



Financial Management

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/ www.temagroningen.nl

/ board@temagroningen.nl

/ www.temagroningen.nl / board@temagroningen.nl

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Chapter 1

1.1

Finance deals with when and what to buy and to sell. The objective is to make yourself and the company better off. **Financial management** is about how to create and, once created, preserve economic value of assets (for corporations, small businesses, and individuals).

The **cycle of money** is the transfer of money from a lender to a borrower and eventually back to the lender. Normally, a **financial intermediary** like a bank gets the money from investors and gives it to someone else who wants to borrow it. The investor is given some rent by the bank for his money, and the borrower has to pay some rent to the bank for the money he is provided with. The bank lets the borrower pay more than it gives to the investor, so that the bank is better off as well.

1.2

We can distinguish four areas of finance. First, **corporate finance**, which is finance supporting a business. Typical activities are financing projects by borrowing money and repaying them by interest payments, dividends, and principal payments. We can define **investment** as all activities concerned with selling and buying of assets. We can distinguish two kinds of assets. **Real assets**, which are physical (buildings, gold). The other is financial assets, which are intangible (stocks, bonds). **Markets and financial institutions** make the cycle of money easier. **International finance** is finance for multinationals (MNEs) operating across borders.

1.3

Financial markets can be physical or virtual. We can make subgroups by type of assets. First, **equity markets** (for selling and buying of stocks). Second, **debt markets** (for selling and buying of bonds). Third, derivatives markets, which can be divided again into futures markets (for buying and selling of futures contracts for commodities) and options markets (for buying and selling of options on equity, futures, or currencies). Fourth, **foreign exchange markets** (selling and buying of currencies). Another way to distinguish between financial markets is in terms of maturity. That is how long the borrower has to pay back the money. If that has to be done in a time span shorter than a year, the financial assets are dealt in **money markets** (short-term loans), if that has to be done in one year or longer, they are dealt in **capital markets** (long-term loans, including bonds and stocks). Another classification is by owner. When the stock is sold for the first time and the money paid for the stock goes to the company, the deal is made in the **primary market**. If a private owner of a stock sells it to another person, than they deal in the **secondary market**. The proceeds go to the former owner and the company is told who the new owner is. We can also distinguish financial markets by type of sale. When an individual or a firm sells or buys stocks or bonds from his own inventory, he deals on the **dealer market**. When many bonds or stocks are offered for sale to many buyers at the same time, the dealing takes place on an **auction market**. The ones who auction are often investment banks and they get a certain percentage of sales for their intermediation.

1.4

The **chief financial officer (CFO)** monitors the finance operations within the whole company. He determines how borrowed funds are going to be repaid so that they are not repaid to late but also

not too early so that the company has some money left. We can distinguish three main areas. First, **capital budgeting**, which is about the selection of long-term operating projects. They are first planned, then evaluated and compared, and eventually selected. The question here: what business are we in? Second, **capital structure**, so where the money comes from. Normally, bonds (debt) and stocks (equity) are sold to investors and owners to raise capital. The question here: how are we going to finance our service and product choices? Third, **working capital management**, how the daily operations are managed by using the current liabilities and assets (so that is finance on the short term)

1.5

We said that the main objective is make the firm better off. We may think that this can be achieved by maximizing profits. But the owners of the firm are the owners of stock. So the primary goal of the finance manager should be to increase the current stock price as much as possible. That includes many other sub-objectives. To increase the cash flow in the future, employees should be happy, as well as customers and suppliers. So by trying to maximize current stock price, many other things have to be taken into account. We can define this in a broader way by saying that the current market value of equity of the company should be maximized.

1.6

The CFO has to work with other departments as well to function as effectively as possible. The employees and the managers form the internal players of the company. Other players are external, for instance suppliers and customers. Also additional services like banking services are performed by external players.

1.7

There are several legal classifications of businesses. First, the **sole proprietorship**. The business is owned by one person. This is the easiest way to create a business. The advantage in terms of finance is that the owner can make all decisions and gets all the profit. However, he also pays all the bills and his personal assets are included in the property (unlimited liability). Also, the business dies when the owner dies before he has sold his business to someone else. Second, **the partnership**. The business is owned by at least two persons. They can be **general partners**, so they operate the daily business together. They can also be **limited partners**, these only operate part of the business, or silent partners, who just invest and do not operate daily business. This form also mixes up personal and private property (unlimited liability), except for the limited partner. It is difficult to change partners, because a new agreement has to be set up. Third, **corporations**. Here, the company is a legal entity so that there is only **limited liability**. To set up a corporation, articles of incorporation are required. The shareholders are the owners, and they select a board of directors. This board chooses the main corporate officers. Ownership can be transferred easily (by selling stocks). It is easier to borrow money. A disadvantage is that the corporation pays taxes on profits and then the owner pay taxes on their income, so there is double taxation. Another legal form is a **hybrid corporation**. LLCs (limited liability corporations) are a blend of corporations and partnerships. One form of an LLC is the **professional corporation (PC)**, where licensed professionals are joined (doctors, lawyers). The **S corporation** is a small business corporate form having fewer than 100 shareholders. With this form, there are no taxes on profits but only on the profit as it is received as income by the shareholders. The last category is the **non-for-profit corporation**. Their goal is not the maximization of

shareholder wealth.

1.8

Owners of a company have interests. To fulfill those interests, managers are hired to operate the company. The managers have interests as well, but these might not be the same as the owners' interests. The **principals** are the owners of a business. Their goal is to increase the current stock price as much as possible. The **agents** are the managers that are hired. They want to earn money and other personal benefits.

They cannot always fulfill their own interests and the principals' interests at the same time, that is referred to as the **principal-agent problem**. If the principal pays the agent for something he was supposed to do, but did not do (correctly), the principal incurs an **agency cost**. To avoid this, monitoring and controlling is important. Also, a proper reward system should be present. One way to make sure that the agent maximizes stock prices, is to fix part of the compensation they get to how the stock performs. A **stock option** is, as its name implies, an option to buy stock in the future at a certain price. If the agent can make the stock price increase, that is beneficial to him because he can still buy the stock at a lower price. The problems between principals and agents and possible solutions for misalignments are summarized as the **agency theory**.

1.9

Corporate governance is a term that describes the way a company does its business and how it monitors whether the right procedures and behavior are used while conducting the business. The SOX, or the Sarbanes-Oxley Act was established to ensure more ethical behavior in businesses. It says that the CFO and the CEO sign a paper which says that the financial report is fair. Moreover, it says that there should be a good internal control on financial reporting. Lastly, auditors and the company monitor whether the controls were effective the last fiscal year. Managers can be replaced. That can be done by the board of directors. Members from the board of directors can be voted out by shareholders. Also, legal action can be taken.

So finance should be studied because as an employee, you will be able to increase your contribution to the company if you know how finance decisions are made. Furthermore, it helps you to assess trade-offs you will face in your personal life.

Chapter 2

2.1

To show how a firm performs, 4 financial statements are available. These are the income statement, the statement of cash flow, the balance sheet, and the statement of retained earnings (RE). They show how the firm got the money, where it is now, and where it goes to. They help forecasting future cash flows so that decisions can be made about budgeting. We will first discuss the **balance sheet**. It shows what assets the company owns and the claims against them at a certain point in time. **Assets** are owned by the company. Subcategories are physical assets (equipment, buildings, inventory), financial assets (accounts receivable), intellectual assets (trademarks, patents), and cash. These are presented at the left side of the sheet. On the right side, **liabilities** and **equity** are shown. Liabilities represent money owed to others (loans, account payable, etc, so debt). Equity is what is left after liabilities have been paid, it is distributed to the owners (owners are the residual claimants). This is the accounting identity:

Assets = liabilities + owners' equity

Every time that something is entered on the left side (debit side) of the balance sheet, something should be entered on the right side (credit side) as well. That is called **double-entry bookkeeping**. Five sections in the balance sheet are important for finance.

First, the **cash account**. That represent the amount of cash available to pay bills or to buy new things. Second, the **working capital accounts**. These are formed by the current liabilities and assets. These accounts are used for the daily operations of the firm. How these two accounts are related to each other can be measured using **net working capital**, which is current assets – current liabilities. Third, **long-term assets accounts**. These tell you how money is invested for capital investments. Often the money is invested in plant, property, and equipment, and other long-term assets. The amount stated on the balance sheet combines the original value with the depreciation (annual reduction in value). Fourth, **long-term liabilities (debt) accounts**. Debts are long-term if they have to be repaid longer than a year from now. Fifth, **ownership accounts**. Normally these are RE and common stock. The latter is how much capital the owners have given to the company, and RE are earnings that the company kept to reinvest or to repay debts.

Now we will discuss the income statement. It shows how a company performed financially over a certain period. The last line of the income statement is net income (revenues – expenses). The first line shows the revenue (so the sales). Then operating expenses are subtracted (cost of goods sold, depreciation, selling, general, and administrative expenses, other expenses) so that we get operating income. Then, other income is added to get **EBIT (earnings before interest and taxes)**. Next, the interest expense is subtracted so that we get taxable income. Subtract taxes and you will get net income. Net income is not the same as cash flow, because we can also sell on credit so that we have income but we do not have the cash yet. **Cash flow** is how much the cash account increases or decreases in that period. There are three issues to show that cash flow is not the same as net income.

First, accrual-based accounting. **GAAP (generally accepted accounting principles)** combines accounting procedures, principles, and standards that are used by companies to establish financial statements. It prescribes that revenue becomes revenue when something is sold, even if you not yet got the cash for it. Also, the expenses you had to pay to make the sale are recorded then, even if you not yet paid them. The second issue is noncash expense items. The most important example is

depreciation. We depreciate items because their value decreases, but it does not actually mean that we pay something. It just means that if we want to sell these items, we will get less for it than their original value. The third issue is classifying interest expense as part of the financing decision, and not as operating decision.

The **OCF (operating cash flow)** can be calculated in two ways:

$$\text{OCF} = \text{EBIT} + \text{depreciation} - \text{taxes}$$

$$\text{OCF} = \text{net income} + \text{depreciation} + \text{interest expense}$$

Another financial statement is the **statement of RE**. The change in RE can be calculated by taking net income and subtracting distributed earnings. The latter are the earnings that are paid to shareholders.

2.2

This is the **cash flow identity**:

$$\text{Cash flow from assets} \equiv \text{cash flow to creditors} + \text{cash flow to stockholders}$$

How can we calculate these cash flows? First, cash flow from assets.

$$\text{NWC} = \text{current assets} - \text{current liabilities}$$

$$\text{Change in NWC} = \text{ending NWC} - \text{beginning NWC}$$

$$\text{Net capital spending} = \text{ending net fixed assets} - \text{beginning net fixed assets} + \text{depreciation}$$

$$\text{OCF} = \text{EBIT} + \text{depreciation} - \text{taxes}$$

$$\text{Cash flow from assets} = \text{operating cash flow} - \text{net capital spending} - \text{change in NWC}$$

Then, cash flow to creditors.

$$\text{Net new borrowing} = \text{ending long-term liabilities} - \text{beginning long-term liabilities}$$

$$\text{Cash flow to creditors} = \text{interest expense} - \text{net new borrowing from creditors.}$$

Then, cash flow to stockholders:

$$\text{Change in equity} = \text{ending common stock and paid-in-surplus} - \text{beginning common stock and paid-in-surplus}$$

$$\text{Net new borrowing from owners} = \text{change in equity}$$

$$\text{Cash flow to owners} = \text{dividends} - \text{net new borrowing from owners}$$

2.3

The annual report of a company contains at least the following sections:

company highlights, president's letter to the shareholders, description of the company's activities, management's analysis of the company's performance, financial statement, notes to financial statements, auditor's report, financial ratios, and corporate information.

The regulation fair disclosure says that a company should give the same information to all investors at the same time. Notes to the financial statements explain how certain numbers are calculated, or how numbers differ from expected numbers, etc. The cost of revenue consists of the cost of goods sold and the depreciation.

Chapter 3

3.1

When we want to know the value of a specific amount of money in, let's say, 10 years, we want to know the future value. We will start with a simple example, the single-period scenario. That is, I have a certain amount of money now, \$100, and put it in a savings account that gives me 5% interest. At the end of the year I will have \$105. So the principal (what I had at the beginning) times the interest rate is what I will earn on my investment. Here, the bank borrows money from me, so I am the lender. The \$105 in the future is a lump-sum payment. I am paid just once (my original deposit and the interest earned).

Now we will discuss the multiple period scenario. At the end of the year, I have \$100 (my original deposit) and \$5 (the interest earned). So in the next year, I will receive interest on both the \$100 and the \$5.

$$0.05 \times \$100 + 0.05 \times \$5 = \$5.25$$

Compound interest is the interest earned on interest. To calculate the future value then, you have to multiply the initial amount you put on your account times the interest plus one for every year that you keep the money in your account. We assume that you do not add money in that time. The formula is:

Future value = deposit $\times (1 + r) \times (1 + r)$ etc

We will now make a simple equation for this. Therefore we use the FV (future value), the PV (present value), r (interest rate), and n (the number of time periods).

$$FV = PV \times (1+r)^n$$

r is also described as the **growth rate**. The last part of the equation, $(1+r)^n$ is the FVIF (future value interest factor), which combines the time periods with the interest rate. You can use a table to look up the appropriate FVIF.

3.2

Now we want to know how much a certain amount in the future would be worth today. We start again with the single-period scenario. I want to buy a new laptop for \$500 next year. How much should I put aside now to be able to have the money then? So we want to find the present value of the \$500. Instead of the growth rate, we now need the discount rate. We can make the following equation:

$$PV = FV \times 1 / (1+r)$$

For the multiple-period scenario we just have to add the n :

$$PV = FV \times 1 / (1+r)^n$$

The last part is the **PVIF (present value interest factor)**, which can also be found in a table.

3.3

We have now isolated PV and FV, that means that we have two factors left, r and n. First r, (interest rate, discount rate, growth rate, or yield).

$$r = (FV / PV)^{1/n} - 1$$

$$n = [\ln(FV / PV)] / [\ln(1+r)]$$

The latter tells you how long it takes to have a certain amount of money in the future with a known PV, FV and r.

3.5. There is a very simple rule to calculate how long it takes to have twice as much money as you have now: **the Rule of 72**. Divide 72 by the interest rate and you will get the number of years it takes for your money to double. You can also divide 72 by a certain number of years to see what interest rate you will need to double your money in that amount of years.

Chapter 4

4.1-4.2

In the previous chapter we discussed how much one payment now will be worth in the future or how much one payment in the future will be worth now. But what if we put \$100 in our savings account every year instead of only once? We use T_0 for now, T_1 for in one year, etc. All the payments can be calculated with the equation for the FV we used in the previous chapter. If we put \$100 in our savings account every year for 5 years long and get an interest rate of 5%, we can calculate the value at the end of year 5. We put \$100 in our equation for FV, and use 0.05 for r and 5 for n. Then we use the same but then 4 for n, since the \$100 we put in our account at T_1 will be in the account for only 4 years. We go on like that until we are at the end of year 5. In our examples the cash flows are the same all the time (\$100). If that is the case, and the cash flows occur at regular intervals, the series of cash flows is called an **annuity**. We can make the calculation easier:

$$FV = PMT \times [(1+r)^n - 1] / r$$

Where PMT is the periodical cash flow. The last part of the equation is the **FVIFA (future value interest of an annuity)**. So:

$$FVIFA = [(1+r)^n - 1] / r$$

When the payment is made at the end of the period, it concerns an **ordinary annuity**. When it is made at the beginning, it is an **annuity due**.

4.3

We discussed the future value of an annuity, but we can also calculate the present value of an annuity:

$$PV = PMT \times [1 - [1 / (1+r)^n]] / r$$

The last part of the equation is the **PVIFA (present value interest of an annuity)**. So:

$$PVIFA = [1 - [1 / (1+r)^n]] / r$$

4.4

For the **annuity due**, the equation is slightly different:

$$FV = PMT \times [(1+r)^n - 1] / r \times (1+r)$$

When an annuity goes on forever, it is called a **perpetuity**. For that, the equation is the following:

$$PV = PMT / r$$

4.5-4.7

If we borrow money, there are several ways to repay the money. First, you pay nothing until the maturity date has come, and then you pay the principal and all the interest. That is called a **discount loan**. To calculate the amount of money you will have to pay, you can use the FV equation we established first. Another method is to pay interest as you go and pay the last interest plus the principal when the maturity date has come.

That is called an **interest-only loan**. A third manner is to pay both the principal and the interest as you go, which is an **amortized loan**. To calculate what you have to pay, we have to transform the equation for the PV so that we isolate the PMT:

$$PMT = PV // r]$$

So we pay that amount every year. But what part is for the principal and what part for the interest? Easy. We calculate the first interest payment by calculating principal times interest. That is the amount of interest we will pay. The rest of the amount we just calculated is thus for paying off the principal. So that 'rest' should be subtracted from the principal. Then you will have the remaining part of the principal, which you take and multiply with the interest rate to calculate the amount of interest for the second year. The rest of your annual payment is again to pay off the remaining principal. That goes on until you reach the maturity date and you paid off the loan!

The r and the n were easy to calculate for single-period scenarios. But how to find them for annuities?

$$n = \ln [(FV \times r) / PMT + 1] / \ln(1+r)$$

We cannot isolate r, so to find r you can isolate PV/PMT and try values for r until you find the right one.

Page 131 provides a list of ten important things about the time value of money.

Chapter 5

5.1

If you lend (invest) or borrow, there is always a certain percentage involved. The **annual percentage rate (APR)** is the rate that you earn or pay per year for lending or borrowing. The APR is normally shown as an annual rate, but the interest is often paid or received more than one time a year. **The compounding periods per year (C/Y)** is the number of times interest is paid or received. We will use m for C/Y. so if the interest is quarterly compounding, $m = 4$. To see how much you will receive for a certain period if you know the APR, we have an equation:

Periodic interest rate, $r = APR/m$

So if the APR is 5%, then the periodic interest rate if the interest is paid quarterly is $5\%/4 = 1.25\%$. That means that the actual annual rate is higher, because if you get your first interest payment after 3 months, the amount on your account will be higher so the next interest payment will also be higher. The rate that you actually get paid is called the **effective annual rate (EAR)**. We have an equation to calculate it:

$EAR = (1 + APR/m)^m - 1$

If the compounding is quarterly and the percentage 5%, then the EAR is

$$(1 + 0.05/4)^4 - 1 = 5.094\%$$

Banks have to state the **annual percentage yield (APY)** for investments (savings accounts and CDs), which is the same as EAR. For loans, they have to tell the APR, which is weird because if the interest is compounding more than once a year, the APR states a lower percentage than what the borrower actually has to pay. Before we used n for the number of periods. Since m is the number of periods per year, we can multiply m with the number of years to get n .

5.2 -5.3

In the previous chapter about the time value of money, we used r for the interest rate. When the interest rate is not paid annually, you have to convert it so that it is appropriate for the period. r and n must be applied to the same number of periods.

Recall the amortized loan from the previous chapter. If we do not pay annually, but monthly, the payment schedule changes. We have the PV of the loan which is \$25,000, we lend it for 6 years at an APR of 8%. n is the number of years times the compounding periods per year. In our example $6 \times 12 = 72$. r is the APR divided by the number of periods per year. In our example $0.08/12 = 0.006667$. We can then use the equation for the PMT.

$PMT = PV // r]$

$$PMT = \$25,000 // 0.006667] = \$438.33$$

So that outcome is the monthly payment. The interest expense part of that amount is $\$25,000 \times 0.08 / 12 = \166.67 for the first month. The rest of the amount is to pay off the principal amount. The next month, interest expense is the remaining amount of money to pay off times $0.08 / 12$ and so forth.

5.4

The interest rate we have used until now is called the **nominal interest rate**. That consists of two things; the real interest rate and the inflation. The **real interest rate** is the part of the interest that is paid to you or that you pay as a compensation for waiting; as a **reward for waiting**. The nominal interest rate is just the rate you receive or pay, so that is the real interest rate adjusted for inflation. So we can make the following equation:

Nominal rate = real rate + expected inflation

An example. If a book costs \$50, and I have \$1,000, I can buy 20 books now. But I want 21 books. If the books will cost \$52 in one year, and there will be an inflation of 4%, how much will I have to pay in one year to buy 21 books? I need $21 \times \$52 = \$1,092$. So I need \$92 more than I have now. Then I can calculate what interest rate I need to make \$1,092 from my \$1,000.

Nominal interest rate $r = (FV/PV)^{1/n} - 1$

$$(\$1,092/\$1,000)^1 - 1 = 9.2\%$$

That is a little more than we would expect if we use the equation for the nominal rate we just established, according to that it would be 9%. This effect, that it is slightly more than you would expect, is called the **Fisher effect**. A better equation is:

Nominal interest rate = real rate + inflation + (real rate x inflation), or:

$$r = r^* + h + (r^* \times h)$$

5.5

The differences in nominal rates can be assessed by the length of the loan or investment and the level of risk involved. The part of the interest rate that you pay for the length is called the **maturity premium**, the part of the interest rate that you pay for the risk is called the **default premium**. If you loan to be able to buy a car, the car (the asset) experiences a decrease in value over time. So the default premium is higher because if you cannot repay the loan and the borrower gets your car, it will get less money for it than what you paid for it. However, other assets like houses normally increase in value so the default premium on loans to buy a house is lower. For credit cards, the interest rate is even higher because it has no collateral (like the house or the car) that can be taken if the borrower cannot repay. The **risk-free rate** is an interest rate which only consist of a maturity premium because no risk is involved. One investment which has a risk-free rate is a U.S. Treasury bill. So:

Treasury bill interest rate = r_f

It still consists of inflation and the real rate, so:

$$r_f = r^* + inf$$

Where inf = inflation. If the default premium is involved, the equation becomes the following:

$$r_f = r^* + inf + dp$$

Where dp is the default premium.

The shorter the time you borrow or lend money, the lower the interest rate. That has to do with the

maturity premium. The longer the lender has to wait to get his money back, to more interest he gets. So now we can establish the final equation for r :

$$r = r^* + inf + dp + mp$$

Where mp is the maturity premium.

The four components of which the equation for the interest rate is composed change. We cannot foresee what the change in inflation will be. To do a probable forecast, we can average the expected inflation and the actual inflation for a certain period. If a bond is classified as AAA it has the lowest chance to default.

5.6

Yield curve: the relationship of the interest rate to the maturity date of a particular financial instrument is the yield curve of that financial instrument.

Most important points about interest rates:

- It is standard to use the nominal annual percentage rate (APR) as the basic quoted rate for interest. The annual percentage rate remains the most frequently quoted interest rate.
- The effective annual rate (EAR) is the rate that provides the best information on the actual cost of a loan for borrowers or the actual yield on an investment for investors.
- the periodic interest rate (semiannual, quarterly, monthly, or daily rate) is the rate that we use in the time value of money equations.
- The components (real rate, inflation, default premium, maturity premium) determine the nominal rate for individual loans or investments.

Chapter 6

6.1

One way for a government or a company to raise capital, is by selling bonds. A **bond** is typically a long-term debt whereby the one who is borrowing will pay back the borrowed money on a certain date in the future plus interest on certain dates in the future. We need to explain a little bit more about bonds. They have a **par value**, which is the principal. That amount of money has to be repaid at the end date of the bond, the maturity date. The **coupon rate** is the interest rate. It is shown on the bond itself in an annual percentage, it never changes. By **coupon** we mean an interest payment on the bond. We can calculate the coupon by multiplying the par value with the coupon rate. Then we have the **maturity date**, when which the bond expires. The last interest is paid and also the amount of money that was determined as the par value is repaid. The **YTM (yield to maturity)** represents the overall investment value of the bond. It is the return that the buyer of the bond gets when he keeps it until the maturity date. Another yield is the **current yield**. That can be calculated by dividing the annual coupon payment by the current price.

Now that we know some basics about bonds, we can move on with pricing a bond. Therefore we need to know what it yields to be the owner of the bond. First we want to know how much we get as interest. Therefore we multiply the par value with the coupon rate. If the par value is \$1,000 and the coupon rate 6.5%, we will get:

$$\$1,000 \times 0.065 = \$65$$

The holder will receive this \$65 a number of times in the future as interest payment. We also know that the holder of the bond receives \$1,000 at the maturity date.

Now that we know the future cash flows, we can calculate what they would be worth today with the equation for the present value. The appropriate r here is the discount rate of the bond, which is 5.3% in our example. The appropriate n here is the number of years from now until the maturity date, which is 10 years in our example.

$$\text{PV of coupon stream} = \text{PMT} \times r$$

$$\text{So } \$65 \times 0.053 = \$494.68$$

That was the present value of the coupon payments, now we need to calculate the present value of the par value:

$$\text{PV of par value} = \text{FV} \times 1 / (1+r)^n$$

$$\text{So } \$1,000 \times 1 / (1 + 0.053)^{10} = \$596.65$$

Now we put them together to get to total present value of the bond, which is the price:

$$\$494.68 + \$596.65 = \$1,091.33$$

Often the price is shown relative to the par value, so as a percentage of the par value:

$$\$1,091.33 / \$1,000 \times 100\% = 109.13\%$$

Now we can establish an equation for the price of a bond:

$$\text{Bond price} = \text{par value} \times 1 / (1 + r)^n + \text{coupon} \times r$$

6.2

Often, coupons are not paid annually but semiannually. To determine the coupon payment, we divide the interest rate by two and multiply it with the par value. The appropriate discount rate is the YTM divided by two, that will be the r in the equation. There is another kind of bond, which does not pay any coupons at all. That is called the **zero-coupon bond**. Then, the price can be calculated as follows:

$$\text{Zero-coupon bond price} = \text{par value} \times 1 / (1 + r)^n$$

The U.S. government issues many bonds as zero-coupon bonds. These are called the U.S. Government **STRIPS**.

6.3

It might be confusing that there are two rates; the coupon rate and the discount rate, or the YTM. The coupon rate is just used to calculate the coupon payments. The YTM (discount rate) is the proper interest rate of the bond. It is thus, like we discussed before for interest rates, based on waiting time and risks.

The values of these two rates can tell us things. First, when the coupon rate $<$ YTM, we say that the bond sells for a discount compared to the par value. That means that you can buy the bond for less than its par value. Logically, this bond is called a **discount bond**. It implies that the market rate yields more than the coupon rate. Then we have the **premium bond**. then, the coupon rate $>$ YTM.

We say that the bond sells for a premium compared to the par value. It means that the market yields less than the coupon rate. When there is no difference between the coupon rate and the YTM, the price is the same as the par value. We then call the bond a **par value bond**.

Bonds are rated by agencies. The better a bond is rated, the less likely is the chance of default. The best rating is AAA. If you buy an AAA bond, you will most likely get your money back and receive coupons as agreed.

6.4

Junk bonds are the bonds rated below BBB. We also call that a speculative grade. These agencies rate bonds because it saves investors time. Also, not everyone is able to assess the risk of a bond himself. Furthermore, the ones issuing bonds like it to have a high rate because it means that they can sell their bonds easier. The riskier a bond, the higher the yield. An AA bond is a little lower than an AAA bond, 31 **basis points** to be precise. Bonds that were issued with a quite good rate but have a lower rate now are sometimes called **fallen angels**.

6.5

In earlier times, bonds were **bearer bonds**. That means that the one who possesses the bond got the interest and the principal repayment. When the interest date was due, the owner clipped a coupon and gave that to the trustee (normally a bank) in exchange for payment. When all the coupons were clipped, the only thing that was left was the **corpus**. With that, the payment at maturity could be recovered. The problem was that possession and ownership were sometimes not aligned. If someone stole your bond, there was no way to prove that you were the owner, even though you did not possess it anymore. That is why firms started to keep up a register with all the owners of bonds. Whenever bonds were sold, they must be notified that ownership had changed. Another problem that arose with the bearer bonds was that important events could not be communicated to the owners of the bonds.

Since it was unclear who had the bonds, it was difficult to communicate something. Nowadays, an **indenture** or **deed of trust** is always signed by the bondholder and the issuer. There, certain conditions and agreements are specified. If the bond issuer is not able to pay the coupon payments or the repayment at maturity, there is back up from the **collateral** or **security** of a bond. That can be a physical or a financial asset. It is called a **mortgaged security** when real property is the collateral. Bonds which do not have such a security are **debentures**. When a company is not able to pay the creditors anymore, there is a certain order in which they pay the creditors with the money they do have. The ones who receive money first are called senior creditors. Bonds which are issued before other bonds are called **senior debt** and the younger bonds are **junior debt**. The owners of senior debt will get money before the owners of junior debt. When a company issued many bonds, they have to repay a big amount of money at maturity date. Therefore it can build a fund to be able to pay. That is called a **sinking fund**. The indenture which we just discussed also includes **protective covenants**. They say what the issuer of the bond has to and cannot do. These are to protect the bondholders. An example is that collaterals cannot be sold. It is possible to issue bonds with additional options for in the future. An example is a call option. That is the option for the issuer to buy the bond back before maturity date is due, for a preset price. Then the bond is a **callable bond**. A bond issuer would do that when interest rates are becoming so low that it is more beneficial to buy back the bond and reissue it at a lower cost. The closer the bond is to the maturity date, the lower the call price will be. For the bond holder, the yield to maturity is replaced by the **yield to call**

as the appropriate discount rate. A **putable bond** is the reverse of a callable bond. It means that the holder of the bond can sell back the bond before maturity date is due. He would do that when interest rates are increasing, so that it is more beneficial to invest in something which pays a higher interest rate. Another option is a **convertible bond**. Then, the holder of the bond can exchange it for another asset, which is typically common stock. Such options are valuable. In case of a callable bond, the issuer holds the option so the price is lower. In case of a putable bond, the holder holds the option so the price is higher. If the coupon rate is not fixed, the bond has a **floating rate bond**. The rate is then determined by comparing it to some other rate, for instance the rate that the banks use for their best customers (**prime rate**). It can also be tied to the company's income, then the bonds are **income bonds**. There is a general name for bonds which have all kinds of options attached for them, which is **exotic bonds**.

6.6

The U.S. government is the largest borrower worldwide. They issue treasury notes, treasury bills, and treasury bonds. **Treasury notes** and **treasury bonds** are semiannual and the difference is that the maturity of treasury notes is between 2 and 10 years, and of treasury bonds is more than 10 years. The **treasury bill** has a maturity of less than 1 year. Also, there are no coupon payments for the treasury bill. The only payments occur at maturity date (interest and principal). State governments can also issue bonds, these are called state bonds. Those issued by county, city, or local governments are **municipal bonds**. Lastly, **foreign bonds**, which are issued by foreign governments or companies.

Now we will see how we can determine the price of a U.S. government bond or note. The same process is used as for corporate bonds. The price is the present value of all future payments. So:

$$\text{Bond price} = \text{par value} \times 1 / (1 + r)^n + \text{coupon} \times r$$

Pricing treasury bills is another thing. Therefore, we have to discount the face value. However, we have to adjust for the days that are left to maturity by using the bank discount rate. The formula is:

$$\text{Price} = \text{face value} \times [1 - (\text{discount rate} \times (\text{days to maturity} / 360))]$$

Since the discount rates that the bank use are not consistent with how we dealt with interest rates before, we have to find a way to compare it with the interest rates. We can convert the rate to the bond **equivalent yield (BEY)** of the bill. First, we need to calculate the holding period return (HPR). We do that as follows:

$$\text{HPR} = (\text{face value} - \text{price}) / \text{price}$$

Next, we use the simple interest formula to make an annual percentage:

$$\text{BEY} = \text{HPR} \times 365 / \text{days to maturity}$$

These two steps in one provide the following formula:

$$\text{BEY} = (365 \times \text{discount yield}) / (360 - \text{days to maturity} \times \text{discount yield})$$

The BEY is comparable with the annual percentage rate discussed earlier. The treasury bill is very important because its yield is the nominal risk-free rate. The U.S. government never defaults. So there is no risk.

Chapter 7

7.1

One of the financial assets of a company is **common stock**. It is a piece of ownership of the company. As bonds, it is a source of finance. The owner will get some cash flow, but it is not predetermined what and when he will get it. We will now discuss some characteristics of common stock.

As said, common stock is a piece of ownership. The latter is an **equity claim**. That means that if debts are paid, the owners of common stock are entitled to assets and residual cash flow. Also, the holder of the stock (the shareholder) has influence on the management of the company. The shareholders choose the board. The board selects the management to actually operate the company. The more shares you have, the more influence you have.

Since the claim of the shareholders is a claim on residual items, it is called a **residual claim**. Bond holders do not have to wait until all liabilities have been satisfied, they get their predetermined amount. The amount that shareholders get is dependent on how much the company has left. The advantage of this is that the payment can be much higher than the bond payment if the company had a profitable year.

As said, shareholders have influence on management. That is represented by votes. Normally you have one vote per share. Companies can also issue nonvoting common stock, or the contrary, super voting rights (multiple votes).

Stocks do not have a maturity date. Since bonds have a maturity date, they are seen as temporary financing, even though the maturity date might be in many years.

The shareholders receive money through dividends. Coupon payments are an interest expense for the company but dividend payments are not. However, the shareholder does pay tax on them.

Depending on where they are, shares have different names. If it is only stated in the charter of the company that it can issue a certain amount of shares, these are called the **authorized shares**. The **issued shares** are the shares that are publicly available. They are divided into **outstanding shares** which are sold and remain publicly available and **treasury stock**, that is the rest that is held by the company. They hold it as a future compensation for management or for future sales. Of course these do not have voting rights, since the company itself cannot vote.

If you have 20% of the shares in a company and the company issues new shares, you do not have 20% anymore. To remain the owner of 20%, companies often give **preemptive rights**. That means that shareholders can buy a fixed percentage of any new issues so that he keeps the same percentage of shares.

7.2

Stock can be sold in two main kinds of markets. First, the **primary market**. That is where the stock is first issued. So there a piece of ownership leaves the company. When a company issues stock for the first time, it goes public. That is called the **initial public offering (IPO)**. Often, investment bankers help companies because they do not know how to do that themselves. He also prepares the **prospectus** which contains information about the upcoming sale and the company.

The investment banker has to perform **due diligence**. That means that he discloses all relevant information before the sale. There are two ways of compensating the investment banker for his work. First, the **firm commitment approach**. Then, the investment banker buys all the stock and sells it for a higher price. The difference is his compensation. That requires him to make a good sale, otherwise he will not get any money. Another option is a **best efforts sale**. Then, the investment banker promises to do his best and gets a certain percentage of the sale.

Second, the **secondary market**. That is the market for sales after the initial issues. The most important secondary markets in the U.S. are the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the National Association of Securities Dealers (NASD) and its trading system, the National Association of Securities Dealers Automated Quotation System (NASDAQ). The first two are physical locations. **Specialist** try to ensure that an orderly market is maintained for the stock. The NASDAQ is virtual (with computers). The sellers these have an **ask price** and the buyers a **bid price**. Dealers make money because they buy at a low price and sell for a higher price. The difference is the **bid-ask spread**.

If the stock prices in a market are generally increasing, the market is a **bull market**. If they are generally decreasing, the market is a **bear market**.

As with everything, the value of a stock is the present value of all future cash flows:

$$\text{Price} = \text{future price} \times 1 / (1+r)^n + \text{dividend stream} \times r$$

7.3-7.4

It is very similar to the formula for pricing a bond. However, since the stock payments are not predetermined, it is way more difficult to price stocks correctly. The price estimation depends on what the general consensus on the market about the future value is, and that can change any minute.

We will first discuss stocks which have a constant dividend stream and are never-ending (infinite horizon). The dividend is then called the **constant annual dividend**. The formula:

$$\text{Price} = \text{dividend} / r$$

That is the same as the formula for a perpetuity, we just replace PV by price and PMT by dividend. The prices of stocks move in the other direction than the return/yield.

Now we will discuss stocks which have a constant dividend stream but do have a finite horizon. First, we need the formula for the future dividend stream:

$$\text{Value future dividends} = \text{dividend stream} \times r = \text{dividend} \times \text{PVIFA}$$

Then we determine the present value of the future price:

$$\text{PV} = \text{price}_n / (1+r)^n$$

For the price, we add up the PV and the value of the future dividends.

It is also possible that the stock dividend grows constantly. Constant growth means that 'the percentage increase in the dividend is the same each year'. We will examine this case with an infinite horizon. Price₀ means the price at this moment, Div₀ means the dividend at this moment, Div₁ means the dividend one year from now. For the growth, we use g.

$$Price_0 = Div^1 / (r-g)$$

This is known as the **Gordon model**.

The last case: constant growth and a finite horizon. The formula is as follows:

$$Price_0 = [Div_0 \times (1+g)] / (r-g) \times [1 - [(1+g) / (1+r)]^n]$$

If dividends do not grow constantly, every future dividend should be estimated and discounted to its present value.

A financial asset can be valued by determining all the cash flows in the future which the owner will receive and what the owner requires as rate of return for the cash flow. Since it is difficult to determine the future cash flows precisely, it is also difficult to determine the value of a financial asset precisely. Remember that the more risk is involved in an investment, the higher the required rate of return is. The second problem with the constant dividend models appears if a company returns a lower dividend than the year before. Then, the growth is negative. A more comprehensive model is necessary that does not need a stable history of dividends. We will provide such a model in the next chapter.

7.5

Preferred stock includes, as the name implies, some preferences. Its dividend has to be paid before dividends are paid to common stockholders. Also, the owners of preferred stock get any assets before the common stockholders if the company goes bankrupt. The dividend that is distributed to owners of preferred stock is constant and preset. Like bonds, preferred stocks have a par value. But that is not returned at maturity, since there is no maturity date. The par value is used when the company stops its operations or when the preferred stock is bought back. **Cumulative** preferred stocks have a special element. If the company does not pay a dividend, it has to pay it sometime in the future. So these will become a liability for the company. Holders of **noncumulative** stocks do not have these rights, so if a dividend is not paid, it will also not be paid in the future. There is a way to price preferred stocks. First, we have to calculate the dividend paid annually. We do that by multiplying the par value by the dividend rate. Then, we can use the constant dividend model with infinite horizon. There is also a formula to calculate the required return:

$$r = dividend / price$$

The r stands for return. That is the return for the stockholder, but also the cost of borrowing money for the one who issues the stock.

7.6

If a market is **efficient**, the costs in the market are minimal and the prices in the market are up to date and considered fair by all traders. There are several kinds of efficiency. First, **operational efficiency**. That is about the accuracy and speed of buying and selling at the best available price. Another type is **informational efficiency**. That is about the speed of reflection of information in the available prices. So if all available information is used, stocks trade at a fair value and the market is efficient. Within informational efficiency, there are three strengths of markets. First, **weak-form efficient markets**. In these markets, 'current prices reflect the price history and trading volume of the stock'. There is no chance to assess the old stock prices to determine future prices. Then we have **semi-strong-form efficient markets**. In these markets, 'current prices already reflect the price

history and volume of the stock as well as all available public information'. So there is no chance to use any public information to gain an advantage. The last form is **strong-form efficient markets**. In these markets, 'current prices reflect the price and volume history of the stock, all publicly available information, and even all private information'. So there is no chance to use insider information to gain an advantage. The general consensus is that the latter form does not exist, since there is always some insider information that is not publicly available. Most research showed that markets are semi-strong.

Chapter 8

8.1

In an ideal situation, the investors get a maximal return and a minimal risk. The outcome of risk and return depends on the investor. If the investor can handle a high amount of risk without having problems sleeping at night, he will go for a riskier investment with a higher return. We can establish the following formula for the profit of an investment:

$Profit = ending\ value + distributions - original\ cost$

That is a formula for the absolute profit (the amount in dollars), we can also establish one for the relative profit (the profit as a ratio):

$Return = profit / original\ cost$

8.2-8.3

Remember that when comparing things, they should be compared over the same period of time. **The holding period return (HPR)** was discussed before, now we need it again. It is the return over the period from the initial purchase to the final sale:

$HPR = profit / cost$

$HPR = (ending\ price + distributions - beginning\ price) / beginning\ price$

$HPR = (ending\ price + distributions) / beginning\ price - 1$

Now that we know how to calculate the HPR, we only have to turn it into the annual returns. One method is by using the simple interest (we will get the annual percentage rate, APR). The other way is to use the compounding interest (we will get the effective annual rate, EAR). If we use the simple interest, this is the formula:

$Simple\ annual\ return = HPR / n$

Where n is the number of years.

If we use the compounding interest, this is the formula:

$EAR = (1 + HPR)^{1/n} - 1$

When you have two different investments, you can either compare them on their APR or their EAR, as long as you do not compare APRs with EARs.

If the holding period is shorter than a year, you have to determine whether you can get the same rate of return for the rest of the year. Otherwise it does not make sense to convert the return into an annual return.

Risk has to do with **uncertainty**. The outcome of an investment is uncertain, even though you sometimes can make a quite good estimation. We can measure this uncertainty with risk. If an outcome is not uncertain at all, there is no risk. Such an investment is said to be risk-free.

Remember the Treasury bills? Since the U.S. government has never defaulted on its Treasury bills, they are risk-free because their outcome is certain. It might be an option to consider the historical returns of an investment. Therefore, we need to introduce the term cap. That is an abbreviation of capitalization and it represents the price of the company stock times the outstanding shares. So actually the cap is the net value of the company. If that net value is more than \$5 billion, the stocks are large-cap stocks. If the net value is less than \$1 billion, the stocks are small-cap stocks. The latter normally have a higher return, but also a more fluctuating return. The Treasury bills normally have the lowest return, but is risk-free, also over time. You can also take a look at the most common returns instead over the average returns. Then you will see that there are more different returns for small-cap stocks, and that the U.S. Treasury bills returns are bunched together since they provide a stable return. You can also take a look at the possible range of outcomes.

8.4

Now we have come to some statistics. The variance measures the 'statistical dispersion by finding the average squared difference between the actual observations and the average observation'. So you compare each and individual score with the mean of all scores to get the variance. The formula for that is the following:

$$\text{Variance (x)} = \sum [(x_i - \text{average})^2] / (n - 1) = \sigma^2$$

We also need the **standard deviation**. It can be calculated by taking the square root of the variance:

$$\text{Standard deviation} = \sqrt{\text{variance}} = \sqrt{\sigma^2} = \sigma$$

To give any meaning to the outcomes, we have to introduce the bell-shaped curve, which can be found on page 219. If you standardize outcomes, the mean of the sample is zero and the standard deviation is one. We can say three things about this normal distribution. First, 68% of the observations will be within one standard deviation of the mean. Second, 95% of the observations will be within two standard deviations of the mean. Third, 99% of all observations will be within three standard deviations of the mean. What can we do with the standard deviation? The greater the standard deviation of the return of an investment, the greater the uncertainty of that investment, and thus the greater the risk. Looking at historical returns, we can range different investments from low risk to high risk: Treasury bills, government bonds, large-company stocks, and small-company stocks.

8.5-8.6

When making a choice about an investment, you can take different views. When you look back at the history, you take an **ex-post** view. When you look at possibilities in the future, your view is **ex-ante**. For the latter, to make a good estimation, you need to know the probabilities of the different possibilities. The formula for the expected payoff is as follows:

$$\text{Expected payoff} = \sum \text{payoff}_i \times \text{probability}_i$$

So if the chance of winning \$10 is 60% and the chance of losing it is 40%, the expected payoff is \$10 x 0.6 - \$10 x 0.4 = \$2

The expected return as a percentage is then the expected payoff divided by the price you paid. If that is \$25, the expected return is $2/25 \times 100\% = 8\%$

That was the return part. The other part is the risk, calculated as follows:

$$\sigma^2 = \sum (\text{payoff}_i - \text{expected payoff})^2 \times \text{probability}_i$$

In this case:

$$\sigma^2 = (\$10 - \$2)^2 \times 0.6 + (-\$10 - \$2)^2 \times 0.4 = \$96$$

$$\sigma = \$96^{1/2} = \$9.80$$

All probabilities added up are always 1, and negative probabilities do not exist.

If you know the risks and returns of several investments, you can compare them and see which investments are best for you. If you consider two investments, and the expected returns are the same, you should pick the one with the lowest risk. If two investments have different expected returns but the risk level is the same, you should pick the one with the highest expected return.

8.7

To make risk as low as possible, you can diversify your investment **portfolio**. **Diversification** is taking different investments to reduce the risk of the whole portfolio. Why is that? Because of **correlation**. That is something that measures how different investments work together in different states of the economy. The **correlation coefficient** tells you how high this correlation is. It is a number that varies from -1 to 1. All values above zero indicate **positive correlation**. That happens when the returns of two investments move in the same direction. If the value is 1, they are perfectly correlated. All values below zero indicate **negative correlation**. That happens when the returns of two investments move in a different direction. If the value is -1, they are perfectly negatively correlated. If stocks are perfectly positively correlated, it does not make sense to invest in both. The closer the value of the correlation coefficient comes to -1, the bigger the effect of diversification on the investment portfolio.

There are different types of risk. First, **unsystematic risk**. That is industry- or firm-specific risk. So that is risk that is incurred by one company or one industry. We also have **systematic risk**. That is risk incurred by the whole economy. The first type, unsystematic risk, is **diversifiable**. That means that you can reduce it by diversifying your investment portfolio. Systematic risk is **nondiversifiable**. If we diversify our portfolio greatly, the only risk that is left is systematic risk. Such a portfolio is called a **well-diversified portfolio**.

8.8-8.9

We can measure systematic risk with **beta**. That measures the volatility of an investment with the whole market. So it examines the return of an investment relative to the market where it is in. the average beta is 1.0. If an investment has a beta of 1, it has the same risk as the whole market. If the beta is bigger than 1, it involves more risk, and if it is lower, it involves less risk. If the beta is zero, there is no risk (U.S. Treasury bill). This formula tells us how we can find the beta of a portfolio:

$$\beta_p = \sum w_i \times \beta_i$$

w_i means how an individual investment is weighted in the portfolio. β_i is the beta of the individual investment. We can make a graph with the risk on the horizontal line and the expected return on the vertical line. The line in the graph is called the **security market line (SML)**. Before we do that, we have to say this: the risk-free rate is the basic reward for waiting, the expected reward is greater if the risk is greater, and there always is a trade-off between risk and rewards. Where beta is zero, the SML intercepts the vertical axis. That value for the vertical axis (the expected return) is the expected return without systematic risk. **The market risk premium** is the extra return you get for accepting the risk on the market. It is represented by the slope of the SML. It is also called the **reward-to-risk ratio**.

There is a model to explain the behavior of prices; the **capital asset pricing model (CAPM)**. It says that the expected return depends on the reward of waiting (so actually the time value of money), the reward for the risk you take, and how high that risk is. The formula for the expected return of an individual investment using the CAPM is the following:

$$E(r_i) = r_f + [E(r_m) - r_f] \times \beta_i$$

The market risk premium is the expected return on the market minus the risk-free rate, so that is $E(r_m) - r_f$. So if the market risk premium is given, you should fill that in in the formula instead of the part between []

Chapter 9

9.1

We distinguish between short- and long-term decisions on base of three elements. First, the length of effect. Second, the cost. Third, how much information needs to be gathered before the decision can be taken. Normally, the more the first two, the more the third as well. **Capital budgeting decisions** are decisions on the long term. These cannot be undone easily, only when you pay a lot for it. Capital budgeting concerned 4 steps: planning, appraising, comparing, and selecting the projects for the long term. The long term is usually longer than one year. Capital budgeting decisions are normally to do or not to do something. To make such a decisions, a precise estimation about the timing and amount of money needed for it is necessary. Whether to invest or not to invest depends on the criteria that are predetermined. We will now discuss several models that can be used to either accept or reject investments. For numerical examples of all approaches, see from page 254 on.

9.2

First, **the payback period**. Then, you need to know what the future expected revenues are. These are subtracted from the initial payment year by year, until you reach zero. When you do not reach zero on a whole year, you are going to calculate the months necessary in the last year to reach zero. You do that by taking the expected revenue for that year and dividing it by the remaining amount of the initial payment. That number should be multiplied by 12 for the amount of months needed, or by 365 for the amount of days needed. Hereby we assume that the amount of expected revenue in a year is spread equally over the year. We ignore the time value of money when using this approach. We also ignore the cash flows that occur after that the initial payment is recovered.

Another approach is the **discounted payback period**. It is actually the same as the payback period, but now we take into consideration the time value of money. So we take the expected cash flow in year one and divide it by $(1+r)$. We subtract that from the initial payment. Then we take the expected cash flow in year one and divide it by $(1+r)^2$. We then subtract that from the remaining part of the initial payment. Etcetera. We still ignore the cash flows that occur after the recovering of the initial payment.

9.3

Next is the **net present value (NPV)**. That is the most important model. Thereby, all future cash flows are discounted and added up, also including the initial payment. If the eventual amount is positive, you should invest, if it is negative, you should not. The discount rate to use is r , the cost of capital. The formula for NPV is:

$$NPV = -CF_0 + CF_1 / (1+r)^1 + CF_2 / (1+r)^2 + CF_3 / (1+r)^3 + \dots + CF_n / (1+r)^n$$

If two investments both have a positive NPV, you take the one with the highest NPV. If projects are mutually exclusive, it means that if you pick one, you cannot pick one or more others. That can happen when you only need one project, or when you do not have enough money to pay for more projects. If the cash flow is constant, you can simplify the formula by taking the formula for PV we already used in chapter D:

$$PV = PMT \times [1 - [1 / (1+r)^n]] / r$$

9.4

What if the projects do not have the same live? So the one will work for the coming 8 years, but the other only for the coming 6 years. How can we compare them? One way is to find the common life. In this case, that will be 40 ($5 \times 8 = 40$ and $4 \times 10 = 40$). So then you take the future cash flow stream and assume it will go on like that 5 more times for the one for 8 years, and 4 more times for the one with 10 years. Then you can compare their NPV. Another way is to find the **equivalent annual annuity (EAA)**. That is actually the same as the time value of money we used for an annuity in chapter D.

$$PVIFA = [1 - [1 / (1+r)^n]] / r$$

$$EAA = NPV / PVIFA$$

The higher the EEA, the better that investment.

Next is the internal rate of return (IRR). That is the discount rate that gives a NPV of zero. That means that the future cash flows are as much as the initial payment.

$$0 = -CF_0 + CF_1 / (1+r)^1 + CF_2 / (1+r)^2 + CF_3 / (1+r)^3 + \dots + CF_n / (1+r)^n$$

It takes a lot of trial and errors before we get to the right r . Beforehand, we establish a **hurdle rate**. That is the required rate of return. If the IRR we will eventually find is higher than the hurdle rate, the project will be accepted. If the IRR will be lower, the project will be rejected. What should be the discount rate for a project? You can take some discount rates and plot them, then you get a **NPV profile of a project**. The x-axis shows the discount rates, and the y-axis shows the amount of dollars. Where the line intercepts the x-axis, the PV is exactly the initial project. That point shows the IRR. Where the line intercepts the y-axis, the discount rate is zero. When you plot to projects, the one with the higher IRR should be selected. The two lines might intersect each other, that point is the crossover rate. It can be found by equating the two equations for the IRR. The outcome is the crossover rate. The IRR is also not perfect. Sometimes, there are multiple IRRs possible. Also, it is assumed that the money earned can be reinvested at the same rate continuously. That might not be the case.

To take that into account, the **modified internal rate of return (MIRR)** is used. That approach assumes that the cash flows are reinvested at the cost of capital for the firm. That rate is normally lower than the IRR. You then calculate the future value of all future cash flows by converting them to the point in time where the last future cash flow occurs. Then you can calculate the MIRR:

$$MIRR = (FV/PV)^{1/n}$$

9.5

Another approach is the **profitability index (PI)**. The formula is:

$$PI = \text{present value of benefits} / \text{present value of costs}$$

If the outcome is bigger than 1, the project should be accepted. If the outcome is lower than one, it should be rejected. Recall that the NPV is the present value of the benefits minus the costs. So if we add the costs again, we have the PV, or the present value of the benefits. The outcome is the dollar amount of return for every dollar that you invest in the project.

An overview of all models is available on page 277.

Chapter 10

10.1

Cash flow and profits are not the same. **Cash flow** is what you actually get or spend. **Profits** are the measure that accountants use for performance. That means that you cannot spend profits, but you can spend cash. The distinction between cash flows and profits makes it possible that you lose money (your profits are negative) but you still pay dividends. That can occur because for instance the depreciation expense is very high. That is a expense where you do not pay money for, but the accounting principles require that you subtract it anyway. We will now explain how to calculate the **operating cash flow (OCF)**, which is the cash flow that is estimated to be generated by the basic

operations. You start with revenue, and subtract cost of goods sold, selling, general, and administrative expenses, and depreciation. Then you have EBIT (earnings before interest and taxes). Next you subtract taxes and now get the modified net income. Next you add back depreciation and then you have OCF. The formula for OCF is:

$$OCF = EBIT + depreciation - taxes$$

10.2

When you decide to take on a new project and it will create more cash flow than the current cash flow is. The additional cash flow that is generated is called the **incremental cash flow**. It is influenced by several issues. First, **sunk costs**. these are costs that you have already paid and cannot be undone. They cannot be of influence for the go or no-go decision for a project, since you have to pay them anyway. Often people tend to think like 'but we have already put so much money in it, now we have to go on'. But that is wrong. Next are **opportunity costs**. These are cash flows that do not really happen but that would happen if you would not choose the project. So if you have project A and B, and you will take B, than you will not get the benefits that A would generate, these benefits are opportunity costs. These have to be included as a outflow/cost of the project. Next, **erosion costs**. If a company introduces a new product, it might be that their other products are sold less. The decrease in sales from the other products generates erosion costs. If another company introduces a new product and therefore the sales of your company decrease, these are NOT erosion costs because they would have occurred as well if you would not have taken on your own project. Fourth, **synergy gains**. That is the opposite of erosion costs. For instance, if a coffeemaker introduces coffee milk, it might sell more coffee because more people now like it because there is milk available that complements the coffee. These extra sales of existing products are called synergy gains. Fifth, working capital. If you introduce a new product, you need some starting inventory. For instance, when you sell something in bottles, you first need some bottles and you have to pay for them. Eventually when you stop operations you can sell these last bottles, but it means that in the first year you incur some extra costs. The costs of that initial inventory is called **working capital**. Two other things need to be taken into account, the capital expenditures and the depreciations and cost recovery of divested assets. These are more complex so we will discuss them more comprehensively.

10.3

If a company buys machines or other assets, they need to be depreciated. **Depreciation** is expiring the cost of a tangible asset that is for long-term use over the time that it can be used. One way to do that is using straight-line depreciation. Then these assets are reduced in value with the same amount every year. You calculate that amount by dividing the initial cost by the number of years that the asset is useful. Another option is the **modified accelerated cost recovery system (MACRS)**.

Then, the depreciation amount accelerates each year. With the latter method, it is not necessary to estimate a residual value because the government says you can depreciate till 100% is depreciated. Tables which show the percentages of depreciation using different useful lives are depicted on page 302. The fact that you can write off more in the early years is an advantage of MACRS because depreciation expenses are deductible for tax.

10.4

If an asset is sold before it is totally depreciated, you can gain on tax or lose on it. that depends on the book value of the asset at the time of sale. The **book value** is the initial cost that you paid for the asset minus all the depreciation. If the selling price is higher than the book value, you gain on the sale. If it is less, you lose. However, when you gain on the sale, you have to pay taxes over this gain (tax loss!), which means a cash outflow. So the total cash flow than is the selling price minus the tax on gain. When you lose on the sale, there is a tax credit (tax gain!), which means a cash inflow. So the total cash flow than is the selling price plus the tax credit on loss. If the selling price and the book value are the same, the cash flow is equal to the selling price. Of course the book value is nothing if the asset is totally depreciated.

10.5

We will now summarize the steps you need to take to project the cash outflow for a new product. First, the initial capital investment for the project needs to be determined. Then, the cash flow that the project will generate in each future period needs to be estimated. Therefore, you can make a modified income statement for every period. Third, the change in working capital has to be determined, both at the beginning and at the end. Thereby the gain or loss on a possible disposure also needs to be determined. Lastly, a go or no-go decision should be made by using the NPV model

Chapter 11

11.1

Often, companies do not have enough money to pay for an investment right away. Therefore they need to borrow it. Borrowing is of course not free. The costs companies incur are called the **cost of capital**. Companies can borrow money from several sources. There are different financing methods. When a company sells bonds or borrows from a bank, the financing is called **debt financing**. We use the abbreviation R_d for that. Normally we only look at the long-term debt when considering debt. Account payable are an example of short-term debt, but we do not take that into account when assessing debt. A second manner is **equity financing**. That happens when a company raises capital by using its internal funds, or by selling common stock. The abbreviation is R_e . The third and last way is **hybrid equity financing**. That is when the company sells preferred stock. The abbreviation is R_{ps} . It is called hybrid because the payment is comparable to debt, but the principal is not repaid, and that looks more like equity. These ways of raising capital all have a different cost of capital. The average of these costs is called the **weighted average cost of capital (WACC)**. We will reconsider several things, for instance the yield to maturity of a bond, which will be used to establish the cost of debt. Also the constant dividend model will be uses again to assess the cost of preferred stock. Lastly, the SML (security market line) will be used for the cost of equity.

Remember that we used 'r' all the time as discount rate? Until now, this r was given, but actually r is the WACC! So now the formula becomes the following:

$$NPV = -investment + \sum cash\ flow_t / (1 + WACC)^t$$

Another method we discussed was the IRR, the WACC represents the hurdle rate in that approach. So:

IRR > WACC à accept project

IRR < WACC à reject project

11.2

We will now discuss the different components of the WACC more extensively. The cost of debt is how much return the holder of the bond or the bank wants to get for his money. For the company, it represents how much rate it pays on the debt it currently has. We already discussed the yield to maturity (YTM) of a bond, which is equal to R_d . the formula now:

$$\text{Price} = \text{par value} \times 1 / (1 + \text{YTM})^n + \text{coupon} \times \text{YTM}$$

So the only difference is that we replace r by YTM. Recall that often an investment banker is used to sell the bonds. The cost that is paid for him reduces the actual return from the sale. So the net proceeds from the sale of bonds is the amount of money you need to use to determine the cost of debt. And these net proceeds determine the cost of debt rather than the market price. The cost paid to the investment banker are flotation costs.

As we already discussed, holders of preferred stock get a constant cash dividend. Also, there is not maturity date. Therefore we can use a formula that we already established, the perpetuity model:

$$\text{Net price} = \text{dividend} / R_{ps}$$

Which means that:

$$R_{ps} = \text{dividend} / \text{net price}$$

To determine R_e , the cost of equity, we can use the SML:

$$R_e = E(r_i) = r_f + [E(r_m) - r_f] \times \beta_i$$

So the expected return is the same as the cost of equity.

Another way to establish R_e is by using the dividend growth model:

$$R_e = [\text{Div}_0 \times (1+g)] / P_0 + g$$

We can include flotation costs in the formula:

$$R_e = [\text{Div}_0 \times (1+g)] / [P_0 \times (1 - F)] + g$$

These two approaches can generate different results. If we know the data to use both formulas, we can average the results to get a proper R_e .

Companies generate cash by operating their business. That cash can be reinvested in the company. The retained earnings are the profit that is left after all the liabilities are paid. They can use it to pay to the common stockholders, but they can also reinvest it in the company. So the cost of retained earnings is actually the loss of dividend for the owners.

We also need to include tax in our story about dividends. A company pays interest on funds that they borrow, and that interest expense is deducted from taxable income. Therefore, it is a cost saving for the firm, since the taxable income becomes less and the firm thus has to pay less taxes. We can include this finding in the formula for WACC by multiplying the cost of debt by $1 - T_c$, where T_c is the tax rate:

$$\text{After-tax cost of debt} = R_d \times (1 - T_c)$$

11.3

We already discussed the book value before. A book value also exists for a liability; it is the cost of the liability which is stated on the balance sheet. With the book values of the different liabilities, the financing mix that the company uses can be assessed. Therefore we need to introduce some letters. D stands for debt, E stands for equity, PS stands for preferred stock, and V is the total value of the firm. Now we can introduce the formulas:

Equity weight: $E / V = (\text{common stock} + \text{retained earnings}) / \text{total assets}$

Debt weight: $D / V = \text{long-term debt} / \text{total assets}$

Preferred stock weight: $PS / V = \text{preferred stock} / \text{total assets}$

If we make percentages out of these weights, than they add up to 100%.

If we know the various percentages, and we include the advantage of tax, we can establish a formula for the adjusted weighted average cost of capital:

$$\text{WACC}_{\text{adj}} = E / V \times R_e + PS / V \times R_{ps} + D / V \times R_d \times (1 - T_c)$$

We now used the book value to determine the weights of the different funds. Another way is to use the **market value**. The market value is the price which is now asked or offered on the market. That is a better way to weight, but it is not always available since market prices cannot always be estimated.

11.3-11.6

We already discussed before that not all projects per definition have the same discount rate, and thus the same WACC. For a numeric example of this, see page 333.

We can look at a company as a bundle of projects. But what betas should be assigned for all these projects? The most easy way to assign betas is **pure play**. Then, you try to find a company who's only business is the business you project is about, and check what beta that firm uses. Especially when you take on projects in areas which are not familiar to you, this might be a useful option. Another option is to use a beta for the whole company, and adjust it for each project. If the perceived risk of the project is higher than normal, the beta should be increased. Similarly, if the perceived risk is lower, the beta should be decreased.

As always, there is not enough money to do everything. So the company should first check which projects have a positive NPV, and then spread the available funds over the most valued projects. If you have some money left after investing in projects, that money can be invested by lending it out, or it can be returned to debt and equity sources.

Chapter 12

12.1

To estimate future cash inflows and outflows and to detect any possible shortcomings and surpluses, an analytical tool is used: **the cash budget**. To predict whether an excess or a short-fall will be the outcome, several steps are used every month. First, the cash receipts are estimated. Then, the cash disbursements are estimated. Next, the disbursements are subtracted from the receipts to get the net cash flow. Then, the beginning cash is added to the net cash flow to get the ending cash. Next, the reserve for cash is subtracted and the excess or short-fall remains. The reserve for cash is an amount of cash that the company wishes to always have. Therefore it should be subtracted, since it is not available for use. We already introduced the cash receipts, but what are they? They can occur because of cash sales from the operating part of the company (products and services), accounts receivable, cash sales from assets (for instance equipment), or they can come from funding sources like bank loans or bond or stock sales. The cash disbursements represent how the cash is used. It can be used for cash purchases, account payable, payments on liabilities, wages and salaries, and more. For the complete list, see page 354.

12.2

We already discussed that the cash inflow does not have to be at the same moment that the sale occurs. That should be kept in mind when establishing the sales forecast. So two important things to know are when the sales occur, and when the money for that sale will be received. Sales revenues can be estimated using various methods. First is to take the growth rate of sales from the previous two years and average is. You can also choose to just take the growth rate of the previous year. Another option is to use the average increase in dollars, so the absolute growth instead of the relative. Two kinds of data exist that can be used for the forecast. First, **internal data**. That is information that is from within the firm. **External data** come from outside the firm.

12.3

The cash inflow can be estimated based on the sales data and the agreements on when the cash payment will occur. For instance, you agree with 50% of the buyers that you will be paid two months later, with 30% that you will be paid 1 month later, and with the rest that you will be paid in cash immediately. Then you know that the cash inflow for January will be 50% of the total sales in November, 30% of the sales in December, and 20% of the sales in January.

The main goal is to have enough money to fulfill liabilities and to be able to deal with any unexpected situations, but to not have too much money because you could have invested it to earn money on it. The things for which cash is paid can be divided into 4 categories, the first two being the most important because they concern the daily activities of the firm. First, accounts payable for materials and supplies. Second, salaries, labor wages, taxes, and other operating expenses. Third, capital expenditures. Fourth, long-term financing expenses.

12.4

If there is a shortfall of cash, management can deal with that in several ways. First is to take the money from the savings account, if there is enough in there. However, that is not very common. The most used approach is to take a bank loan. These loans are often agreed on beforehand, and called a **line of credit**. It works as follows. The bank lets the company borrow up to a certain amount of money. The firm can borrow the whole amount, but it can also borrow nothing, or part of the

amount. It is unsecured, which means that if the firm defaults, there is no backing in the form of an asset.

Often, the bank requires the firm to sometimes pay off the whole amount for a certain period; called the **clean-up period**. Another form of bank loans is **secured loans**. Then, an asset does back up the bank in case it cannot pay for its liability. There are more options, for instance the **commercial paper**. That is a financial asset that the company sells to investors, like stocks and bonds. These papers have a very short maturity dates, normally less than 90 days. The maximum is 270 dates. Another option is a **banker's acceptance**. To explain this, we need an example. A car dealer gets money and buys cars for it. Then he sells the cars, and with the money he gets for that he pays off the banker.

If there is a surplus in cash, a firm can do several things with it. The easiest option is to put it in a savings account. They can also invest it in **marketable securities**. These are investments which are convertible to cash in a short period of time. Another option is to pay back money to lenders and owners. Third, old assets like machinery can be replaced. The last option is the reinvest it in the company by taking on projects.

12.5

When planning on the short-term, income statements, statements of cash flow, and balance sheets are used. Not for the actual events, but for the forecasted ones. These are called **pro forma financial statements**. So once the sales and operating estimations are made, these statements can be set up. You can establish them by using the financial statements of the year before and what the changes are and the second input is the estimation of the sales for the year that has yet to come. We will now explain how the previous balance sheet is used. Each category is represented in an absolute and relative amount. So the amount in dollars is written down, but the percentage it is of for instance total sales or total assets. If you estimated the sales amount for the coming year, you can use the same percentages to estimate every category of the statement.

We will first discuss the pro forma income statement. If you look for instance at the percentage next to 'total cost of goods sold', you might see 50%. If that is the percentage of sales, it means that for every dollar you sold, 50 cent was used to pay for the production of it. If the predicted sales growth is for instance 5%, you increase the dollar amount of sales by 5% and then you multiply that amount by 0,5 (50%) to get the dollar amount of total cost of goods sold. You do that for every category. Next, a few things need to be adjusted. For instance, depreciation tends to go down, and not up. Also, the fixed costs normally stay the same, but the variable costs may increase when more sales occur. So the percentages of fixed and variable costs may change. So the percentages are a good way to start, but still adjustments are necessary.

Next, the pro forma balance sheet. We use the same approach with percentages here. Also, some adjustments are necessary. For instance, if new assets are acquired or old ones are sold, the assets percentage needs to be adjusted.

Chapter 13

13.1

We already briefly touched the working capital. In this chapter we will discuss the working capital management. It is all about improving the flows of money for a company. Remember: the amount and the timing of flows is what it is all about. Before the company gets paid for its products, it first has to pay to produce them. So there is a gap. The cash conversion cycle (CCC) helps understanding that gap. It consists of three sub cycles. First, the production cycle. That is how long it takes to produce and then sell the product. Then, the collection cycle. That is how long it takes to get the money from customers. Last, the payment cycle. That is how long it takes to pay for labor and suppliers. The formula:

$CCC = \text{production cycle} + \text{collection cycle} - \text{payment cycle}$.

The first two sub cycles together form the business operating cycle. That focuses just on the core business. There is no fixed time for the different cycles, so normally average times are used. We will now discuss how we can come to those average times.

First, the average production cycle. Therefore we first need to know the average inventory. The formula is the following:

$\text{Average inventory} = (\text{beginning inventory} + \text{ending inventory}) / 2$

Next, we have to calculate the time in which the company turns over the inventory. Therefore, we need the cost of goods sold. The formula: **$\text{Inventory turnover} = \text{cost of goods sold} / \text{average inventory}$**

Now we are ready to calculate the average production cycle. We assume 365 days in a year. The formula is the following:

$\text{Production cycle} = 365 / \text{inventory turnover}$

But what does the outcome of this mean? It means that it takes on average that amount of days to deliver an order after that it is received.

Next we have the average collection cycle. Another term for it is the average accounts receivable cycle. That is a flow in the other direction; from the customer to the company. The ones who pay in cash immediately are not included, only the ones who pay on credit. We use similar steps as in the average production cycle. We first need to know the average account receivable. The formula is the following:

$\text{Average accounts receivable} = (\text{beginning accounts receivable} + \text{ending accounts receivable}) / 2$

Next, we have to calculate the time in which the company turns over the account receivable. Therefore, we need the credit sales. The formula:

$\text{accounts receivable turnover} = \text{credit sales} / \text{average accounts receivable}$

Now we are ready to calculate the average collection cycle. We assume 365 days in a year. The formula is the following:

$\text{Collection cycle} = 365 / \text{accounts receivable turnover}$

The outcome of the latter formula tells you how long it takes for a customer to pay his bills, on average.

Now we have come to the last sub cycle of the average cash conversion cycle. That is the average payment cycle. It is sometimes called the account payable cycle. Again, we use a similar process to calculate it. We first need to know the average account payable. The formula is the following:

Average accounts payable = (beginning accounts payable + ending accounts payable) / 2

Next, we have to calculate the time in which the company turns over the accounts payable. Therefore, we need the cost of goods sold again. The formula:

accounts payable turnover = cost of goods sold / average accounts payable

Now we are ready to calculate the average payment cycle. We assume 365 days in a year. The formula is the following:

Payment cycle = 365 / accounts payable turnover

The outcome of the latter formula tells you how long it takes for the company to pay its bills, on average.

Now that we know how to calculate the three different sub cycles of the cash conversion cycle, we can calculate the cash conversion cycle. The formula is the following:

Average cash conversion cycle = production cycle + collection cycle – payment cycle.

The outcome tells you how much time is between paying for the material you need to produce and the payment you receive for your final products.

We often assumed that the cash flow was quite steady, but usually that is not the case. Seasons and the state of the economy play a role in the fluctuations of cash flow.

13.2

If the company does not allow customers to make credit payments and it does not buy things on credit itself, it means that the CCC (cash conversion cycle) just includes the production cycle. That means that credit is the most important part of the CCC. For the company, it is most beneficial to have as much money on hand as possible. Therefore they want two things. First, they want to collect the payments from their customers as soon as possible, so that more cash is available. Second, they want to extend payments to their suppliers as long as possible, for the same reason. Interesting here is that accounts receivable for the one are the account payable for the other and vice versa.

So the suppliers want their money as soon as possible, but the company wants to wait as long as possible. That makes credit a two-sided coin. If a company allows its customers to make credit payments, it should carefully think of how to deal with these credit payments. They need to think of what customers are allowed to make credit payments, in what manner and in what period of time they have to pay the credit amount, and they need to establish a plan B for when the customers do not pay their bills on time. We will discuss these three things in more detail.

First, who is allowed to extend payment? The most important elements to determine this are the background of the customer and his potential for business. So if you will probably make big sales in the future with this customer, you will probably allow him to extend payment. It is also important to check what similar companies do. If they allow customer to extend credit, and you do not,

customers will probably prefer the other company. It is possible to screen potential customers on their credit. It costs to do so, but sometimes the benefits are higher than the costs.

The second consideration was the manner in which customers are allowed to extend payments. Companies often look at what other companies do. There are certain ways to write down the allowed extension of payment. Often, if a customer does pay within a certain period of time, he is given some discount. For instance, a company might give its customers 1% discount if they pay within 10 days. They may also choose to pay within 60 days, but then they do not get any discount. The way that would be written down is the following:

1/10 net 60

Where the first number stands for the discount, the second for the period of time in which the discount is given, and the third number for the number of days in which the customer has to pay anyway. For a numeric example about what is the better option in a specific situation, check page 390.

The last consideration concerns the customers who do not pay on time. Those debts are called bad debts. There are two possibilities to deal with such customers. First is to write off the amount as uncollectible. The second possibility is to take action. The first action normally is to send a letter that he paid to late and that he now has to pay some extra. The letter will also state a new date for payment, and another extra amount that the customer has to pay when he then still does not pay. If that not works, the company might take some other more expensive action. For instance they may hire a collection agency or go to court. If they do not want to do so, they can still write it off as bad debt. A collection agency normally takes a percentage of the amount as fee, usually one third, so 33%. Going to court is even more expensive.

13.3

The **float** is the time between the moment that the customer makes is payment, and the moment that the company receives it. If the company initiates a payment and the supplier receives it later, the float is called a disbursement float. The receiver of the money who has to wait for his money, has to deal with a collection float. Again the objective in 'playing' with these floats is to have as much money as possible. So the longer the disbursement float the better, and the shorter the collection float the better. How can they do that?

We will first discuss how to collect sooner. Often, lockboxes are used. These are post office boxes at a post office which is nearest to the bank of a company. So then they do not have to collect the money first and bring it to the bank later, but it is immediately received by the bank. Also, many payments are made using electronic transfers. **EFT means electronic funds transfer**. It makes use of the Internet to transfer funds between banks immediately. That makes a major difference because no paper and post offices are needed which reduces the time significantly.

Now we will discuss how to extend payment as long as possible. The best option is to use credit. There are also other methods, but companies have to be careful because if they use tricky methods, the relationship between the supplier and the company might be hurt.

13.4-13.5

The next topic is the management of inventory. Inventory is a special element of a business. On the one hand, you need it because otherwise you might not be able to comply to the wishes of your customer. But on the other hand, carrying inventory costs you money so too much inventory is not desirable. Several models were established to deal with the inventory.

First, the ABC inventory management. This method distinguishes between different kinds of inventory. The A stands for the critical inventory items, or the large dollar items. The B stands for the essential inventory items, or the moderate dollar items. The C stands for the non-essential inventory items, or the small dollar items. The inventory items belonging to the A category need more attention and may be counted and reordered daily. The B items may be assessed less frequently, and the ones in the C category may even just be reordered when there is nothing left.

Another important element is to look at redundant inventory items. Such an item is not utilized in current operations but are just necessary when an item that is currently used fails. Then, the redundant item can replace the one which is used now.

How much inventory do you need? The perfect amount of inventory can be calculated with the **economic order quantity (EOQ) model**. Therefore we need two costs associated with holding the inventory. First, the ordering and deliver costs of the inventory. Second, how much it costs to carry the inventory. This method works well when the number of inventory items that is used is spread equally over time. The ordering costs can be calculated as follows:

$$\text{Total annual ordering costs} = OC \times S / Q$$

OC stands for the costs per order, S stands for the annual sales, Q stands for the size of each order. Next we have to calculate the carrying costs:

$$\text{Total annual carrying cost} = CC \times Q / 2$$

CC stands for the carrying costs, and Q again for the size of each order. We divide it by two because we have to know the average inventory. The total ordering costs are the n the carrying costs plus the ordering costs. For numeric examples see page 398 and 399. Now we can determine the EOQ:

$$EOQ = \sqrt{2 \times S \times OC / CC}$$

The **reorder point** tells us when we should set a new order, at what level of inventory. The formula is the following:

$$\text{Reorder point} = \text{days of lead time} \times \text{daily usage rate}$$

The **safety stock** is some extra inventory that we need to keep for if some inventory is not delivered on time. Then we still have some inventory to cover the orders that we receive. So the formula for the average inventory becomes the following:

$$\text{Average inventory} = EOQ / 2 + \text{safety stock}$$

Another system to manage the inventory is the **just in time (JIT)** system. Then, the carrying costs are reduced as much as possible. So the ultimate goal is to make sure that inventory is delivered just when it is needed. It works also if we look at the EOQ model because if the ordering costs are almost zero, the most optimal order quantity is close to 1.

We will now discuss the relationship between the working capital expenses, the income statement, and the operating cash flow. If we keep operating at the same level, the cost of goods sold will represent the usage of supplies and remain constant. As we said before, when the business stops operating, there will be a certain point that inventory is not replaced anymore, but used up. Then, there will be a cash inflow because products are sold but no inventory is bought anymore. From page 404 on, a numeric example combining the working capital management with previous chapters is given.

Chapter 14

14.1

We already took a quick look at the balance sheet and the income statement, in this chapter we will discuss them in more detail. The balance sheet is called a balance sheet because its left and right side always are in balance. So:

Assets \equiv liabilities + owners' equity

The balance sheet shows the assets, liabilities, and owners' equity of the company at a certain point in time. The income statement, on the contrary, shows the activities of the company over a certain period of time. Normally that period is a year, but often these statements are presented more often. The last line of the income statement shows the earnings per share (EPS). You can calculate that by dividing the net income by the number of shares outstanding.

Benchmarking is an important time in analyzing. It means comparing one's performance with the performance of competitors or with the own historical performance. To compare objectively, one needs to compare using the same measures and over the same period of time.

Net income can be calculated in the following way:

Sales revenue

- **Cost of goods sold**
- **Selling, general, and administrative expenses**
- **Depreciation** +

EBIT

- **Interest** +

Taxable income

- **Taxes** +

Net income

Note: even though there are plusses at the end of the line, there are minus signs. So for instance the first part means sales revenue – cost of goods sold, - selling etc, - depreciation.

You can use this to predict the net income, but you can also compare it with previous growths of income, like we did before. There is no better way, it just depends on the preferences of the company. To compare objectively with other firms, we can convert the statements into common size financial statements. Then, all parts of the statement are represented as a percentage of sales. You can then compare percentages instead of actual numbers.

14.2-14.3

Another way to compare is by using ratios. Financial ratios represent the relationships between accounts in financial statements.

First, liquidity ratios. They measure how well a company is able to pay its short term debts on time. These three ratios are liquidity ratios:

Current ratio = current assets / current liabilities

Quick ratio (or acid ratio test) = (current assets – inventories) / current liabilities

Cash ratio = cash / current liabilities

But what do the outcomes tell us? The current ratio shows how many times the current liabilities are backed up by the current assets. The quick ratio shows the same but leaves the inventory out of the calculation. The cash ratio shows what percentage of the current liabilities is backed up by the available cash.

Next are the financial leverage or solvency ratios. These measure how well a company is able to pay its long term debts on time. These three ratios are financial leverage ratios:

Debt ratio = (total assets – total equity) / total assets OR total liabilities / total assets

Times interest earned = EBIT / interest expense

Cash coverage ratio = (EBIT + depreciation) / interest expense

But what do the outcomes tell us? The debt ratio shows how much debt there is for every dollar of assets. The times interest earned shows how many times the interest obligation is backed up by the earnings before taxes and interest expenses are paid. The cash coverage ratio shows how well the company is able to generate cash by just operating the daily operation. Depreciation is added back because it is an expense but not paid with cash and we want to know the cash amount available.

Third we have asset management ratios. They indicate how well the company uses the assets to gain revenues. There are **five asset management ratios**:

Inventory turnover = cost of goods sold / inventory

Days' sales in inventory = 365 / inventory turnover

Receivables turnover = sales / accounts receivable

Days' sales in receivables = 365 / receivables turnover

Total asset turnover = sales / total assets

But what do the outcomes tell us? The inventory turnover shows how many times a year the whole inventory was sold and filled again. The days' sales in inventory shows how long the inventory was carried before it was used. The receivables turnover shows how many times a year the payments for the sales was received. The days' sales in receivables shows how many days it took before customers paid what they bought. The total asset turnover shows how efficiently the assets are utilized to make revenue.

Fourth, **profitability ratios**. They show how well the company turns sales or assets over into income. There are three ratios:

Profit margin = net income / sales

Return on assets (ROA) = net income / total assets

Return on equity (ROE) = net income / total owners' equity

But what do the outcomes tell us? The profit margin tells us how much profit is made with every dollar of sales. The return on assets shows how efficiently the assets generate income. The return on equity shows how much profit is made for the owners.

Lastly, the **market value ratios**. They compare the performance of the firm with its value. The value is determined by the shares. There are four ratios:

Earnings per share = net income / number of shares outstanding

Price to earnings ratio = price per share / earnings per share

Price/earnings to growth (PEG) ratio = price/earnings per share / (earnings growth rate x 100)

Market to book value = market value per share / book value per share

The second ratio shows how long it takes two have twice as much money if you buy stock at a certain price. If firms have a high P/E ratio, they are growth companies, if they have low P/E ratios, they are probably mature, stable companies.

We already discussed the ROE (return on equity), but there is a method to further analyze it, DuPont established it. The components are the operating efficiency, the asset management efficiency, and the financial leverage. These three multiplied give the return on equity. The formulas:

Operating efficiency = net income / sales

Asset management efficiency = sales / total assets

Financial leverage = total assets / total equity

Return on equity = operating efficiency x asset management efficiency x financial leverage

As you see, some elements appear in more than one formula. We can reduce the formula:

Return on equity = net income / total equity

It is useful because management can see how it can perform better; which parts need improvements. Of course, there are many more financial ratios, but the ones we just discussed are essential and used commonly. To analyze a company, you need the ratios, but also the trend in the ratios over time.

Chapter 15

15.1

In this chapter we are going to look how firms raise their capital. Every firm has a **business life cycle**. The five active phases are: start-up, growth, maturity, decline and closing. The first phase starts when the business idea reaches the implantation stage. Some business will move through all stages and some go straight to the final stage. Each stage presents different financing sources as well as different management issues for a business. In this chapter we are going to look at the different financing sources.

15.2

A business can use five sources of capital to start with:

- 1) Personal funds
- 2) Borrowed funds from family and friends
- 3) Commercial bank loans
- 4) Borrowed funds through business start-up programs like the U.S. Small Business Administration (SBA)
- 5) Angel investor or venture capitalist funds

U.S. Small Business Administration (SBA) is a government agency with three different loan programs designed to cover a wide range of businesses. They help small business owners to qualify for loans when they may not be able to qualify through the regular lending policies of a commercial lender/bank. The lender instead receives a guaranty from the SBA, thereby lowering the default risk on the loan.

Angel investors are lenders who provide funding in new, high-risk ideas and therefore require higher rates of return. The lender plans on a **liquidity event** occurring in a relatively short amount of time. This event allows the angel to cash out all or some of his ownership shares to realize a profit.

Venture capitalist firms or **funds** are groups or institutions that provide funding at growing businesses, it is at a higher level than most individual angel investors. Funds that borrowers obtain from a venture capitalist may come in segments over time, with the new business needing to meet certain specific targets before the business gets more money.

The **burn rate** or **bleed rate** is the rate at which an idea will use up funds. This lets the financier know the timing of necessary future funding. Businesses with high burn rates may need more monitoring, more time etc. and will affect the decision to fund a venture.

Important areas to select an angel or venture capitalist on:

1. Financial strength of the angel or venture capitalist
2. Contacts of the angel or venture capitalist
3. Exit strategy of the angel or venture capitalist

15.3

The second phase of borrowing is usually at commercial banks, where they review the business operations and evaluate the potential of the business to generate enough cash to maintain operations and pay back the loan. This is most of the time to support the operations of the firm and is because of that a short-term financing.

Ways to set up a loan:

- Straight loan with preset payment schedule
- Discount loan
- Letter of credit or line of credit
- Compensating balance loan

With a **discount loan** the bank subtracts the interest charges from the loan up front and allows the company to borrow the face amount of the loan minus the interest on it. So it's a loan without a series of repayments to the bank. Instead it has a lump sum up front, principal borrowed and a lump sum payment at maturity, principal and interest.

A **letter or credit** or **line of credit** is a preapproved borrowing amount that works much like a credit card. Most of the time with floating interest rate tied to a benchmark interest rate.

The last way to borrow money from a bank is with a **compensating balance loan**. This type of loan looks a bit like a line of credit, but only a portion of the loan is available for the business and it pays interest on the face value of the loan.

A **syndicated loan** is a loan from a set of multiple banks that join together and make the loan to a single company, sharing both the income from the loan and the risk of default. This type of loans are most common for large and mature business and they are for the long term.

15.4

Once a business has established itself in an industry, there are two ways to raise funds in the capital markets. The first way is through **bonds**, the pricing of bonds is already discussed in chapter 6 and 7. We now look at the issuing process. Bonds generally have maturities of 20 or 30 years, because of that we view them as long-term financing. Bonds are issued by a financial institution either in a public auction (SEC regulates the process) or through a private placement.

The five steps of a bond auction:

1. The business selects an investment bank to help design and market the bond. An **investment bank** is an agent that works with the business to meet all the listing requirements of the bond issue, the marketing of the bond, the design of the bond terms and last but not least the auction of the bond.
2. The business and investment bank register the bond with the SEC, providing a prospectus and referencing the indenture for the bond.
3. The bond is rated to help potential buyers determine an appropriate price.
4. The investment bank markets the bond to prospective buyers using the prospectus.

5. The investment bank conducts an auction where the bonds are sold.

There are two documents required for a bond sale:

1. **Prospectus**, this contains much of the information filed in the registration and the bank uses it to inform potential buyers about the bond.
2. **Indenture**, this is the formal contract for the bond between the issuing company and the eventual buyer. It includes all the important information for example the payment schedule, the maturity date, the coupon rate, the par value etc.

Sinking fund is when a company puts away money each year into a special fund for retirement of debt. It allows the company to reduce the effect of the large cash outflow at the bond's maturity.

15.5

The second way to raise funds is to sell stock. By selling this, you sell part of the firm's ownership rights and the holders get voting rights. Selling stock for the first time is called initial public offering (IPO), this is governed by the SEC and the 1933 Securities Act. Companies seek an investment bank to help them sell the stock. Investment banks are required to perform **due diligence** in ensuring that all information that they release during the process is accurate. When the information is wrong the company and the investment bank are at risk for litigation.

There are two ways to hire an investment bank: through a competitive bid process or through a direct selection process. It usually involves negotiation of terms, on how the company will compensate the bank for its services. The bank determines the compensation for the business by either a preset funding arrangement or the number of shares sold, the share price and the spread on the securities. The spread is the difference between the stock sale price to the public and the sale proceeds that the investment bank pays to the business.

Two types of compensation for the investment bank:

1. **Best efforts arrangement**, investment bank tries to sell as much shares as possible and take a cut on each individual share it sells.
2. **Firm commitment arrangement**, the investment bank guarantees a preset amount of money to the business.

Underwriter describes the function of an investment bank, by making a firm commitment, the investment bank is buying the entire issue and then selling it to the public. For an example of the two methods see page 499.

Registration with the SEC contains of:

- Description of the issue
- Listing of all individuals and firms involved
- Financial expectation of the business
- All material information regarding the business

Red herring is the first filing of the prospectus.

Quiet period or **cooling-off period** is the waiting period when the SEC reviews the filed documents. Usually this takes between the twenty till forty days.

Letter of comment is send to the business and investment bank when there is missing information in the filed document. When this necessary corrections are made and it is filed again. Also the quiet period for approval starts again.

The **tombstone** is the advertisement of the issue after the quiet period. It contains the name of the issuing business, some details about the issue and the list of involved investment banks.

There are two major exceptions to the requirement to file with the SEC:

1. When the issue mature in less than nine months (270 days)
2. When the issue is for less than 5 million, this is called **Regulation A**. Also known as the small business exception and requires only a brief offering statement.

A **road show** is an effort to seek additional buyers for the issue by holding information sessions in several major cities. If there is still insufficient interest the issue doesn't go to the actual auction.

The auction is one day and buyers submit bids for a specific quantity of preset auction price shares. There are two possibilities which can occur: undersubscribed, this happens when the bid quantity is less than the offered shares and all bidders get their requested shares. Or option two is when the bid is oversubscribed, then each bidder receive a **pro-rate** share of his or her bid.

After the auction the business new outstanding equity shares are traded on the secondary market. To keep the investment bank ability to function as a dealer there is a **green-shoe provision**. This allows the investment bank to purchase up to 15% of additional shares over a thirty-day period beyond those offered to the public during the auction.

Another agreement which is possible is the **lock-up agreement**. This requires the original owners of the firm to maintain their shares of stock for 180 days, so they maintain a majority interest in the business.

15.6

Two ways to raise capital for a mature business:

1. **Commercial paper** is a discounted note that a business sells directly to an investor with both principal and interest repaid within 270 days.
2. **Banker's acceptance** is a short-term credit arrangement created by a business and guaranteed by a bank. This is most of the time used to finance inventories or other assets that will self-liquidate over a short period of time.

15.7

In the final phase of the business a successful company can stop and sell the remaining assets. But an unsuccessful company usually declares **bankruptcy**. This is a state of financial distress in which the business cannot pay its debts. There are two paths through bankruptcy, both overseen by a court.

1. **Chapter 7:** of the Federal Bankruptcy Reform Act of 1978 deals with straight liquidation, which means the selling of the business assets.
2. **Chapter 11:** is a reorganization of the company's business affairs and restructuring of its debts. This is a temporary solution, so the business can work out its financial difficulties without the claimants taking action.

Chapter 16

16.1

In this chapter we will discuss capital markets. An important thing that you have to keep in mind is that the cost to the seller of the assets is the return to the investor. The sellers, the companies, cannot all sell stocks or other assets. It depends on the risk that the company carries with it how much and against what rate he can rent. The more risk, the higher the interest rate. From the investor perspective (so the one who lends the money), it depends on how much risk he wants to take. Some investors ask very high interest rates. Why would borrowers pay a very high interest rate? Because of financial leverage. That is the phenomenon of making more money with money. If firms have a lot of debt to finance their operations, they are highly leveraged. If they have no debt at all, they are unlevered.

16.2

How much **financial leverage** there is can be assessed with the earnings per share (EPS). If a company does not have debt at all and uses shares to finance the operations, the EPS are quite low. If a company has a high debt and only one share (because there needs to be at least one owner), the EPS are much higher. However, if the operating predictions are not fulfilled, such a high debt is a bad thing. So more debt involves more risk. Of course, a mix with some debt and some funds from owners is also possible.

16.3-16.4

If firms have different capital structures, you can calculate the point where the companies have the same EPS. The formula:

$$(EBIT - interest) / shares = (EBIT - interest) / shares$$

The part before the = should be filled in for the first company, the part after the sign for the second company. At that point, it does not matter what capital structure the firms have. A general rule is the more earnings, the more debt the company should use to finance the company. There is an approach to see from who a company should lend money. It is the **pecking order hypothesis**. The base of this approach is the assumption of **asymmetric information**. That is when two parties in a transaction have different information available. The most logical thing is to use the cheapest source of funding first. So there are two predictions. First, firms prefer internal financing first. The

internal financing comes from the retained earnings. Second, if that is not possible, the safest or cheapest external funding source must be chosen first. That means that debt financing is used first, an equity if there really is no other possibility. There are three implications that arise from these assumptions. First, profitable companies borrow less since firms prefer internal funds and profitable firms have more internal funds. **They thus may have lower debt to equity ratios.** Second, less profitable companies use more external funding. Third, if no other possibility is there, firms will sell equity.

16.5

We will now turn to a model which provides us with a method to establish an optimal capital structure. The essential assumption in this model is that the financing decision and the investing decision are separable. The model was established by Modigliani and Miller. It begins with a simple world without taxes and bankruptcy.

The first proposition they provided was called **M&M proposition I. it says that it is not relevant how firms finance their operations if we consider the firm's value. The equation for this proposition is the following:**

$$VE = VL$$

The E stands for all-equity, so a firm which uses no debt financing. The L stands for levered, or a firm which uses debt financing. The V stands for value. You can draw this equation as two circles. The one is totally green, and means the firm's value is derived completely from equity. The other is half green and half orange, the orange part representing the part of the value of the firm that is derived from debt. The second proposition, M&M proposition II says that the value of the firm depends on three things. First, the rate of return that the firm requires on its assets. Second, how costly debt is to the firm. Third, the firm's debt to equity ratio. The equation for the follow becomes the following:

$$\text{Value} = \text{annual cash flow} / r$$

The formula for the WACC:

$$\text{WACC} = Ra = (E/V \times Re) + [D/V \times Rd \times (1 - Tc)]$$

Since we have no taxes, Tc is 1, and we can rewrite the formula:

$$\text{WACC} = (E/V \times Re) + (D/V \times Rd)$$

We can rearrange it:

$$Re = Ra + (Ra - Rd) \times D/E$$

Until now we assumed no taxes and no bankruptcy. Now, we will include taxes, but still leave out bankruptcy. The first proposition then changes into: all debt financing is optimal. The second becomes: the firm's WACC decreases as more debt is added. The new way the circle is sliced can be found on page 496. Now, the firm which uses debt financing has an advantage over the firm which does not. That is because the firm which uses debt can deduct interest it pays to their lenders. So, a tax shield is created. So both firms have to pay the same amount to the government as taxes, but the firm which uses debt gets a little back because it has paid that as interest to their financiers. So the slice the government gets when a firm uses debt is smaller. The equation for the first proposition changes in the following way:

$$VL = VE + (D \times Tc)$$

$D \times Tc$ represents the tax shield. The equation for the second proposition change in the following way (as we wrote it before)

$$WACC = Ra = (E/V \times Re) + [D/V \times Rd \times (1 - Tc)]$$

16.6

It seems like the more debt a company has, the better. However, it is too risky to have a 100% debt structure. That is where bankruptcy comes in. Bankruptcy means that the equity part of the firm is zero. At that point, the debt holders become the owners of the company. The **direct costs of bankruptcy** are the costs that have to be paid as legal and administrative fees. There are also **indirect costs of bankruptcy**, which we call **financial distress costs**. These consist of lost employees, lost consumer confidence etc.

But what is the optimal capital structure then? That is at a certain point where, if you add one dollar of debt, the extra benefit in the form of a tax-shield is equal to the costs of bankruptcy from that extra dollar. At that point, the firm reaches the **optimal debt to equity ratio**. The theory behind it is called the **static theory of capital structure**. The 'static' is included because before we can determine that point, the assets and operations need to be fixed. The **optimal capital structure** is where the WACC is at the lowest point, and depends on various things.

Chapter 17

17.1

The owners of a company receive cash dividends. Since they are income for those owners, they have to pay taxes on the dividends. There are several important dates when it comes to buying and selling stock. First, the **settlement date**. That is when the buyer's money is given to the seller. Brokerage firms are there to arrange that, so the buyers and sellers do not have to transfer the money themselves. Therefore, it is easier that the brokerage firms hold the shares, the shares as said to be held in the street name. The one who actually owns the shares is the **beneficiary owner**, even though the shares are held on name of the broker. The broker is the owner of record. The **declaration date** is the date on which the board announces that it will pay a certain dividend. The next date is **the ex-dividend date**, or the ex-date. On that date, it is assessed who will receive the dividend. So it might be the case that after they announce that they would give a dividend, the shares change owner. If that happens before the ex-date, the new owner will receive the dividend. Next comes the **record date**. That is two days after the ex-date. On that date, it is recorded who were the owners of the shares two day earlier. Last is the **payment date**. Then, the dividend is paid.

There are several kinds of dividends. First, **regular cash dividends**. Such a dividend is regularly paid, every time after an equal period of time. There might be a constant growth in the dividends, in percentage or in dollars. It is considered a bad sign if companies reduce their dividends because the investors then think that the companies cannot keep paying out dividends the same way they do now. The next form is the **special or extra dividend**. These are paid when the company is doing extraordinary well. So it is not a fixed dividend that will be paid every period. Third we have the **stock dividend**. So no cash is paid, but instead the shareholder receives more shares. Last, **liquidating dividend**. That is distributed when the company stops existing or when a major part was sold.

17.2

The dividend policy is about the amount of dividend payments and the manner of paying them. This is based on the investors. Owners might like high dividends because it is income for them. They may also like small or no dividends because since these are income, they have to pay taxes on them. The incentive for them to hold shares is that they can sell them when their value increased. These different shareholders with different preferences are called **dividend clienteles**. What would the shareholder prefer? To examine this we start in a simple world again: we assume that there are no taxes and also no costs to buy and sell shares. There are two possibilities. The first is that the firm pays a high dividend, so you will get 2 euros every year. The second option is no dividend. For you, it does not matter! Why? Let us say you have 10,000 shares and you want to have an income of 20,000 euros a year. The price per share is 10 euros before the cash dividend was paid out, that means that the price is 8 after that it has been paid out. If no dividend is paid, the price will stay at 10 euros per share. What you have now is 10,000 shares times 10 euros, so 100,000 euro represented by the shares you have. If the company pays the dividend you will get 2 euros times 10,000 shares, so 20,000 euros. That is exactly what you wanted. If no dividend is paid, and I want to get 20,000 euro, I will need to sell 2,000 shares (2,000 shares times 10 euros = 20,000 euros). Then if have left 8,000 shares which are worth 10 euros, so 80,000 euros on paper, and 20,000 cash, makes 100,000 euros as well.

So that I why it does not matter! This theory was also established by Modigliani and Miller, and they called it the **dividend policy irrelevance theory**.

When we add taxes, the theory does not become different. That is because you pay taxes for both the sale of stock and the receipt of dividends as income. However, if you have a gain on the sale, things become more complicated. **Transaction costs** are the costs that investors pay to complete a transaction that reduces the net cash flow to a buyer or seller. We will now discuss the reasons why some shareholders prefer low or high dividends more closely. First the preference of low or no dividends. The first reason is the tax advantage. If they do not receive dividends as income, they also do not have to pay taxes on them. The second is the chance of higher returns in the future because the company can invest the money in projects. The third reason is that there is less need for external funding. Outside funding is expensive and avoided when the firm uses its own money. These reasons seem plausible, why do some people than want high dividends? First, because they do not have to consider transaction costs. To get income, they do not have to sell shares, thereby avoiding transactions costs. Also, if they get paid today, they know for sure that they will have money. Their share might drop in value in the future, so no money is guaranteed for the future. So a certainty is involved in a high dividend policy.

17.3

There are different dividend policies. First, a **residual dividend policy**. That means the first all other capital requirements are met, and only then, when some money is left, dividends are paid out. It is an unusual approach. More usual are **sticky dividends**. Investors do not like high fluctuations of dividends, because that involves uncertainty. Of course a reduction in income (in the form of dividends) is not a nice thing. Also, as said before, a reduction in dividends signals possible bad performance of the company.

Also, some legal issues are involved in paying out dividends. First, **legal capital** cannot be used to pay out dividends. The legal capital is the value plus (if it exists) the paid in excess of par of the

shares. So if you own a share with a par value of 20, and the company has only left 20 dollars, they cannot give it to you because then they would not have the value of your share anymore. That is because it protects the shareholders. Another term is 'restrictive bond covenants'. These are agreements that no dividends will be paid if no sufficient cash is available for the next coupon payment. Also, when not enough cash is available to pay fixed dividends, normally companies do not want to lend money to pay dividends. Lending money is to invest or expand, not to pay dividends.

17.4

There are some actions firms can perform with their stocks. First, they can pay out stock dividends. The stock dividend cannot be more than 25%. For instance, if somebody owns 100 shares, and the stock dividend is 15%, he will get 15 extra shares. Another action is a **stock split**. That means that if you own those 100 shares, each worth 10, you will now own 200 shares, each worth 5. That was a 2-1 split. A 3-1 or 4-1 etc split is also possible. There is a certain process for this, first, the company announces the split. Then, an ex-date will be set for when the split will be performed. Third, a date is set as record-date, on which the owners are recorded. Fourth, on the payment date, the new shares are mailed by computer to the new owners. Why would a company split its stock? The first reason is to influence the **preferred trading range**. That is the gap between the highest and lowest price the investors are willing to buy and sell. 100 shares represent a **round lot**. Less shares represent an **odd lot**. So it might be that someone would want a share for 10 euros, but not for 20 euros.

So if the lowest price first was 20 euros, after a 2-1 stock split it becomes 10 euros and that person would want to buy a share. Another explanation is the **signaling hypothesis**. It says that management wants to show that they perform so well that current prices are rising too fast and that they therefore decide to split the stock. The third reason is increased liquidity. More shares are available, and as said before, more people are willing to buy the shares because the price is lower. So there is a higher chance that shares will be traded. **Reverse split** is exactly what the name says. So instead of a 2-1 split, a 1-2 split is performed. Thereby, the stock price can be raised. If a stock is below the preferred trading range, it seems like the company is not performing well. That is the first reason why they might increase the price by using a reverse split. The second reason is that the NASDAQ has a certain rule which says that you cannot trade your shares for below 1 dollar for more than 30 days. So if that tends to happen, a reverse split might be the solution.

17.5

Two specialized dividend plans will be discussed next. First, the **stock repurchase plan**. Thereby, the own shares of the company are bought back to decrease the number of available shares on the market. That will increase the EPS. Such a repurchase will be announced ahead so that everybody is aware of it. A legal condition for this is that it must have a business reason. Another plan is the **dividend reinvestment plan (DRIP)**. That is an agreement with shareholders that they will not receive cash dividends, but that they will automatically receive their dividends in the form of new shares. Then, transaction costs are avoided. Sometimes DRIPs are accompanied by **optional cash purchase plans**. With these, a shareholder can buy more shares for a low initial price and with low transaction costs. DRIPs can be handled in several ways. First, company-run programs. Then, the company deals with them itself. Second, transfer-agent-run programs. Then, financial institutions deal with the DRIPs on behalf of the company. The company pays for that. Third, brokerage-run

programs. These are companies that deal with the shares. They then are the owner of record on behalf of the shareholder and the company.

Chapter 18

18.1

A MNE, or a multinational enterprise, is a firm that has its operations in more than one country. The first issue when going international is **cultural risk**. That exist because customers, attitudes, assumptions, expectations, and customs are not the same in the host country as in the home country. The first thing that might be different for the company is the ownership structure. Sometimes a firm needs to be locally owned because the law says so. That is to protect the local firms. The next difference might lay in human resources. Often, it is required by law to hire local citizens. Also, women do not have the same rights as men everywhere in the world. A third issue concerns the religious heritage. Differences may be avoided as much as possible by just showing respect. The fourth issue is **nepotism**. That is that the local government forces the firm to hire some specific persons on important positions. Thereby, the government can keep control over the business. Also, corrupt practices might be a normal thing in some countries. If everybody uses bribes, and it is considered normal, should you then still not use them because you would not do so in your own country? If you use them, you will break with you own standards, but if you do not so, you are probably not able to compete. Fifth and last: **intellectual property rights**. Property rights are rights that make sure that your property cannot be used by someone else without your permission. Intellectual property rise are comparable but they concern products and services. That is especially important when the essential element of a firm is a certain technology.

We assessed the cultural risk, next is the **business risk**. That exists because the economic circumstances and business practices in the host country differ from those in the home country. These can concern for instance high inflation rates. By diversifying, systematic risk can be minimized.

Third is **political risk**. That arises from possible changes in the government of the host country. A good thing would be if the local government fully supported your operations. A bad thing would be if the government takes over your business by nationalizing it. To protect your company to that, you can do three things. First, you should keep the essential elements of your operations private. For instance, a certain technology. If the government then takes over your business but the person who knows everything about the technology leaves, they will not benefit from it. Second, finance the assets locally. Then you will not lose you money if the government takes over these assets. Third, make sure that inputs come from outside the country. If they come from your own parent company, you can just not supply them anymore if the government takes over. Terrorists and possible wars also need to be considered.

18.2

An important issue when going abroad is the foreign exchange. Therefore, we need to explain the concept of the **exchange rate**. First, we consider the **purchasing power parity**. That says that comparable goods have a comparable price all over the world. If a pair of shoes costs \$65 in the US, the same pair costs ¥6,010. We will explain why. For every dollar you change, you get ¥92.46. 65 times 92.46 = 6,010 so that means that the shoes are as expensive in Japan as in the US. Of course, this does not hold for every product and you might gain some when you look for your product in another country. The **direct rate** is the amount of your currency that is needed to buy 1 unit of a foreign currency. The indirect rate is the amount of foreign currency you get for 1 unit of your own currency. There are also cross rates these show the rate of two foreign currencies. You can establish such a **cross rate** by converting one unit of your own currency to both other currencies.

Arbitrage is the possibility to make money with money without any risks involved. We can do that sometimes by exchanging currencies, the process is then called triangular arbitrage because you have to switch currencies 3 times. **The forward exchange rate** is the future indirect exchange rate. We need to include inflation to establish a formula for it.

Forward indirect rate = current indirect rate \times (1 + inf_f) / (1 + inf_h)

Where f stands for foreign country and h stands for home country. We of course do not know these inflation rates precisely, because they are in the future. So the rates we have to fill in are expected inflation rates. The current market is the spot market. You can convert money there at the spot rate. If the current indirect rate is 10 dollars for 1 euro, and the forward rate that is currently offered is 12 euros, you can sign a forward contract. That means that you agree on that you buy a certain amount of dollars in the future for 1 euro per 12 dollars. If you think that the real exchange rate in the future will be less than 12 euros, so let us say 11 euros, you can earn a profit. You sign the contract for let us say 10 euros, so you will get 120 dollars. Then you sell these dollars for 120/11=10,90. Then you made a profit of 0,90. That is only a small amount, but this happens for much bigger amounts.

You can also invest cash in a country that has a high inflation rate. When the money is worth more you convert it back to your own currency. That is called covered interest arbitrage; so using inflation rates to make a profit. In chapter E we used the Fisher effect, now we can establish the International Fisher effect. The approximate equation:

Nominal rate_h – inflation rate_h = nominal rate_f – inflation rate_f

Where h again stands for the home country, and f for the foreign country. Also:

Real rate_{home country} = real rate_{foreign country}

So, actually different inflation rates cannot be exploited!

18.3-18.4

We will consider three exposures with which a manager might have to deal. First, **transaction exposure**. That is a possible loss in your own currency because of future foreign currency payments. So it might be that because customers pay late, the foreign currency is worth less in your own currency than previously. To avoid this, a forward currency contract can be signed. Then you agree to receive a certain amount of your own currency for the foreign currency that you will receive in the future. That way you know for sure what amount of your own currency you will receive. The next is **operating exposure**. That also has to do with changes of the exchange rate, but then on the long run. It might be that the exchange rate changes in such a way that it is not profitable anymore to do business in that country. Third is translation exposure or **accounting exposure**. That concerns differences in accounting practices. That can have a negative effect on taxes or profits in the home country.

We considered capital budgeting extensively, but we need to consider some more things in an international perspective. First, how to calculate the discount rate to be used. Therefore we need to include inflation in our formula:

Discount rate = real rate + inflation + risk premium of the project

We have considered the NPV method extensively. We can also use it for determining which projects to take when operating abroad. We still need to know the initial costs of the project and all expected future cash flows. The one difference lays in which currency we need to take, and we also need to deal with the exchange rate, which is quite easy. We can just convert the NPV of a project into our own currency and decide then. For a numerical example, see page 560.

It turns out that does not matter whether you use the own currency of the foreign currency, as long as you are consistent. Also a word of caution is necessary for the rounding. Rounding in the process of calculating may produce wrong results. So make sure to not round off until the very last number, that way your results will be as accurate as possible. Also make sure to make consistent use of discount rates. So if you use the foreign currency, you also have to use the proper discount rate for the foreign country. If you use your own currency, use the home country discount rate.