit, the variable cost per unit and the total fixed costs. We also need to know the total investment required, including any investment in net working capital.

→Interest is a financing expense, not a component of operating cash flow → it is thus never mentioned in the cash flows…..

Project cash flow

→The net cash flow comes from: operating activities, financing activities, and investing activities. →Thus, here only the ones from investing.

→Financing activities should be ignored because we are interested only in the cash flows from the project.

→$Project\ cash\ flow = Project\ operating\ cash\ flow - Project\ capital\ spending$

Project operating cash flow

→$Operating\ cash\ lfow = net\ income + depreciation - increase\ (+decrease) in\ net\ working\ captial$

Project net working capital and capital spending

→If the net working capital is not worked up at the end of the project's life, it is a cash inflow then.

→Thus net working capital comes back at the end with the same amount.

A closer look at net working capital

→Net working capital can also be the difference between the trade receivables and trade payables.

→Of dit nou alleen voor dit voorbeeld geldt… $Total\ cash\ flow = operating\ cash\ flow - change\ in\ NWC - capital\ spending$

→$Cash\ flow = operating\ cash\ flow - change\ in\ NWC$

Depreciation

→Depreciation only has cash flow consequences because it influences the tax bill.

→***Reducing balance method***: a depreciation method allowing for the accelerated write off of asset under various classifications.

→The amount that is written off becomes smaller and smaller.

→The total amount written off is the investment ± the residual value.

→Common Consolidated Corporate Tax Base (CCCTB) to create one tax system for the whole European Union because this is now a major obstacle for integration. →The recommendation is to use a 20% reducing balance depreciation on plant and machinery, and 2.5 straight line deprecation on buildings, and 4% straight line for long term tangible assets (assets that will last for more than 25 years).

Book value versus market value

→When you sell something above the current value, you have to pay ordinary income tax on the difference between the income price and the book value. →Excess depreciation which have to be recaptured when the asset is sold. →It is not a capital gain because it is only a capital gain when the asset is sold above the original cost.

→If the book value exceeds the market value, then the difference is treated as a loss for tax purpose (you do not have to pay for it).

Alternative definitions of operating cash flow

→EBIT here: $Sales - costs - depreciation$

→Tax to pay $Taxes = EBIT * T$ →Where T is the tax corporate rate

→OCF is operating cash flow $OCF = EBIT + depreciation - taxes$

The bottom up approach

Because any financing expenses such as interest are excluded in calculations about the OCF, project net income is $EBIT - Taxes$ →thus, OCF is $Net\ income + depreciation$

→It is called the bottom up approach because we start with the accountant's bottom line (net income) and add back any non-cash deductions such as depreciation.

→This definition of operating cash flow as net income + depreciation is correct only if there is no interest expense subtracted in the calculation of the net income.

The top down approach

→$OCF = sales - costs - taxes$

→Here we start with the top of the income statement.

→Strictly noncash items as depreciation are left out.

The tax shield approach

→$OCF = (sales - costs) * (1 - T) + depreciation * T$

→This approach views OCF as having two components:

1. The first part is what the project's cash flow would be if there were no depreciation expense.
2. The depreciation deduction multiplied by the tax rate →***depreciation tax shield***: the tax saving that results from the depreciation deduction.

→This approach has the same outcome as the other approaches.

Evaluation cost cutting proposals

→Upgrade existing facilities to make them more cost-effective. The issue is whether the cost savings are large enough to justify the necessary capital expenditure.

Evaluating equipment options with different lives

→***Equivalent annual cost (EAC)***: the present value of a project's costs, calculated on an annual basis.

Chapter 10: Project analysis and evaluation

Evaluating net present value estimates

Forecasting risk

→***Forecasting risk/ estimation risk***: the possibility that errors in projected cash flows will lead to incorrect decisions.

Sources of value

→Whát does it make that the NPV of the project is positive?

→Something new?

→The degree of competition in the market.

Scenario and other what if analyses

→The basic form of what if analysis is called ***scenario analysis***: the determination of what happens to the NPV estimates when we ask what if questions.

→Do the other scenarios overall look bad or good?

→A good place to start is with the worst case scenario. This will tell the minimum NPV of the project.

→If this turns out well, one can calculate the best case scenario.

→You then have the two bounds.

→To get the worst, we assign the least favorable value to each item.

→In place of best and worst, it is better to use pessimistic and optimistic.

Sensitivity analysis

→***Sensitivity analysis***: investigations of what happens to NPV when only one variable is changed.

→Useful in pinpointing the areas where forecasting risk is especially severe.

→The greater the slope, the more sensitive the NPV is to changes of that variable being invested.

→A drawback is that it does not tell what to do about positive errors.

Simulation analysis

→With scenario analysis, we let all the different variables change, but we let them take only a few values (e.g. the upper, lower, base and two quartiles).

→With sensitivity analysis, we let only one variable change, but we let it take on many values.

→The combination of these two approaches is ***simulation analysis***.

Break even analysis

→It will frequently turn out that the crucial variable for a project is sales value.

→Break even analysis is a popular and commonly used tool for analyzing the relationship between sales volume and profitability.

Variable costs

→Costs that change when the quantity of output changes.

→$total\ variable\ cost = total\ quantity\ of\ ouput * cost\ per\ unit\ of\ output$

→$Vc = Q * v$

Fixed costs

→Costs that do not change when the quantity of output changes during a particular time period, at least in a range.

→But in the (very) long run, all costs are variable.

Total costs

→The sum of the fixed and variable costs $TC = VC + FC$ →$TC = v * Q + FC$

→***Marginal/ incremental cost***: the change in cost when there is a small change in output (the variable cost per unit?).

Accounting break even

→The sales level that results in zero project net income.

→***Contribution margin per unit***: the difference between the selling price and the variable cost.

→Taxes are zero too at this point

→Interest is not included, but depreciation is because it is accounting break even.

Accounting breakeven: a closer look

→The breakeven is equal to $\frac{fixed\ costs + depreciation}{price\ per\ unit - variable\ cost\ per\ unit}$

→The following variables are there:

1. P = selling price per unit
2. v = variable cost per unit
3. Q = total units sold
4. S = total sales = P*Q
5. VC = total variable costs = v*Q
6. FC = fixed costs
7. D = depreciation
8. T = tax rate

→$(project) net\ income = (sales - variable\ cost - fixed\ costs - depreciation) * (1 - T)$

→$(S - VC - FC - D) * (1 - T)$

→Breakeven point $net\ income = 0$ →Thus $S - VC - FC - D = 0$ →$Q = \frac{FC + D}{P - v}$

Accounting break even and cash flow

→$operating\ cash\ flow = EBIT + depreciation - taxes$ →$(S - VC - FC - D) + D - T$

→When a project break even on an accounting basis, the cash flow for that period will equal the depreciation.

→A project that does better than break even has a payback that is shorter than the life of the project, and has a positive rate of return.

→A project that just breaks even on an accounting basis has a negative NPV and a zero return.

Sales volume and operating cash flow

→$OCF = [(P - v) * Q - fc - D] + D$ →$OCF = (P - v) * Q - FC$

Cash flow, accounting and financial break even points

→$Q = \frac{FC + OCF}{P - v}$

Cash break even

→A project that breaks even on an accounting basis has a net income of zero, but has a positive cash flow (equal to depreciation??).

→The ***cash break even*** is the sales level that results in a zero operating cash flow: $Q = \frac{FC}{P - v}$

→The fixed costs are then covered.

→Here, only the fixed costs are covered, by the original investment is completely lost and so the investment has a IRR of -100%.

Financial break even

→***Financial break even***: the sales level that results in a zero NPV. This it to the financial manager the most interesting case.

→What we do first is to determine what the operating cash flow has to be for the NPV to be zero. We then use this amount to determine the sales volume.

→The financial break even is often substantially higher than the accounting break even.

Questions to ask:

1. How much confidence do we have in our projections?
2. How important is the project to the future of the company?
3. How badly will the company be hurt if sales turn out to be low? What options are available to the company in case?

Operating leverage

→***Operating leverage***: the degree to which a firm or project is committed to fixed production costs.

→Has to do with ***capital intensity*** .

Implications of operating leverage

→Fixed costs act like a lever in the sense that a small percentage change in operating revenue can be magnified into a large percentage change in operating cash flow and NPV. →***leverage***.

→The higher the degree of operating leverage, the greater is the potential danger from forecasting risk by this magnitude.

Measuring operating leverage

→The ***degree of operating leverage (DOL)***: the percentage change in operating cash flow relative to the percentage change in quantity sold. $Percentage\ change\ in\ OCF = DOL * percentage\ change\ in\ Q$

→$DOL = 1 + \frac{FC}{OCF}$

→The ratio FC/ OCF measures fixed costs as a percentage of total operating cash flow.

→The reason that DOL declines is that fixed costs, considered as a percentage of operating cash flow, get smaller and smaller, so the leverage effect diminishes.

Capital rationing

→***Capital rationing***: the situation that exists if a firm has positive NPV project but cannot find the necessary financing.

Soft rationing

→***Soft rationing***: the situation that occurs when units in a business are allocated a certain amount of financing for capital budgeting.

???????

Hard rationing

→***Hard rationing***: the situation that occurs when a business cannot raise financing for a project under any circumstances.

Chapter 11: Some lessons from recent capital market history

→Two central lessons emerge from our study of market history:

1. There is a reward for bearing risk.
2. The greater the potential reward is, the greater is the risk.

Cash returns

→The gain or loss on your investment is called the ***return on investment***. This return will usually he two components:

1. ***The income component***: the cash you directly get while you own the investment. (e.g. dividend)
2. The value of the asset you purchase will often change, so a ***capital gain/ loss*** will occur.

→The total cash return is: $dividend\ income + capital\ gain\ (positive\ or\ negative)$
→Total cash if equity is sold: $initial\ investment + total\ return\ (can\ aslo\ be\ a\ loss?)$
→$Proceeds\ from\ equity\ sale + dividends$ is the same to the outcome of the one above.
→The capital gain has to be taken into account to even if you do not sell your shares, it IS part of your return.

Percentage returns
→This shows the relationship between the invested amount and the return.
→The question we want to answer is: how much do we get for each unit of cash we invest?
→Pt is the share price at the beginning of the year, and Dt+1 is the dividend paid during the year.
→$dividend\ yield = \frac{Dt+1}{Pt}$
→Capital gains yield: $Pt + 1 - \frac{Pt0}{Pt}$
→$Percentage\ return: \frac{dividends\ paid\ at\ the\ end\ of\ period + market\ value\ at\ the\ end\ of\ period}{beginning\ market\ value}$

The historical record
→None of the returns here are adjusted for taxed, transaction costs or inflation.

Risk premiums
→The rate of return on T-bills is called ***risk free return*** because the government can always get the money to pay (taxes up), and this will be used as a kind of benchmark.
→The difference between the rate of return of the very risky return on ordinary equities and the virtually risk free return on T-bills can be interpreted as a measure of the ***excess return*** on the average risky asset.
→Because this excess comes from bearing risk, we shall call it a ***risk premium***.
→**Lesson: over the long term, risky assets, on average, earn a risk premium**.

The variability of returns: the second lesson

Return variability
→We need to measure the spread in returns. →We want to know how volatile the return is.
→The ***variance*** (the average squared difference between the actual return and the average return) and its squared root, the ***standard deviation***, are the most commonly used measures of volatility.
→Here we calculate the *historical* variance and standard deviation.
→$Var(R) = \sigma^2 = \frac{Totals\ of\ squared\ deviation}{number\ of\ returns - 1}$) →$\frac{1}{T-1} * [(R1 - \bar{R})^2 + \cdots + (RT - \bar{R})^2]$
→$St.dev(R) = \sigma = \sqrt{variance}$

The normal distribution
→***Normal distribution (bell curve)*** is useful for describing the probability of ending up in a given range.
→The normal model is a good approximation if the distribution is at least roughly mount shaped and symmetric.

The second lesson
→The greater the potential reward, the greater is the risk.

Using capital market history
→$corperate\ and\ goverment\ bonds < large\ company\ equities < small\ company\ equities$ = risk

Arithmetic versus geometric averages
→***Geometric average return***: the average compound return earned per year over a multi year period.

→***Arithmetic average return***: the return earned in an average year over a multi year period.

Calculating geometric average returns

→$Geometric\ average\ return = [(1+R1)*(1+R2)*...*(1+Rt)]^{\frac{1}{T}} - 1$

→Thus, four steps are required:

1. Take each of the T annual return, R1, R2,.., RT and add 1 to each (after converting them to decimals).
2. Multiply all the number from step 1 together
3. Take the result from step two and raise it to the power 1/T
4. Finally, subtract 1 from the result of step 3. The result is the geometric average return.

→The geometric average return is always smaller (unless all the returns are identical). →The difference is greater for more volatile investments. →The geometric average return is approximately equal to the arithmetic average return minus half the variance.

Arithmetic average return or geometric average return?

→The geometric average tells what you actually earned per year on average, compounded annually.

→The arithmetic average tell what you earned in a typical year.

→***Blume's formula***: combining both of the methods, with N years of data, and we wish to use these to form a T year average return forecast R(T), where T is less than N

→$R(T) = \frac{T-1}{N-1} * geometric\ average + \frac{N-T}{N-1} * arithmetic\ average$

→Blume's formula says that if you are using averages calculated over a long period of forecast up to a decade or so into the future, you should use the arithmetic average.

→If you are forecasting a few decades into the future, then you should just split the difference between the two averages' returns.

→If you are doing very long forecasts covering many decades, use the geometric average.

Capital market efficiency

→A market is said to be ***efficient*** when prices quickly adjust and correctly when new information arrives. To be more precise, in an ***efficient capital market***, prices fully reflect available information. The price thus reflects the market condition

Price behavior in an efficient market

→The price of a share will rise with the additional NPV per share.

The efficient market hypothesis

The ***efficient market hypotheses (EMH)*** asserts that well organized capital markets, are efficient market. Inefficiencies may thus exist, but they are relatively small and not common.

→If a market is efficient: then there is a very important implication for market participants: all investments in that market are zero NPV investments because there is no difference between the market value of an investment and its cost. You get exactly what you pay for.

→Competition among investors makes a market efficient. They analyze the market completely to find mispriced equities.

The forms of market efficiency

→Depending on the degree of efficiency, we say that markets are either weak-from efficient, semi-strong-from efficient, or strong-form efficient. The difference between these forms relates to what information is reflected in prices.

→***Strong-form efficient***: all information of every kind is reflected in the share prices. There is thus no such thing as inside information (which can be valuable to possess).

→***Semi-strong efficient:*** the most controversial. If a market has this type of efficiency, it is implied that a security analyst who tries to identify mispriced equities using for example financial statement information is wasting time because that information is already reflected in the current price.
→***Weak-form efficient***: the current share price reflects at a minimum the equity's own past prices. Thus, studying past prices to find misprices shares is a futile one.
→What does capital market history say about market efficiency?

1. Prices appear to respond rapidly to new information, and the response is at least not grossly different from what we would expect in an efficient market.
2. The future of market prices, particularly in the short run, is difficult to predict based on publicly available information.
3. If mispriced equities exist, then there is no obvious means of identifying them. Simple minded schemes based on public information will probably not be successful.

Chapter 12: Return, risk and security market line

→There are two types of risk:

1. Systematic
2. Unsystematic

→This distinction is crucial because systematic risk affect almost all assets in the economy to at least some degree, whereas unsystematic risk affects at most a small number of assets.
→Highly diversified portfolios tend to have almost no unsystematic risk, only systematic risk thus matters.
→A famous relationship between risk and return is called the ***security market line (SML)***

Expected return
→E(R).
→Pas op: tabellen in het boek net andersom gemaakt dan bij MOO.
→***Expected return*** per investment: the return on a risky asset expected in the future.
→***Projected/ expected risk premium***: the difference between the expected return on a risky investment and the certain return on a risk free investment. $Risk\ premium = expected\ return - risk\ free\ rate$

Calculating the variance
→Determine the squared deviation from the expected return. Then multiply each possible squared deviation by its probability and add these up = the variance.

Portfolios
→***Portfolio's*** are a group of assets such as bonds and equities held by an investor. Portfolio return and portfolio risk are of obvious relevance.

Portfolio weights
→The percentage of a portfolio's total value that is in a particular asset. →The weights have to add up to 1.00

Portfolio expected returns
→The expected return of a portfolio (R_p) is the weight of the portfolio part times the expected return. It can be calculated per state of nature.
→The expected return can be calculated more easily: adding up the expected returns from the different states of nature.
→Thus, the expected return on a portfolio is a straightforward combination of the expected returns on the assets in that portfolio. →But this way of calculating is not always the right one.

Portfolio variance
→$\sqrt{variance}$

Expected and unexpected returns

→$Total\ return = expected\ return + unexpected\ return\ (suprise)$ →$R = E(R) + U$

→Through time, the U will be zero (CLT), so it become the E(R).

→The E(R) part consists of the part of the return that shareholders predict or expect. This return depends on the information that the shareholders have that bears on the equity, and it is based on the market's understanding today of the important factors that will influence the share price in the coming year.

Announcements and news

→Also depends on how new the information is.

→When it is a surprise, it is part of U and when it is not a surprise, it is part of E(R). →It is no 'news' then.

→A common way of saying that an announcement is not new is to say that the market has already ***discounted*** the announcement. The announcement has thus less impact because we already know about it.

→Innovation/ surprise part (U).

→The expected part of any announcement is the part of the information that the market uses to form the expectation, E(R) of the return on equity. The surprise is the news that influences the unanticipated return on the equity (U).

Risk: systematic and unsystematic

→The unanticipated part of the return, that portion resulting from surprises is the true risk of any investment.

Systematic and unsystematic risk

→***Systematic risk***: a risk that influences a large number of assets, also called ***market risk***.

→***Unsystematic risk***: a risk that affect at most a small number of assets. Also called ***unique/ asset-specific risk***.

Systematic and unsystematic components of return

→U will consist of the systematic and unsystematic component: $R = E(R) + m + \varepsilon$

→The unsystematic part ε is more or less unique to that company or asset.

The effect of diversification: another lesson from market history

→When the number of equities increase, the standard deviation will become smaller.

The principle of diversification

→Figure 12.1 illustrates two main points:

1. Some of the riskiness associated with individual assets can be eliminated by forming portfolios
   →The process of spreading an investment across assets (and thus forming a portfolio) is called ***diversifaction***.
2. There is a minimum level of risk that cannot be eliminated simply by diversifying.
   →Thus, diversification reduces risk, but only up to a certain point.

→Unsystematic risk is eliminated by diversification, so a portfolio with many assets has almost no unsystematic risk.

Diversification and systematic risk

→The systematic part cannot be diversified because the wash out affect is not there.

→$Total\ risk = systematic\ risk + unsystematic\ risk$

→Systematic risk is also called: non-diversifiable risk.

→Unsystematic risk is also called: diversifiable risk, unique risk, or asset specific risk.

The systematic risk principle

→***The systematic risk principle***: the expected return on a risky asset depends only on that asset's systematic risk because the unsystematic part is washed out.

Measuring systematic risk

→***Beta coefficient***: the amount of risk present in a particular risky asset relative to that in an average risky asset.

→By definition, an average asset has a beta of 1.0 relative to itself.

→The larger the beta (and thus the systematic risk), the greater the return.

Portfolio betas

→When you have many assets in your portfolio, multiply each asset's beta by its portfolio weight and then add the results to get the portfolio's beta.

The security market line

→A risk free asset has no risk (neither systematic nor unsystematic), and so has no beta.

Beta and the risk premium

→It is possible for the percentage invested in an asset to exceed 100% because the investor can borrow and so the more than the investor's wealth.

The reward to risk ratio

→The slope of the line in figure 12.2 is the risk premium divided by the beta of that asset: $Slope = \frac{(E(Ra)-Rf)}{\beta a}$

→This slope is called the ***reward to risk ratio***. This is the systematic risk premium.

The basic argument

→When comparing, notice:

1. The hight of the line
2. The slope of the line.

The fundamental result

→Price is another important factor in the choice, this can change the E(R).

→The buying and selling will continue until the two assets plotted on exactly the same line, which means they would offer the same reward for bearing risk.

→Thus, in a competitive market: $\frac{E(Ra)-Rf}{\beta a} = \frac{E(Rb)-Rf}{\beta b}$ →This is the fundamental relationship between risk and return.

→**Conclusion**: the reward to risk ratio must be the same for all assets in the market (a competitive one!).

The security market line

→The line which we talked about above to describe the relationship between systematic risk and expected return in financial markets is called the ***security market line (SML)***.

Market portfolios

→A ***market portfolio*** is a portfolio made up of all the assets in the market. →Its expected return is denoted as $E(R_m)$.

→The beta is denoted as β_m because this portfolio is representative of all the assets in the market, it must have average systematic risk. It thus has a beta of 1.o.

→The slope of the SML is thus $SML\ slope = \frac{E(Rm)-Rf}{\beta m} = \frac{E(Rm)-Rf}{1} = E(Rm) - Rf$

→The last term is often called the ***market risk premium*** because it is the risk premium on a market portfolio.

The capital asset pricing model

→***Capital asset pricing model (CAPM)***: the equitation of the SML showing the relationship between expected return and beta. →$E(Ri) = Rf + [(E(Rm) - Rf) - \beta i]$

→The CAPM shows that the expected return for a particular asset depends on three things:

1. The pure time value of money: as measured as the risk free rate Rf, this is the reward for merely waiting for your money, without taking risk.
2. The reward for bearing systematic risk: as measured by the market risk premium $E(R_m - R_f)$ this component is the reward the market offers for bearing an average amount of systematic risk in addition to waiting.
3. The amount of systematic risk: measured as the beta from i.

→The slope of the SML in the CAPM is equal to the market risk premium $E(Rm) - Rf$

The SML and the cost of capital: a preview

The basic idea

→The SML tells us the reward for bearing risk in financial markets.
→It tells the going rate for bearing risk in the economy.

The cost of capital

→The appropriate discount rate on a new project is the minimum excepted rate of return an investment must offer to be attractive. This minimum required return is often called the ***cost of capital*** associated with the investment. →It is thus the opportunity cost associated with the firm's capital investment.
→An investment is attractive if its expected return exceeds what is offered in financial markets for investments of the same risk.

Chapter 13: Cost of capital

→The ***weighted average cost of capital (WACC)*** is the cost of capital for the firm as a whole, and it can be interpreted as the required return on the overall firm. The different ways of attracting capital have different costs.
→Taxes are important and we should look at the after tax cash flows from a project.

Required return versus cost of capital

→The required return is the return in percentage which the project has to have to get a positive NPV. It is the breakeven return, where the return equals the cost of capital.
→The cost of capital for a risk free investment is the risk free rate.
→Thus, required return, appropriate discount rate and cost of capital are more or less interchangeable.
→**The cost of capital depends primarily on the use of funds, not the source (and thus on the risk of that investment)**.

Financial policy and cost of capital

→The fixed debt-equity ratio in this chapter reflects the target capital structure.
→A firm's cost of capital will reflect both its cost of debt capital and its costs of equity capital.

The cost of equity

→***Cost of equity*** : the return that equity investors require on their investment in the firm. There are two ways of estimating this cost:

1. The dividend growth model approach
2. The security market line approach

The dividend growth model

→Po and Do can be observed, but the g part has to be estimated:

1. Use historical growth rates and use the average (arithmetic)
2. Use analyst's forecasts of future growth rates.

→Advantages:

1. Its simplicity

→Disadvantages:

1. Only applicable for companies that pay dividends
2. Reasonably steady growths in dividends have to occur
3. The estimated cost of equity is very sensitive to the estimated growth rate
4. It does not explicitly consider risk.

The SML approach

→Recap: the required or expected return on a risky investment depends on three things:

1. The risk free rate, Rf
2. The market premium, E(Rm)-Rf
3. The systematic risk of the asset relative to average, the beta coefficient β

→$E(Re) = Rf + \beta * [E(Rm) - Rf]$

→Advantages:

1. It explicitly adjusts for risk
2. It is applicable for companies other than just those with steady dividend growth.

→Disadvantages:

1. The market risk premium and the beta coefficient have to be estimated.
2. We rely on the past, just like the dividend growth model does.

The cost of debt

→***Cost of debt*** is the return that lenders require on the firm's debt.

→Often, this is simply the interest rate the firm must pay on new borrowing, and we can observe this on the financial markets.

→E.g. when the firm has already outstanding bonds, the yield to maturity on those bonds is the market required rate on the firm's debt.

→You can also use the current rate for that kind of bonds (AA for example).

The cost of preference shares

→$Rp = \frac{D}{Po}$ where d is the fixed dividend and Po is the current preference share price. It is thus equal to the dividend yield on the preference share.

The capital structure weights

→E (for equity) is used to stand for the market value of the firm's equity. It is calculated by taking the number of shares outstanding an multiplying it by the share price.

→D (for debt) is used to stand for the market value of the firm's debt. We calculate it by multiplying the market price of a single bond by the number of bonds outstanding. For short term debts, t hook values and market values should be somewhat similar, so book values can be used as estimates of the market value.

→V stands for value for the combined market value of debt and equity: $V = E + D$

→If we divide both side by V, we can calculate the percentage of the total capital by debt and equity. $100\% = \frac{E}{V} + \frac{D}{V}$ →These percentages can be interpreted like portfolio weights, and they are often called ***capital structure weights***.

Taxes and the weighted average cost of capital

→Tc is the corporate tax rate, the after tax rate can be written as: $Rd * (1 - Tc)$

→***Weighted average cost of capital (WACC)***: the weighted average of the cost of equity and the after tax cost of debt.

→$WACC = \frac{E}{V} * Re + \frac{D}{V} * Rd * (1 - Tc)$

→The outcome is the overall return the firm must earn on its existing assets to maintain the value of its equity. It is also the required return on any investments by the firm that have essentially the same risks as existing operations.

→When there are preference shares, the WACC changes in: $WACC = \frac{E}{V} * Re + \frac{P}{V} * Rp + \frac{D}{V} * Rd * (1 - Tc)$

Where Rp is the cost of preference shares.

Capital budgeting problems

→The WACC reflects the risk and target capital structure of the firm's existing assets as a whole. As a result, the firm's WACC is the appropriate discount rate only if the proposed investment is a replica of the firm's existing operating activities.

Performance evaluation: another use of the WACC

→The best known approach is the ***economic value added (EVA)*** method. Other methods are market value added (MVA) and shareholder value added (SVA).

→The idea is to multiply the WACC with the total capital and see if the cash flow exceeds this amount

The pure play approach

When the WACC cannot be calculated within in the own business because the new project is very different form the own way of working, the ***pure play approach*** can be used: the use of a WACC that is unique to a particular project, based on companies in similar lines of business.

The subjective approach

→When a project has a high risk, something is added to the WACC and when it has a low risk, something is distracted.

Flotation costs and the WACC

→$fa = \frac{E}{V} * fe + \frac{D}{V} * fd$

→This average one is then used: $amount\ raised = \frac{amount\ needed\ for\ investment}{1 - flotation\ cost}$

Flotation costs and NPV

→Flotation costs are also called issuance costs.

→Investments can thus turn out to be not attractive anymore.

Internal equity and flotation costs

??? Saying that there is no flotation cost to equity???