# Introduction to Corporate Finance

## Subject of Corporate Finance

Corporate Finance manages cash flow, corporate capital (including its structure and financial resources of the enterprise). It is a subjective economic activity dealing with by obtaining the necessary amount of money and capital from various financial sources (Financing), allocations money into various forms of non-monetary assets (Investment), and profit distribution (Dividend policy) in order to maximize market value of assets.

Financial management is the dominant and at the same time integrating component of company management. All business activities (production, trade, sale and acquisition of assets) ..) will affect the movement of finances (money) At the same time, the financial goals are the decisive goals of the company, to which the other sub-goals are adapted.

## Objectives of financial management:

**The main goal of financial management is to maximize the market price of the company**

Maximizing the value of the company is multi-criteria method of financial management. To achieve this main goal, it is necessary to fulfill the series partial goals, either directly from the field of own finance (profitability, solvency and liquidity, long-term financial balance) and others operating fields of activity of the company (production, trade, organizational, etc.).Profit maximization is an outdated approach to financial management

### Advantages of multi-criteria management.

* Based on real financial decision
* Takes into account the risk.
* Takes into account the time value of money.
* Takes into account the capital structure of the company
* Takes into account the growth opportunities of the company.

### Disadvantages of profit in decision making

* Does not take into account the time value of money
* Does not take into account the risk
* Does not take into account the capital structure
* It is affected by the accounting method
* In practice, it does not correspond to real behaviour managers (they prefer multi-criteria decision making)

## Main tasks of financial management

* Financing
* Investing
* Dividend policy

### Partial tasks of financial management

**Long term task**

* Obtaining and allocating resources for business development
* Evaluation of investment efficiency
* Determination of the optimal capital structure
* Determination of the optimal structure of assets
* Profit distribution and dividend policy
* Financial planning
* Risk management

**Short-term tasks**

* Optimization of current assets management
* Optimization of short-term resource management

**Specific task**

* Tasks associated with the integration of the company into higher units
* Tasks associated with the creation, reorganization (or termination) of the enterprise

## Principles of financial management:

* Decision making according to cash flows. The decision is not based on profit, but on cash flows.
* Taking into account the net present value of money
* Respecting the time factor ("the dollar earned today has a higher price than the dollar earned tomorrow").
* Taking into account risk ("the dollar earned without risk has a higher price than the dollar earned at risk").
* Capital structure optimization (maximum values can only be reached by minimizing WACC).
* Taking into account the efficiency of capital markets (when determining the required return, it is necessary to take into account the situation on the capital markets).
* Planning and analysis of financial expenditures (without detailed data and their optimal use, it is impossible to achieve the goals).

# Time value of money

A money on hand today is worth more than a money to be received in the future because the money on hand today can be invested to earn interest to yield more than a money in the future.

The Time Value of Money mathematics quantifies the value of money through time. This, of course, depends upon the rate of return or interest rate which can be earned on the investment.

The time value of money serves as the foundation for all other notions in finance. It impacts:

* Business Finance
* Consumer Finance
* Government Finance

The Time Value of Money has applications in many areas of Corporate Finance. It impacts:

* Capital Budgeting
* Bond Valuation
* Stock Valuation
* Investment decisions
* Financial decision making
* Supply Management
* Receivables management
* Money management
* Short-term debt management
* Recently, the time value of money has also been applied in financial analysis (via the EVA indicator)

## Interest

Interest is the cost of borrowing money. Interest may be thought of as rent paid on borrowed money. An interest rate is the cost stated as a percent of the amount borrowed per period of time, usually one year. The prevailing market rate is composed of:

1. The Real Rate of Interest that compensates lenders for postponing their own spending during the term of the loan.
2. An Inflation Premium to offset the possibility that inflation may erode the value of the money during the term of the loan. A unit of money will purchase progressively fewer goods and services during a period of inflation, so the lender must increase the interest rate to compensate for that loss.
3. Various Risk Premiums to compensate the lender for risky loans such as those that are unsecured made to borrowers with questionable credit ratings, or illiquid loans that the lender may not be able to readily resell.

### Simple Interest

Simple interest is calculated on the original (beginning) principal only. Accumulated interest from prior periods is not used in calculations for the following periods. Simple interest is usually used for a single period of less than a year, such as 30 or 60 days. However, not necessarily, simple interest can be used for a period longer than one year, and loans shorter than 1 year are often interest-bearing compound interest.

For calculate you can use this formula for simple interest:

**Future value of money:**

FV = PV\*[1+ i\*n ]

**Prezent value of money:**

PV = FN/ (1+i\*n)

Where:

FV = future value of money

PV = present value of money

p = principal (original amount borrowed or loaned)

i = interest rate for one period

n = number of periods

You can also calculate:

**Interest rate**



**Number of periods**

n = 

**Example 1:**

For instance, if someone were to receive 10% interest on a beginning value of $100, the first year they would get:

0.1 x $100 = $10 in interest

If they continued to receive 10% interest on the original $100 amount, over five years the growth in their investment would look like this:

Year 1: 10% of $100 = $10 + $100 = $110

Year 2: 10% of $100 = $10 + $105 = $120

Year 3: 10% of $100 = $10 + $110 = $130

Year 4: 10% of $100 = $10 + $115 = $140

Year 5: 10% of $100 = $10 + $120 = $150

**Example 2:**

You borrow $10,000 for 3 years at 5% simple annual interest. Calculate the interest for these 3 years.

Solution: Interest = p \* i \* n = 10,000 \* .05 \* 3 = 1,500

**Example 3:**

You borrow $10,000 for 60 days at 5% simple interest per year (assume a 365 day year).

Solution: interest = p \* i \* n = 10,000 \* .05 \* (60/365) = 82.1917

### Compound Interest

The Compound Interest concepts will be grouped into two areas: Future Value and Present Value.

* Future Value describes the process of finding what an investment today will grow to in the future.
* Present Value describes the process of determining what a cash flow to be received in the future is worth in today's money.

**Present Value of Single Sum**

What is present value of $1 that will be received at a specified time in the future?

With compound interest, interest is calculated not only on the beginning interest, but on any interest accumulated in the meantime. It means that compound interest is calculated each period on the original principal and all interest accumulated during past periods.

**Future Value of Single Sum**

What is the future value of $1 that is invested today?

The formula below calculates how large a single sum will become at the end of a specified term. This value is referred to as the future value of a single sum. It may also be referred to as the accumulated value because it represents both the single sum and the interest accumulated over the term.

**Compound Interest Formula**

Instead of calculating interest year-by-year, it would be simple to see the future value of an investment using a compound interest formula. The formula for compound interest is:

**Future value of money:**

 

**Present value of money:**

 

You can also calculate:

**Interest rate**

 

**Number of periods**

n = 

Where:

FV = Value at end of t time periods

PV = Beginning (Present)Value

n = Number of periods

i = Interest rate per period

**Example 1:**

If someone were to receive 10% compound interest on a beginning value of $100, the first year they would get the same thing as if they were receiving simple interest on the $100, = $10.

The second year, though, their interest would be calculated on the beginning amount in year 2, which would be $110. So their interest would be: 0.1 x $110 = $11 in interest

You can continue to the other years.

Year 1: 10% of $100.00 = $10.00 + $100.00 = $110.00

Year 2: 10% of $110.00 = $11.00 + $110.00 = $121.00

Year 3: 10% of $121.00 = $12.10 + $121.00 = $133.10

Year 4: 10% of $133.10 = $13.31 + $133.10 = $146.41

Year 5: 10% of $146.41 = $14.64 + $146.41 = $161.05

You can compare the grown simple and compound interest: investments with simple interest grow in a linear fashion and compound interest results in geometric growth.

So with compound interest, the further in time and investment is held the more important the growth becomes.

**Eample 2:**

What is the current value of the debt if you borrowed $ 100 three years ago? Interest rate was 5%.

Future Value:

FV= 100 \*(1+0,05)3

FV = 115,76

**Type of interest by time period:**

Annually per anum p.a.

Semiannually per semestre p.s.

Qquarterly per quartale p.q.

Monthly per mensem p.m.

**Frequency of interest accrual.**

The frequency of interest accruals is also important. If the frequency of accruing interest is more frequent than the interest rate period, it is necessary to modify the formulas. An example is a situation where the rate is stated as annual, but interest is accrued monthly.

In these cases you can use different formulas:

**Present Value:**



**Future Value:**



**Eample 3:**

This table shows the results of making a one-time investment of 100,000 Kč  for 30 years using 12% simple interest, and 12% interest compounded yearly and quarterly.

|  |  |
| --- | --- |
| Type of Interest | Principal Plus Interest Earned |
| Simple | 460 000 |
| Compounded Yearly | 2 995 992 |
| Compounded Quarterly | 3 471 098 |

## Annuities

An annuity is an equal, annual series of cash flows. Annuities may be equal annual deposits, equal annual withdrawals, equal annual payments, or equal annual receipts. Leases and rental payments are examples. The payments or receipts occur at the end of each period for an ordinary annuity while they occur at the beginning of each period. for an annuity due.

Payments must:

• be the same amount each period

• occur at evenly spaced intervals

• occur exactly at the beginning or end of each period

• be all inflows or all outflows (payments or receipts)

• represent the payment during one compounding (or discount) period

The annuities concepts will be grouped into four areas:

* Future Value of annuities
* Present Value of annuities
* Calculate Payments when Present Value is known
* Calculate Payments when Future Value is known
* Perpetuities

### Present Value of Annuities

The Present Value of an Ordinary Annuity is the value of a stream of expected or promised future payments that have been discounted to a single equivalent value today.  It is extremely useful for comparing two separate cash flows that differ in some way.

The Present Value of an Ordinary Annuity could be solved by calculating the present value of each payment in the series using the [present value formula](http://www.getobjects.com/Components/Finance/TVM/pv.html) and then summing the results.

* A more direct formula is:



Where:

PV = Present Value of an Ordinary Annuity

A = Annuity (Amount of each payment)

i = Discount Rate Per Period

n = Number of Periods

**Example 1:**

What amount must you invest today at 12% compounded annually so that you can withdraw $5,000 at the end of each year for the next 5 years?

A = 5 000
i = 12%
n = 5



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | 1 | 2 | 3 | 4 | 5 |
| Deposit (beginning year) | 18 024 | 15 187 | 12 009 | 8 450 | 4 464 |
| Interest | 2162,88 | 1822,43 | 1441,12 | 1014,05 | 535,737 |
| Payment | 5000 | 5000 | 5000 | 5000 | 5000 |
| Deposit (end of year) | 15 187 | 12 009 | 8 450 | 4 464 | 0 |

**Example 2:**

In practical problems, you may need to calculate both the present value of an annuity (a stream of future periodic payments) and the [present value of a single future amount](http://www.getobjects.com/Components/Finance/TVM/pv.html): For example, a computer dealer offers to lease a system to you for $50 per month for two years.  At the end of two years, you have the option to buy the system for $500.  You will pay at the **end** of each month.  He will sell the same system to you for $1,200 cash, if the going interest rate is 12%, which is the better offer?

You can treat this as the sum of two separate calculations:

* The present value of an ordinary annuity of 24 payments at $25 per monthly period





A = 50 per period
i = 0,01 Interest per period (12% annual rate / 12 payments per year)
n = 24 number of periods

* the present value of $500 paid as a single amount in two years.

PV= FV \* (1 + i)-n    = 500 \*(1 + 0,01)-24 =  393.78

FV = 500 Future value (the lease buy out)
i =0.01 Interest rate
n = 24 Number of periods

The present value (cost) of the lease is 1062,17 + 393,78 = $1,455.95.

So if taxes are not considered, you would be $255.95 better off paying cash right now if you have it.

**Present Value of an Annuity Due**

The Present Value of an Annuity Due is identical to an ordinary annuity except that each payment occurs at the beginning of a period rather than at the end. Since each payment occurs one period earlier, we can calculate the present value of an ordinary annuity and then multiply the result by (1 + i).

**Example 1:**

What amount must you invest today a 12% interest rate compounded annually so that you can withdraw $5,000 at the beginning of each year for the next 5 years?

A=5,000
i=0.12
n = 5

PV = 18 024\* 1.12 = 20 187

Annuities work the way shown in the following explanation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | 1 | 2 | 3 | 4 | 5 |
| Deposit (beginning year) | 20 187 | 17 009 | 13 450 | 9 464 | 5 000 |
| Payment (beginning year) | 5000 | 5000 | 5000 | 5000 | 5000 |
| Interest | 1822,426 | 1441,12 | 1014,05 | 535,737 | 0,00 |
| Deposit (end of year) | 17 009 | 13 450 | 9 464 | 5 000 | 0 |

### Future Value of Annuities

The future value of an annuity refers to the amount that we will accumulate by making regular payments at interest over a period of time. (That is equal to the sum of the present values of the annuity payments).

We know (similarly to the present value):

* Future Value of an Ordinary Annuity (payments are required at the end of each period).
* Future Value of an Annuity Due (payments are required at the beginning of each period. Rent is an example of annuity due)

**Future Value of an Ordinary Annuity**

The Future Value of an Ordinary Annuity could be solved by calculating the future value of each individual payment in the series using the future value formula and then summing the results.

* A more direct formula is:



Where:

FV = Future Value of an Ordinary Annuity

A = Annuity = Amount of each payment

i = Interest Rate

n = Number of Periods

**Example 1:**

What amount will accumulate if we deposit $1000 at the end of each year for the next 5 years?  Assume an interest of 10% compounded annually.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | 1 | 2 | 3 | 4 | 5 | Sum |
| Annuity (deposit) | 1000 | 1000 | 1000 | 1000 | 1000 | 5000 |
| Interest | 464 | 331 | 210 | 100 | 0 | 1105 |
| Future value of annuity (to 5 year). | 1464 | 1331 | 1210 | 1100 | 1000 | 6105 |

Or you can use formula:



**Example 2:**

Julie is 23 and has started her first job. She plans to put aside $5,000 per year so that she can make a nice down payment on a house in 6 years. If she makes the payments at the end of each year and earns 8 percent on her money, how much will she have accumulated at the end of 6 years?



She will accumulate $36,679.50.

**Future Value of an Annuity Due**

The Future Value of an Annuity Due is identical to an ordinary annuity except that each payment occurs at the beginning of a period rather than at the end. Since each payment occurs one period earlier, we can calculate the present value of an ordinary annuity and then multiply the result by (1 + i).

* Formula

FVdue = FV\* (1+i)

Where:

FVad = Future Value of an Annuity Due

FV = Future Value of an Ordinary Annuity

i = Interest Rate

 **Example1:**

What amount will accumulate if we deposit $1000 at the beginning of each year for the next 5 years?  Assume an interest of 10% compounded annually.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| year | 1 | 2 | 3 | 4 | 5 | Sum |
| Annuity (deposit) | 1000 | 1000 | 1000 | 1000 | 1000 | 5000 |
| Interest | 610 | 464 | 331 | 210 | 100 | 1715 |
| Future value of annuity (to 5 year). | 1610 | 1464 | 1331 | 1210 | 1100 | **6715** |

Or you can use formula:

FVdue = FV\* (1+i) = 6105\*1,1=6715

### Calculate Payments when Present Value is known

The Present Value is an amount that you have now, such as the price of property that you have just purchased or the value of equipment that you have leased.  When you know the [present value](http://www.getobjects.com/Components/Finance/TVM/pv.html), [interest rate](http://www.getobjects.com/Components/Finance/TVM/iy.html), and [number of periods](http://www.getobjects.com/Components/Finance/TVM/n.html) of an [ordinary annuity](http://www.getobjects.com/Components/Finance/TVM/pva.html), you can solve for the payment with this formula:

* Formula



Where:
A = annuity

PV = present value of annuity (payments are made at the end of each period)

i = interest rate per period
 n = number of periods

**Example 1:**

You can get a $150,000 home mortgage at  7% annual interest rate for 30 years.  Payments are due at the end of each month and interest is compounded monthly.  How much will your payments be?

PV = 150,000,
i =  0.005833  interest per month (0.07 / 12)
n = 360 periods  (12 payments per year for 30 years)



### Calculate Payments when Future Value is known

The Future Value is an amount that you wish to have after a number of periods have passed.  For example, you may need to accumulate $20,000 in ten years to pay for college tuition.  When you know the [future value](http://www.getobjects.com/Components/Finance/TVM/fv.html), [interest rate](http://www.getobjects.com/Components/Finance/TVM/iy.html), and [number of periods](http://www.getobjects.com/Components/Finance/TVM/n.html) of an [ordinary annuity](http://www.getobjects.com/Components/Finance/TVM/pva.html), you can solve for the payment with this formula:

* Formula



Where:
A = annuity

FV = Future Value of an ordinary annuity (payments are made at the end of each period)
 i = interest per period
n = number of periods

**Example 1:**

In 10 years, you will need $50,000 to pay for college tuition.   Your savings account pays 5% interest compounded monthly.  How much should you save each month to reach your goal?

FV = 50,000, the future savings goal
i =  .004167 interest per month (.05 / 12)
n = 120 periods  (12 payments per year for 10 years)



### Perpetuities

Perpetuity is a cash flow without a fixed time horizon. For example if someone were promised that they would receive a cash flow of $400 per year until they died, that would be perpetuity. To find the present value of perpetuity, simply take the annual return in dollars and divide it by the appropriate discount rate.

To illustrate this:

If someone were promised a cash flow of $400 per year until they died and they could earn 10% on other investments of similar quality, in present value terms the perpetuity would be worth $4000.

 $400 / 0,1 = $4000

# Optimal capital structure

We can observe the capital structure from three points of view.

* The first aspect deals with the structure of internal and external resources.
* The second aspect determines the optimal ratio between short-term resources and long-term resources.
* The third view determines the optimal ratio between own and external resources.

## Internal and external resources

Deciding between internal sources (profit and depreciation) and external sources (stocks, shares, preference stock, external sources, leasing, etc ...) is rather intuitive and depends on the situation of the company and the attitude of managers. There are no mathematical models to provide decisions. In general, external resources are rather more expensive, slowly available, do not allow flexible decision-making (it takes a long time for a company to save resources on investment). On the other hand, the advantages over other own resources are: zero issue costs, control of the company remains with existing owners, reduction of the possibility of hostile takeover. The advantage over foreign sources is the lower risk of bankruptcy.

We can say that internal resources are mainly used by businesses in the sector to stable, but slower growth, with management who prefer lower risk.

The so –called "Conflict of Interest Theory" (see below) suggests that internal resources are generally used more often than would be optimal. Use of internal resources from the management perspective had the least strenuous and carries the least risk of erroneous decisions. The owners controlling management responds to errors resulting from the use of external capital, and often overlook missed opportunities caused by the use of inflexible internal capital.

## Long-term and short-term capital

Theoretically, short-term capital is cheaper but more risky than long-term capital. Long-term capital is less risky, but significantly more expensive.

In practice, these rules are often distorted by the use of guarantees for long-term loans (mortgages, collateral, etc.). Another reason for the higher price of short-term loans (compared to the theory) is the so-called "liquidity reward". Short-term debts often do not have fixed installments (see, for example, an overdraft) and this makes short-term loans more expensive.

The ratio between short-term and long-term resources is dealt with in the so-called Golden Financing Rule. This rule is based on the ratio of fixed and current assets. Fixed assets should be covered by long-term resources. Current assets should be covered mostly from short-term sources, but part of current assets should be covered from long-term sources (despite the higher price, due to a decrease in risk).

Current assets covered by long-term resources are called "Net working capital". This indicator can be calculated, for example, as the difference between current assets and short-term resources. The volume of Net Working Capital should be so large that Current Liquidity (the ratio between current assets and short-term resources) reaches a value of 2.

## Equity and debt

**General comparison of debt and equity.**

Debt is cheaper for the following reasons:

1. Nominal interest on debt is lower than the required return on equity. The reason is a higher risk premium on equity. The partner bears a higher risk than the bank and therefore requires a higher return.
2. Interest is (unlike dividends or profit sharing) a tax deductible expense. Interest payments reduce the tax burden.
3. The issue cost of debt is usually lower than the issue cost of capital. This statement does not apply to retained earnings.

Another advantage of debt is the lower possibility of hostile takeover and the limited possibility of creditors to intervene in the company's decisions.

On the other hand, debt is significantly riskier because it requires regular repayment (as opposed to equity). The burden of repayments can lead to the bankruptcy of the company.

The interaction of all the above factors leads to an optimal capital structure, ie to an optimal debt-to-equity ratio. A number of theories deal with the determination of the optimal capital structure. Miller and Modigliani's theory is considered fundamental.

The optimal capital structure (according to MM) represents the composition of long-term capital, at which the Weighted Average Cost of Capital (WACC) are minimal.

**Basic assumptions of MM theory:**

* Efficient capital market. (Theory of efficient markets see below)
* There are no Transaction Costs. The costs of selling and buying shares are minimal.
* There are no Issue Costs. The cost of issuing shares is low and has no effect on the share price.
* Information symmetry. All investors have the same information. There is no group of market participants (such as managers) who would have access to non-public information.
* There are no Conflicts of Interest between investors. Shareholders, banks, creditors, managers, potential investors, all have a common interest in rising stock prices.
* Uniform interest rate. The differences between the borrowing rate and the lending rate are minimal.

Based on these conditions, Miller and Modigliany defined the following three statements.

The individual statements differ in their attitude to the Costs of Financial Distress and in the possibility of using Interest Rate Shields.

**Tax shield**

A tax shield is a reduction in taxable income for an individual or corporation achieved through claiming allowable deductions such as mortgage interest, amorization, and depreciation. These deductions reduce a taxpayer's taxable income for a given year or defer income taxes into future years. Tax shields lower the overall amount of taxes owed by an individual taxpayer or a business.

**Current Value of the Interest Shield**

Increase in the market price of the company (market price of equity) due to savings from the interest rate shield. It is calculated by discounting future savings. For the company (with infinite lifespan) can be calculated by multiplying the value of debt and tax rate.

**Financial Distress Costs**

In finance, consider a company to be in financial distress when it is having difficulty making payments to creditors. Financial distress may lead to bankruptcy. The more debt a company uses to finance its operations the more it is at risk of experiencing financial distress. There are several costs associated with financial distress:

* Bankruptcy costs
* Distressed asset sales
* Higher cost of debt capital,
* Indirect costs,
* Cost of Coflicts of Interest.

**Bankruptcy Costs and Distressed asset sales**

The more debt a company takes on, the more it risks being unable to meet its financial obligations to creditors. A highly leveraged firm is more vulnerable to a decrease in profitability. Therefore, a highly levered firm has a higher risk of bankruptcy. Bankruptcy costs vary for different types of firms, but they typically include legal fees and, losses incurred from selling assets at distressed fire-sale prices, and the departure of valuable human capital. The way to measure bankruptcy cost is to multiply the probability of bankruptcy by the expected cost of bankruptcy.

**Indirect Costs of financial distress and higher cost of debt**

There are also several indirect costs associated with financial distress. When a company is experiencing financial distress, conservative managers may cut down on research and development, marketing research, and other investments to spare cash. The firm may also incur opportunity costs if trepid managers pass on risky corporate projects. Also, financial distress can affect a firm’s reputation. A company in financial distress may lose customers, be forced to pay a higher cost of capital, receive less favorable trade credit terms from suppliers, etc.

**Financial Distress and Conflicts of Interest**

Financial distress can incur costs associated with the conflicting self-interests of creditors, managers, and owners. When a company in financial distress is confronted with a risky investment opportunity, creditors would prefer the company not engage in the risky investment – they would rather the company preserve its assets so they will be able to collect what’s owed to them in the event of default. Investors, or owners, on the other hand, would prefer the company to go forward with the risky investment. If the company foregoes the investment, owners don’t benefit. If the company does go for the risky investment, owners have at least some upside gain potential. While managers may be either conservative in the face of a risky opportunity in order to try to preserve their jobs.

### MM1 theory (statement by Miller Modigliani I.)

**Partial assumptions:**

* interest is not a tax deductible expense
* there are no Costs of Financial Distress

**Result:**

The average cost of capital (WACC) does not change, so there is no point in examining the debt-to-equity ratio.



**Formulas:**

i (eq) = i (eq0) + i (eq0) - i (debt) \* Debt / Equity

WACC = Debt/capital \* i(debt) + Equity/ Capital \* i(eq)

WACC = constant

Value of company = constant

Where:

i (eq) = i (equity) = required return on equity

i (eq0) = theoretical return on equity at zero debt

i (debt) = required debt yield

Debt = Debt Value

Equity = Market Value of Equity

Capital = Capital Value (= debt + equity)

WACC = Weighted Average Cost of Capital

**For example:**

The company has a value of CZK 100 and is 100% financed by equity. The cost of equity is 20%, we have no debt, so WACC = 20%

If we increase the indebtedness to 50%, and use debt with an interest rate of 10%, the cost of equity will increase according to the formula:

i (eq) = 20% + (20% - 10%) \* 50/50

i (eq) = 30%

WACC = Debt/Capital \* i(debt) + Equity/ Capital \* i(equity)

WACC = 50/100 \* 10% + 50/100 \* 30%

WACC = 0.5 \* 10% + 0.5 \* 30%

WACC = 20%

If we increase the indebtedness to 80%, and use debt with an interest rate of 10%, the cost of equity will increase according to the formula:

i (eq) = 20% + (20% - 10%) \* 80/20

i (eq) = 60%

WACC = Debt/Capital \* i(debt) + Equity/ Capital \* i(equity)

WACC = 80/100 \* 10% + 20/100 \* 60%

WACC = 0.8 \* 10% + 0.2 \* 60%

WACC = 20%

The example shows that the WACC value is constant. (if MM1 applies). The savings caused by the use of cheap debt are offset by increasing of equity cost.

### MM2 theory (statement by Miller Modigliani II.)

**Partial assumptions:**

* interest is a tax deductible expense
* there are no costs of financial distress

**Result:**

The average cost of capital decreases with increasing indebtedness due to the tax shield and at the same time the market value of the company increases.



**Formulas:**

i (eq) = i (eq0) +( i (eq0) - i (debt)) \* (1-T) \* Debt / (Equity+ CVS)

i (debt) = interest rate \* (1-T)

WACC = Debt/ (Capital + CVS) \* i(debt) + (Equity+ CVS) / (Capital+ CVS) \* i(eq)

IS = Interrest \* T

CVS = Debt \* T

Where:

i (eq) = i (equity) = required return on equity

i (eq0) = theoretical return on equity at zero debt

i (debt) = required debt yield

Debt = Debt Value

Equity = Market Value of Equity

Capital = Capital Value (= debt + equity)

WACC = Weighted Average Cost of Capital

T = Tax Rate

IS = Interest Shield

CVS = Current Value of the Interest Shield

For example:

The company has a value of CZK 100 and is 100% financed by equity. The cost of equity is 20%, we have no debt, so WACC = 20%

The company has a book value of CZK 100 and is 50% financed by equity.

Interest rate shield (IS) = i \* Debt\* Tax = 0.1 \* 50 \* 20% = 1

Current shield value (CVS) = Debt \* Tax = 50 \* 0.2 = 10

Equity + CVS = Equity(0) + CVS = 50 + 10 = 60

Capital = similarly = Capital (0) + CVS = 110

i (eq) = i (eq0) + (i (eq0) -i (debt) \* (1-T) \* Debt / Euity+CVS

i (vk) = 20% + (20% -10%) \* (1-0,2) \* 50/60 = 26,66%

WACC = Debt / (Cap+ CVS) \* i (dl) + (Equity+CVC) / (CAP+ CVS) \* i (eq)

WACC = 50/110 \* 10% \* (1-0.2) + 60/110 \* 26.66% = 18.17%

With increasing indebtedness, the WACC is declining.

### MM3 theory (statement by Miller Modigliani III.)

**Partial assumptions:**

* interest is a tax deductible expense
* there are Costs of Financial Distress

**Result:**

The average cost of capital decreases with increasing indebtedness due to the tax shield and at the same time the market value of the company increases. With a certain level of indebtedness, high financial distress will outweigh the benefits of the interest tax shield, and the average cost of capital is rising again.

The average cost of capital is U-shaped.



**Explanation of MM theory and justification why debt increases the cost of equity.**

If the company had only variable costs, then a 1% change in sales would cause a 1% change in profit. Fixed costs increase the change in profit. For a company with fixed costs, then a change in sales of 1% will cause a higher change in profit (higher than 1%). Interest is a fixed cost. Increasing the debt, increases interest (fixed costs). Increasing fixed costs, increases the sensitivity of earnings to the change in sales. Larger fluctuations in profit will be reflected in the beta coefficient. The beta coefficient is the basis for calculating the required return on capital i(eq).

**Operating leverage**

Operating Leverage indicates how much EBIT will change (in %) if sales change by 1%. The difference is given by the share of operating fixed costs.

**Financial leverage**

Financial Leverage indicates the change in EAT (in %) if EBIT changes by 1%. The difference is given by the share of financial fixed costs.

**Alternative interpretation of MM theory.** This is a less accurate description than in the previous case. The following examples would be relevant in the absence of Growth Opportunities.

Situation according to MM1 theory.

The company is owned by five partners (with the same deposit). The required income of one partner is CZK 20. In total, the company must pay 5 \* 20 = 100 CZK.

One partner will be replaced by a bank. Bank interest is CZK 10. The risk of the replaced partner will not disappear, and the bank will not bear it, so it will move to the remaining partners. The required yield of the remaining partners will increase. We have 4 partners with the required yield of 22.5 = 90 CZK. And a bank with interest of CZK 10. The total payment is 100 CZK. The size of the payment is the same as in the previous case.

Two partners are replaced by a bank. The interest is 2 \* 10 = 20 CZK. The risk of replaced partners will not disappear, and the bank will not bear it, so it will move to the remaining owners. The required yield of the remaining partners will increase. We have 3 owners with the required return = 3 \* 26.6 = CZK 80. And a bank with interest of CZK 20. The total payment is again CZK 100

We will replace the four partners by a bank. Interest is 4 \* 10 = 40 CZK. The risk of replaced partners will not disappear, and the bank will not bear it, so it will move to the remaining owner. The required yield of the remaining partners will increase. We have 1 owner with the required income = 1 \* 60 = 60 CZK. And a bank with a interest of 40 CZK. The total payment is again CZK 100.

Any combination of a bank and partners will result in a cost of capital of CZK 100.

Situation according to MM2 theory. We will add the effect of taxes.

The company consists of 5 partners (with the same deposit). The required income per partner is CZK 20. In total, the company must pay 5 \* 20 = 100 CZK. However, the company still has to pay income taxes (20%). So it's 4 CZK per partner. The total payment is CZK 100 for partners and CZK 20 for state taxes = a total of CZK 120.

We will show a situation where interest would not be a tax deductible expense. We will replace 3 partners with a bank. Interest is 3 \* 10 = CZK 30. The risk of replaced partners will not disappear, and the bank will not bear it, so it will move to the remaining owners. We have 2 owners with the required income = 2 \* 35 = 70 CZK and with a tax burden of 14 CZK

And a bank with a yield of 3 \* 10 = CZK 30 and a tax burden of CZK 6. The total payment is again 120 CZK. If interest is not a tax deductible expense, then MM1 theory applies and any combination of a bank and partners will result in a cost of capital of CZK 120.

Situation where interest is a tax deductible expense.

We will replace 3 partners with a bank. Interest is 3 \* 10 = CZK 30. The risk of replaced partners will not disappear, and the bank will not bear it, so it will move to the remaining owners. We have 2 owners with the required income = 2 \* 35 = 70 CZK and with a tax burden of 14 CZK. And a bank with an interest rate of 3 \* 10 = CZK 30 and a tax burden of CZK 0 (interest is deductible). The total payment is 114 CZK. CZK 6 represents (Tax) Interest Shield. Increasing indebtedness leads to greater tax savings and reduces the total payment.

### Factors for estimating the optimal capital structure

The calculation of the costs of financial distress is the biggest problem of the MM theory. It is especially difficult to predict indirect costs. The optimal capital structure is therefore often only estimated.

Factors determining the capital structure of companies where the Costs of Financial Distress cannot be determined:

* Ability to repay: this is the most important factor. The amount of indebtedness and the ability to repay must be verified by a financial plan.
* Usual indebtedness in the industry. It is not recommended to exceed this limit, due to image. When a company's indebtedness is higher than that of the industry, business partners, customers and banks often consider the company to be over-indebted and increase indirect costs.
* Size of operating profit. Higher profits allow higher indebtedness. The size of the profit affects both, the size of potential tax shields and delays financial distress.
* Size of operational risk: Higher risk = lower optimal indebtedness. As the size of the risk increases, the allowable debt decreases. Indebtedness and financial leverage increase volatility. If the volatility itself is high, it is dangerous to increase it further with debt. Therefore, the indebtedness of these companies must be low.
* Structure of current assets. Liquid assets with a stable price allow for higher indebtedness. In case of problems, it is possible to sell these assets and pay debts from the proceeds.

# Financial Ratio Analysis

Financial ratio analysis is the calculation and comparison of ratios which are derived from the information in a company's financial statements. The level and historical trends of these ratios can be used to make inferences about a company's financial condition, its operations and attractiveness as an investment.

Financial ratios are calculated from one or more pieces of information from a company's financial statements. (For example, the "gross margin" is the gross profit from operations divided by the total sales or revenues of a company, expressed in percentage terms).

In isolation, a financial ratio is a useless piece of information. In context, however, a financial ratio can give a financial analyst an excellent picture of a company's situation and the trends that are developing. A ratio gives beneficial information only by:

* Comparison to other data and standards. (Taking our example, a gross profit margin for a company of 25% is meaningless by itself. If we know that this company's competitors have profit margins of 10%, we know that it is more profitable than its industry average and the situation is quite favourable).
* Comparation to the historical trend. (For example, if has been increasing the profit ratio steadily for the last few years, this would also be a favourable information that management is implementing effective business policies and strategies).

You must also monitor the ratios on a regular basis, if you want gain correct data about effectively your company.

Financial analysis procedure

* Selection of suitable indicators and calculation of their value
* Evaluation of ratios over time (trend analysis)
* Comparison of ratios with industry standards (comparative analysis - benchmarking)
* Evaluation of indicator systems in mutual relations

Sources of financial analysis

* Financial Statements
	+ Balance sheet
	+ Profit and loss statement (income statement)
	+ CF statement
* Other sources
	+ Annual Report and financial notes
	+ Management accounting
	+ Internal sources

**Methods of Financial Analysis**

1. Analysis of absolute indicators (Structure analysis and Trend analysis)
2. Analysis of difference indicators (Net working capital and other funds)
3. Analysis of Financial ratios
4. Specific methods of financial analysis

## Trend analysis (Horizontal analysis )

* used to capture trends (assets, capital, sales, costs…)
* indicates changes in the financial statement items (in absolute and relative amount)
* analyzes financial statements line by line (year after year)
* usually analyzes a period of 5 - 10 years

## Structure analysis (vertical analysis)

* Calculates the share of individual components of the Balance Sheet or Income Statement (expressed in%).
* The advantage of the method is that it is not affected by inflation.This allows comparisons of results from different years.

## Financial ratio analysis

Financial ratio analysis groups the ratios into categories which tell us about different aspect of a company's finances and operations.

1. Profitability Ratios which use margin analysis and show the return on sales and capital employed.
2. Activity Ratios (or Operational Ratios) which use turnover measures to show how efficient a company is in its operations and use of assets.
3. Debt Ratios (or Leverage, Solvency Ratios) which show the extent that debt is used in a company's capital structure and which give a picture of a company's ability to generate cash flow and pay it financial obligations.
4. Liquidity Ratios which give a picture of a company's short term financial situation or solvency.
5. Market Value Ratios witch give information about situation on capital markets.
6. Specific method of financial analysis

Although financial ratio analysis is well-developed and the actual ratios are well-known, practicing financial analysts often develop their own measures for particular industries and even individual companies. Analysts will often differ drastically in their conclusions from the same ratio analysis. Therefore you mast write always the methodology, if you make this type of analysis.

**Profit category**

* Earnings for the owner = EAC
* Earnings (Net Income) after tax = EAT (NIAT)
* Earnings (Net Income) before tax = EBT (NIBT)
* Profit before tax and interest = EBIT
* Profit before tax, interest and depreciation = EBDIT (EBITDA)

### Profitability Ratios

The ratios in this section measure the ability of the business to make a profit.A profitability ratio allows measure the ability of the firm to earn an adequate return on sales, total assets, and invested capital.

**Net Profit Growth**

It is percentage increase (or decrease) in Net Profit between two time periods.

* Formula:

(Current Year's Net Profit - Last Year's Net Profit) / Last Year's Net Profit

or

Current Year's Profit / Last Year's Profit

You can also use the Net Profit for a month or shorter term trend.

**Sales Growth**

It is similar to ratio above. Attention: If overall costs and inflation are on the rise, then you should watch for a related increase in your sales. If not, then this is an indicator that your Prices are not keeping up with your costs.

**Return on Assets (ROA)**

ROA measures the company's ability to utilize its assets to create profits.

ROA is an important ratio for evaluation investment too. (You can use this, if the company is deciding whether or not to initiate a new project). The basis of this ratio is that if a company is going to start a project they expect to earn a return on it, ROA is the return they would receive. If ROA is above the rate that the company borrows at then the project should be accepted, if not then it is rejected.

* Formula

= Net Income / Assets

or

= Net Income / ((Beginning + Ending Total Assets) / 2)

**Return on Equity (ROE)**

Measures the income earned on the shareholder's investment in the business.

ROE determines the rate of return on your investment in the business. As an owner or shareholder this is one of the most important ratios. ROE shows the fact if company make enough of a profit to compensate you for the risk of being in business.

ROE must compare with the return on equity to other investment alternatives, such as a savings account, stock or bond, or other businesses in the same or similar industry.

* Formula

= Net Income / Equity

There are several other variations on the formula that management may use:

1. Investors can calculate the coefficient with modify the formula above by subtracting preferred dividends and subtracting preferred equity, so that:

Alternation formula

ROCE = (Net Income - Preferred Dividends)/Common Equity.

2. Return on equity may also be calculated by dividing net income by „average shareholder's equity“, (rather than shareholder's equity), over the period. Average shareholder's equity calculated by adding beginning shareholders equity to ending shareholder's equity and dividing the result by 2.

**Return on Investment (ROI)**

ROI indicated the income earned on the invested capital.

* Formula

= Net Income / (Long-term Liabilities + Equity)

The result is compared with WACC. The ROI must be higher.

**Net Profit Margin (Return on Sales = ROS)**

ROS shows how much profit comes from every dollar of sales. You can compare ROS to other businesses in the same industry to see if your business is operating as profitably as it should be. Or you can compare the trend from month to month. (Trend from month to month can show how well you are managing your operating or overhead costs).

* Formula

= Net Income / Net Sales

You can increase correctness of this ratio, if you remove "other income" and "other expense" items as well as nonrecurring items from Net Income.

**Gross Profit Margin**

This is an indicator of how much profit is earned on your products without consideration of selling and administration costs.

This ratio should be compared with industry data as it may indicate insufficient volume and excessive purchasing or labor costs.

* Formula

= Gross Profit / Net Sales

**COGS to Sales**

This is percentage of sales used to pay for charges which convert directly with sales.

* Formula:

Cost of Goods Sold / Sales

### Activity Ratios

Many of the problems related to profitability can be explained, in whole or in part, by the firms ability to effectively employ ins resources. In this category, we measure the speed at witch the firm is turning over accounts receivable, inventory, and long term asset.

In other words: For short term assets - asset activity ratios (utilization ratios) measure how many times per year a company sells its inventory or collects its entire accounts receivable For long term assets – these ratios tell us how productive the fixed assets are.

**Total asset turnover**

This is indicator of the activity of the assets and the ability of the business to generate sales through the use of the assets.

* Formula

= Net Sales / Average Total Assets

**Fixed asset turnover**

FAT measures the capacity utilization and the quality of fixed assets.

* Formula

= Net Sales / Net Fixed Assets

**Current asset turnover**

CAT indicates the liquidity of the current asset.

* Formula

= Net Sales / Average Current Assets

**Inventory asset turnover**

IAT indicates the liquidity of the inventory.

* Formula

**= Net Sales / Average Inventory Assets**

Generally, a high inventory turnover is an indicator of good inventory management. But a high ratio can also mean there is a shortage of inventory. A low turnover may indicate overstocking, or obsolete inventory.It is necessary to compare to industry standards.

**Inventory Turnover in Days**

This Ratio indicates the liquidity of the inventory in days.

* Formula

Average Inventory / (Cost of Goods Sold / 365)

You must compare the ratio to:

* trends that indicate a change in your inventory levels.
* your inventory cycle.
* industry standards.

**Account receivable turnover**

This ratio indicates the liquidity of the company's receivables.

* Formula

= Net Sales / Average Accounts Receivable (active debts)

You must compare the ratio to:

* trends that indicate a change our customers' payment habit.
* your stated terms.
* industry standards.

**Accounts Receivable Turnover in Days**

This ratio indicates the liquidity of the company's receivables in days.

* Formula

= Average Accounts Receivable (active debts) / (Annual Net Sales / 365)

**Operating Cycle**

This ratio indicates the time between the acquisition of inventory and the realization of cash from sales of inventory. For most companies the operating cycle is less than one year, but in some industries it is longer.

* Formula

Accounts Receivable Turnover in Days + Inventory Turnover in Day

**Cash Turnover**

Cash Turnover measures how effective a company is utilizing its cash.

* Formula

Net Sales / Cash

**Net Working Capital Turnover**

Net Working Capital Turnover indicates the turnover in working capital per year. A low ratio indicates inefficiency, while a high level implies that the company's working capital is working too hard (it is good for profitability but very dangerous for solvency)

* Formula

Net Sales / Average Working Capital

**Accounts Payable Turnover**

Ratio shows the number of times trade payables turnover during the year.

* Formula

Net Sales (or cost COGS) / Average Accounts Payable

The higher value of ratio makes shorter the time between purchase and payment. A low turnover may indicate that there is a shortage of cash to pay your bills or some other reason for a delay in payment

**Accounts Payable Turnover in Days**

This ratio indicates the liquidity of the firm's payables in days.

* Formula

(1 / Accounts Payable Turnover) \*365

You can compare the ratio to:

* trends (that indicate a change in your payment habits).
* the terms offered by your suppliers.
* industry standards.

### Debt ratios

This group of ratios compares debt (and interest on debt) with firm’s asset (and with firm’s earning power). Indicator also shows the businesses' vulnerability to risk. These ratios are often used by creditors to determine the ability of the business to repay loans.

**Debt ratio**

Debt ratio shows the ratio between capital invested by the owners and the funds provided by lenders.

This ratio is very important for creditors too. Debt ratio provides information about the company's ability to absorb asset reductions arising from losses without making danger for the interest of creditors.

* Formula

= Debt / Assets

You can make comparison of how much of the business was financed through debt and how much was financed through equity. For this calculation it is common practice to include loans from owners in equity rather than in debt.The higher the ratio means the great risk to a present or future creditor. Common value is 0,25-0,75, but most lenders have limits for the debt to assets ratio 0,5 (especially for small business firms).

Too much debt can put your business at risk, but too little debt may mean you are not realizing the full potential of your business, and may actually hurt your overall profitability. This is particularly true for larger companies where shareholders want a higher reward (dividend rate) than lenders (interest rate).

**Equity ratio**

* Formula

= Equity / Assets

Evaluation of this ratio is similar to the debt ratio. Indicates how well creditors are protected in case of the company's insolvency.

**Debt-Equity ratio**

Indicates what proportion of the company's assets are being financed through debt. This ratio is very similar to the debt-equity ratio. A ratio under 1 means a majority of assets are financed through equity, above 1 means they are financed more by debt. Furthermore you can interpret a high ratio as a "highly debt leveraged firm". Creditors are bound to get worried if the company is exposed to a large amount of debt and may demand that the company pay some of it back.

Indicates how well creditors are protected in case of the company's insolvency.

* Formula

= Debt / Equity

Evaluation of this ratio is similar to the debt ratio.

**Capitalization Ratio**

Indicates long-term debt usage.

* Formula

Long-Term Debt / (Long-Term Debt + Owners' Equity)

or

Long-Term Debt / Assets

**Long-term Debt to Net Working Capital**

Long-term Debt to Net Working Capital Ratio provides information about ability to pay long term debt from current assets after paying current liabilities.

* Formula:

Long-term Debt / (Current Assets - Current Liabilities)

**Interest Coverage Ratio I.**

Interest Coverage Ratio 1 indicates a company's capacity to meet interest payments. In this ratio is used EBIT (Earnings Before Interest and Taxes). Ratio shows how much of your Net Profits are available to repay Interest. The value above 1 is necessary for long period (value below 1 is allowed only for very short period).

* Formula:

(Net Profit) / Interests

**Interest Coverage Ratio II.**

Ratio is similar to previous. Interest Coverage Ratio 2 indicates a company's capacity to meet interest payments from cash flow. Ratio shows how much of your Cash Flow ((Net Profit + Non-cash expenses) are available to repay Interest.
The value above 1 is necessary for short period too.

* Formula:

(Net Profit + Non-cash expenses) / Interests

**Debt coverage ratio**

Indicates: how well your cash flow covers debt, and the capacity of the company to take on additional debt. Shows how much of your cash profits are available to repay debt. Managers and creditors look at this ratio to determine if there is adequate cash to make loan payments. Most creditors also have limits for the debt coverage ratio.

* Formula:

(Net Profit + Non-cash expenses) / Debt

### Liquidity Ratios

The primary emphasis moves to the firms ability to pay short term debt.

**Working Capital**

Working capital compares current assets to current liabilities, and serves as the liquid reserve available to satisfy contingencies and uncertainties. A high working capital balance is mandated if the entity is unable to borrow on short notice. Working Capital indicates the short-term solvency of a business and in determining if a firm can pay its current liabilities when due.

* Formula

= Current Assets - Current Liabilities

**Current Ratio**

Current Ratio provides an indication of the liquidity of the business by comparing the amount of current assets to current liabilities. A business's current assets generally consist of cash, marketable securities, accounts receivable (active debts), and inventories. Current liabilities include accounts payable, current maturities of long-term debt, accrued income taxes, and other accrued expenses that are due within one year.

In general, businesses prefer to have at least two dollars of current assets for every dollar of current liabilities. However, the normal current ratio fluctuates from industry to industry.

A current ratio significantly higher than the industry average could indicate the existence of redundant assets. Conversely a current ratio significantly lower than the industry average could indicate a lack of liquidity.

* Formula

= Current Assets / Current Liabilities

Generally a ratio of 2:1 is good.

One problem with the current ratio is that it ignores timing of cash received and paid out. For example, if all the bills are due this week, and inventory is the only current asset, but won't be sold until the end of the month, the current ratio tells very little about the company's ability to survive.

**Acid Test or Quick Ratio**

Acid test can use to measurement of the liquidity position of the business. The quick ratio compares the cash plus cash equivalents and accounts receivable to the current liabilities. The primary difference between the current ratio and the quick ratio is the quick ratio does not include inventory and prepaid expenses in the calculation. Consequently, a business's quick ratio will be lower than its current ratio. It is a stringent test of liquidity.

* Formula

= (Cash + Marketable Securities + Accounts Receivable) / Current Liabilities

Acid test indicates the extent to which you could pay current liabilities without relying on the sale of inventory - how quickly you can pay your bills.

Generally a ratio of 1:1 is good and indicates you don't have to rely on the sale of inventory to pay the bills.

Although a little better than the Current ratio, the Quick ratio still ignores timing of receipts and payments.

**Cash Ratio**

Cash Ratio indicates a conservative view of liquidity such as when a company has pledged its receivables and its inventory, or the analyst suspects severe liquidity problems with inventory and receivables.

* Formula

= (Cash + Cash Equivalents) / Current Liabilities

### Market Value Ratios

**Price to Earnings Ratio - P/E Ratio**

One of the most widely used ratios, it compares the current price with earnings to see if a stock is over or under valued.

Generally a high P/E ratio means that investors are anticipating higher growth in the future.

The average market P/E ratio is 20-25 times earnings.

It is useful to compare the P/E ratios of other companies in the same industry, or to the market in general, or against the company's own historical P/E ratios.

Companies that are losing money do not have a P/E ratio.

* Formula

= Market Value / Earnings (per Share)

**Price to Sales Ratio - P/S Ratio**

Somewhat similar to the Price to Earnings Ratio, but it accounts wits sales.

This represents the weighted average of the price/sales ratios of the stocks in a fund's portfolio. Price/sales represents the amount an investor is willing to pay for a dollar generated from a company's operations.

The evaluation is similar like P/E ratio

* Formula

= Market Value / Sales (per Share)

**Dividend Payout Ratio**

Ratio indicates the proportion of earnings that are used to pay dividends to shareholders.

A reduction in dividends paid is looked poorly upon by investors, and the stock price usually depreciates as investors seek other dividend paying stocks.

A stable dividend payout ratio indicates a solid dividend policy by the company's board of directors.

* Formula

= Yearly Dividend per Share / Earnings per Share

**Book Value Per Share - BV**

Somewhat similar to the earnings per share, but it relates the stockholder's equity to the number of shares outstanding, giving the shares a raw value.

Comparing the market value to the book value can indicate whether or not the stock in overvalued or undervalued, but you must take account of kind of market. During bull markets the stock price is more likely to trade significantly higher than book value, and in a bear market the two value's may be close to equal.

* Formula

= (Stockholders Equity - Preferred Stock) / Average Outstanding Shares

## Specific method of financial analysis

### Models of prediction bankruptcy

**Altman Z-Score**

The Z-score model is a quantitative model developed in 1968 by Edward Altman to predict bankruptcy (financial distress) of a business, using a blend of the traditional financial ratios and a statistical method known as multiple discriminant analysis.

The Z-score is known to be about 90% accurate in forecasting business failure one year into the future and about 80% accurate in forecasting it two years into the future.

* Formula

|  |  |  |  |
| --- | --- | --- | --- |
| Z = | 1.2+1.4+0.6+0.999+3.3 | xxxxx | (Working Capital / Total Assets)(Retained Earnings / Total Assets)(Market Value of Equity / Book Value of Debt)(Sales / Total Assets)(EBIT / Total Assets) |

|  |  |
| --- | --- |
| Z-score | Probability of Failure |
| less than 1.8greater than 1.81 but less than 2.99greater than 3.0 | Very HighNot SureUnlikely |

Z-Score was generated for NYSE (New York Stock Exchange). Therefore it is much disputed to use this formula for the Czech companies.

**IN 95, IN 99, IN 01**

These scores were calculated by Mr. and Mrs. Neumaier from VŠE. They are applicable to evaluation of the Czech companies.

IN 95 is usually used to predict bankruptcy. IN 97 is applicable to rating of prosperity. IN 01 is combination both of their.

**IN 95**

* Formula IN95

|  |  |  |  |
| --- | --- | --- | --- |
| IN95 = | h1h2h3h4h5 h6 . | xxxxxx | Total Assets / DebtEBIT / Interest EBIT / Total AssetsSales / Total Assets(Cash + Inventory + Receivables Securities) / Current LiabilitiesDespicable Liabilities / Sales  |

The value h1 to h5 is different for every kind of industry.

* Evaluation IN 95

|  |  |
| --- | --- |
| IN 95 | Probability of Failure |
| less than 1,0greater than 1but less than 2greater than 2.0 | Healthy situationUnspecified situation Healthy situation |

**IN 99**

* Formula IN99

|  |  |  |  |
| --- | --- | --- | --- |
| IN99 = | -0,0174,573 0,4180,015 | xxxx | Total Assets / DebtEBIT / Total Assets Sales / Total Assets (Cash + Inventory + Receivables Securities) / Current Liabilities) |

* Evaluation IN 99

|  |  |
| --- | --- |
| IN 99 | Value of company |
| less than 0,684greater than but less than 2,07greater than 2.07 | Decline rateUnspecified situationIncrease rate |

**IN 01**

* Formula IN01

|  |  |  |  |
| --- | --- | --- | --- |
| IN99 = | 0,130,04 3,920,210,09 | xxxxx | Total Assets / DebtEBIT / Interest of debt EBIT / Total Assets Sales / Total Assets (Cash + Inventory + Receivables Securities) / Current Liabilities) |

* Evaluation IN 01

|  |  |
| --- | --- |
| IN01 | Value of company |
| less than 0,75greater than 0,75 but less than 1,75greater than 1,75 | Decline rateUnspecified situationIncrease rate |

### Calculation of change of profitability

**Du Pont Return on Assets.**

This is a combination of financial ratios in a series to evaluate investment return. The benefit of the method is that it provides an understanding of how the company generates its return.

* Formula

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Net Income Sales | x | SalesAssets | x | AssetsEquity | = | Net IncomeEquity |

You must use these formulas for calculation:







X = main, cardinal indicator (Net Income / Equity)

A, B = particular indicators (Sales/Assets, Net Income/Assets, Debt/ Assets)

### Models based on Added Value

**Economic Value Added = EVA**

EVA is a performance metric that calculates the creation of shareholder value. It is difference from traditional financial performance metrics such as net profit and EPS. EVA is the calculation of what profits remain after the costs of a company's capital (both debt and equity) are deducted from operating profit.

* Formula

= Net Operating Profit After Taxes (NOPAT) - (Capital \* Cost of Capital)

**Market Value Added = MVA**

MVA is the difference between the market value of a company (both equity and debt) and the capital contributed by investors. MVA is the difference between what investors have contributed and what they could get by selling at today's prices. If MVA is positive, it means that the company has increased the value of the capital entrusted to it, thus, creating shareholder wealth. If MVA is negative, the company has destroyed wealth.

# Current Assets Management

Short-term Financial Management

* Financial management makes decisions with consequences for a period of up to 1 year.
* Short-term financing does not correspond to Financing of short-term assets
* The difference is in the financing of Net Working Capital

Liquidity management and working capital management

* Management of Short-term Assets and their components (Inventories, Receivables, Short-term Financial Assets)
* Management of Short-term Liabilities
* Making of a Short-Term Financial Plan

## Inventories

* Material - raw materials, spare parts, packaging, other tangible assets with a useful life of up to one year.
* Inventories of own production - work in progress, semi-finished products, products and animals
* Goods - property acquired for the purpose of resale.

### Valuation of inventories (when issued for production)

* Weighted arithmetic mean: variable - stocks are revalued after each increase using the
* FIFO method - the issue of goods for consumption is valued at the prices of the goods that were first accepted into the warehouse
* LIFO method - the issue of goods for consumption is valued at the prices of the goods that were last accepted into the warehouse

**Example 1:**

First receipt of goods: 100 pieces of 1 CZK each

Second receipt of goods: 100 pieces of 2 CZK

Delivery: 150 pieces.

Determine the price.

* FIFO = 100 pcs for 1 CZK, then 50 pcs for 2 CZK. Total costs CZK 200
* LIFO = 100 pcs for 2 CZK, then 50 pcs for 1 CZK. Total costs CZK 250
* Award with average price = 150 pieces for 1.5 CZK Total costs 225 CZK

### EOQ – Economic Order Quantity

* Formulas





N = total cost

Np = acquisition cost per delivery (order)

Ns = storage costs

C = price per unit (material)

S = projected consumption in technical units for the relevant period

S / Q = number of orders for the reference period

Q / 2 = average stock

## Cash management

* Direct management through a short-term financial plan
* Baumoll Model
* Miller Orr Model

### Baumoll Model

* Principle as EOQ model
* Assumption:
* Consumption of funds in the company is gradual
* Optimizes cash only (not account funds)
* Formulas





CN = total costs associated with raising and holding money

Na = acquisition costs (costs associated with raising money

PL = total need for money for payments for the selected period

ú = interest rate (interest loss on holding a unit of money)

PL / Q = number of acquisitions (withdrawals) during the reference period

Q / 2 = average amount of money held

### Miller Orr Model

It is based on the assumption that the daily cash balance changes randomly

Cash must be kept within the specified limits

Rule:

Allow cash balances to fluctuate freely until an upper or lower limit is reached.

Restore the optimal condition by buying or selling short-term securities

* Formulas

**Miller Orr Model**





Z = required cash position (return point)

Ntr = cost of selling securitiesσ2 = variance of cash flows

K = interest rate (corresponds to the variance time)

Hd = lower limit of funds

Return Point - in 1/3 of the range from the lower limit



## Payment methods

The most used payment methods:

1. Barter (Using other goods)

2. Cash payment

3. Using a bill of exchange

4. Bank transfer

5. Documentary collection

6. Letter of credit

7. Payment commitments

8. Cheque (check-in US english)

9. Factoring and Forfaiting

### Barter

In trade, barter is a system of exchange in which participants in a transaction directly exchange goods or services for other goods or services without using a medium of exchange, such as money.

Economists distinguish barter from gift economies in many ways; barter, for example, features immediate reciprocal exchange, not one delayed in time. Barter usually takes place on a bilateral basis, but may be multilateral (if it is mediated through a trade exchange).

In most developed countries, barter usually exists parallel to monetary systems only to a very limited extent. Market actors use barter as a replacement for money as the method of exchange in times of monetary crisis, such as when currency becomes unstable (such as hyperinflation or a deflationary spiral) or simply unavailable for conducting commerce.

**Advantages**

* Since direct barter does not require payment in money, it can be utilized when money is in short supply, when there is little information about the credit worthiness of trade partners, or when there is a lack of trust between those trading.
* Barter is an option to those who cannot afford to store their small supply of wealth in money, especially in hyperinflation situations where money devalues quickly.

**Limitations**

* The limitations of barter are often explained in terms of its inefficiencies in facilitating exchange in comparison to money.
* There needs to be a 'double coincidence of wants'
* For barter to occur between two parties, both parties need to have what the other wants.
* There is no common measure of value
* In a monetary economy, money plays the role of a measure of value of all goods, so their values can be assessed against each other; this role may be absent in a barter economy.
* Indivisibility of certain goods
* If a person wants to buy a certain amount of another's goods, but only has for payment one indivisible unit of another good which is worth more than what the person wants to obtain, a barter transaction cannot occur.
* Lack of standards for deferred payments
* This is related to the absence of a common measure of value, although if the debt is denominated in units of the good that will eventually be used in payment, it is not a problem.
* Difficulty in storing wealth
* If a society relies exclusively on perishable goods, storing wealth for the future may be impractical. However, some barter economies rely on durable goods like sheep or cattle for this purpose

### Payment in cash

The method was used in the 90s of the last century. The reason for introducing the method was untrustworthy business relations between business entities and difficult debt collection.

Currently, the usability of the method is minimal.

In the Czech Republic, the amount of the payment is limited to CZK 270,000.

Payment can be made in advance, at the same time as the delivery of goods, or subsequently after the delivery of go

The advantage of the method was the security of the payment.

The disadvantage of the method was in danger of robbery.

### Promissory Note and Bill of Exchange

A promissory note is a financial instrument that contains a written promise by one party (the note's issuer or maker) to pay another party (the note's payee) a definite sum of money, either on demand or at a specified future date.

A promissory note typically contains all the terms pertaining to the indebtedness, such as the principal amount, interest rate, maturity date, date and place of issuance, and issuer's signature.

A bill of exchange transaction can involve up to three parties. The drawee is the party that pays the sum specified by the bill of exchange. The paye is the one who receives that sum. The drawer is the party that obliges the drawee to pay the payee.

### Bank transfer

This is the most common method of payment. The advantage is low cost. The disadvantage is low payment security.

Payment procedure:

* The payer submits a payment order
* The payer's bank submits a payment order to the CNB's clearing center.
* The CNB will send the amount to the beneficiary's bank account.
* The beneficiary's bank sends the amount to the beneficiary's account.
* Disadvantages of the method: high risk with a high proportion of bad debts

### Documerntary collection

Documentary collection is a process in which a seller instructs their bank to forward documents related to the export of goods to a buyer's bank with a request to present these documents to the buyer for payment, indicating when and on what conditions these documents can be released to the buyer.

The buyer may obtain possession of goods and clear them through customs, if the buyer has the shipping documents (original bill of lading, certificate of origin, etc.). The documents, however, are only released to the buyer after payment has been made. Documentary Collections facilitate import/export operations. They do not provide the same level of security as Letters of Credit. The costs are lower compared to Letters of Credit. Unlike the Letters of Credit, for a Documentary Collection, the bank acts as a channel for the documents but does not issue any payment covenants (does not guarantee payment). The bank that has received a documentary collection may debit the buyer's account and make payment only if authorised by the buyer.

### Letter of credit (LC), also known as a Documentary credit

LC is a payment mechanism used in international trade to provide an economic guarantee from a creditworthy bank to an exporter of goods.

Letters of credit are used extensively in the financing of international trade, where the reliability of contracting parties cannot be readily and easily determined.

Bank credential (written commitment of the bank) to pay a specified amount of money (or accept a bill of exchange) after fulfilling the letter of credit conditions (eg submission of certain documents)

Procedure:

1. The customer (payer) asks his bank to open a letter of credit.
2. The bank opens the letter of credit (and informs the client about its opening)
3. The supplier delivers the goods
4. The supplier receives bank documents from the customer (through the carrier)
5. The supplier will deliver these documents to his bank
6. The supplier's bank hands over the documents to the customer's bank
7. The customer's bank checks the documents
8. Settlement is performed via a clearing center
9. The supplier's bank will repay the amount
10. The customer's bank debits the customer's account

Advantages of the method:

* secure method of payment

Disadvantages of the method:

* high costs (even higher than for direct debits)
* the supplier is not sure that the customer will collect the goods.
* The legislation is international. Conditions are uniform in all countries.

### Payment Commitments

Similar principle and procedure as for a documentary letter of credit. The difference is that the bank does not undertake to pay, but only undertakes to transfer the relevant amount from the payer's account. The Bank does not guarantee that the payer will have the relevant amount in the account within the given deadline.

### Cheque clearing

Cheque clearing is the process of moving cash (or its equivalent) from the bank on which a cheque is drawn to the bank in which it was deposited, usually accompanied by the movement of the cheque to the paying bank, either in the traditional physical paper form or digitally under a cheque truncation system.

This process is called the clearing cycle and normally results in a credit to the account at the bank of deposit, and an equivalent debit to the account at the bank on which it was drawn, with a corresponding adjustment of accounts of the banks themselves.

If there are not enough funds in the account when the cheque arrived at the issuing bank, the cheque would be returned as a dishonoured cheque marked as non-sufficient funds.

### Factoring and Forfaiting

Factoring is a financial transaction and a type of debtor finance in which a business sells its accounts receivable (i.e., invoices) to a third party (called a factor) at a discount. A business will sometimes factor its receivable assets to meet its present and immediate cash needs.

Forfaiting is a factoring arrangement used in international trade finance by exporters who wish to sell their receivables to a forfaiter.

Factoring conditions vary considerably from country to country. The differences are in the method of accounting, calculation of the factor's remuneration and in taxation. The differences are mainly between the EU countries and the USA.

# The effectivity of the investment projects evaluation

A final phase of the investment decision procedure is the effectivity of the investment projects evaluation with the assistance of variant methods of calculation. These methods are in economic theory distinguished by different perspectives:

**Methods by factor of time**

* static (time factor not considered), used mostly in short life-time of the investment
* dynamic (time factor is considered)

**Methods by character of benefits from the investment**

* methods where the criterion of the evaluation is costs saving (cost criteria of effeciency evaluation)
* methods where the criterion of the evaluation is stated profit (profit criteria of effeciency evaluation)
* methods where the criterion of the evaluation is cash flow from the investment (net cash flow from the investment)

ad 1) The effect derived from the investment is both operating and investment costs savings. Cost criteria of effeciency evaluation are used mostly in the cases when it is not possible to predict the profit from investment.

ad 2) the effect derived from criteria of profit is profit after tax. However the accounting profit does not represent total cash inflow from the investment because depreciation is not included. Return on investment (ARR) or payback period are examples of methods belonging to this category.

ad 3) as the most appropriate and precise methods are the ones considering cash flow as a criterion of evaluation

## Methods where the criterion of the evaluation is costs saving (cost criteria of effeciency evaluation)

The effect derived from the investment is both operating and investment costs savings. Cost criteria of effeciency evaluation are used mostly in the cases when it is not possible to predict the profit from investment.

Use for projects:

* non-generating revenue. (theoreticians can also be used for projects that are guaranteed the same scope of production and the same realization prices)
* the result is the relative efficiency of the project (project ranking), not absolute efficiency (contribution to market value)

**Cost methods of project evaluation**

1. Discounted costs of project
2. Average costs of project
* simplified
* with compound interest

###  Equivalent annual cost (EAC)

Generally known and the most used method in this category is average annual cost method or equivalent annual cost. This method is based on mutual comparison of the average annual cost of individual projects but these projects must be comparable, this means approximately same production quantity for approximately same prices. Fundamental calculation of average annual cost based on assumption of simple interest is as following:

**Average costs of project - simplified**

* Formula:

AC(s) = VC + DE + IN (+ -) LP / n

AC(s) = Average cost calculated by the simplified method.

VC = Variable costs

DE = Depreciation.

IN = Interest.

LP / n = share of liquidation price per one year of life.

Variable costs: Operating expenses, or operating costs without depreciation are often simply considered.

Depreciation. They are calculated as a linear, ie the value of the investment (CE) divided by the lifetime.

Interest. Calculated as the value of the investment \* interest rate. IN = CE \* i. However, the interest expressed in this way is incorrect. They assume a simple interest rate, but in practice compound interest is used, where the value of the debt is gradually repaid and the value of the assets decreases due to depreciation.

Share of liquidation price per one year of life. However, this method of calculation does not respect the time value of money.

**Average costs of project – compounted interest**

* Formula:

AC = VC+ CE(y) +- LP(y)

AC = average cost of project

VC = average annual variable costs

CE (y) = capital expenditure per year

LP (y) = liquidation price per year

CE(y) = CE \* (1+i)n \*i/ (1+i) -1

LE(y) = LP \* i/ (1+i)n -1

More accurate calculation replace depreciation and interest from aquisition value with formula for present value of an annuity multiplied by total investment costs:

In the practise an amount of annual costs often differentiate during life-time of the investment. The procedure is little bit adjusted in this case. Individual annual costs are firstly charged off the interest and their sum is then multiplied by formula present value of an annuity. There are few more modifications of this method depending on circumstances (e.g. residual value consideration) but it is still not possible to decide whether is project acceptable or if cash inflow covers related outflow.

### Discounted costs method

Another very known method is by some authors called present value of costs method. It is moreless an analogy of previous method. As a difference this method calculate total discounted costs for whole life-time of an investment project.

* Formula:

DC = CE + VCd (+ -) LPd

DC = Discounted costs

CE = Capital expenditure

VCd = sum of discounted variable costs (or operating costs without depreciation).

LPd = discounted liquidation price of the asset (at the end of its life).

**Advantages and disadvantages:**

(+) is objective and accurate

(-) it is necessary to convert investments with different lifetime to a common lifetime.

* + For investments with a lifetime of 7 and 11 and 13 years, the common useful life is 1001 years. For each investment is necessary to calculate how much it would cost 1,001 years of its operation (including replacement investments)

If the operating costs differentiate year from year it is necessary to charge off the interest and make a sum then. On the contrary if the operating costs are of same amount every year formula for present sum factor with given discount rate and number of years can be used. It is possible to convert discounted costs to average annual costs dividing by present sum factor.

## Methods where the criterion of the evaluation is stated profit (profit criteria of effeciency evaluation)

Traditional methods of project evaluation (profitable methods)

* Average rate of return on the project
* Payback period of the project

General evaluation:

(-) do not reflect the time

(-) do not reflect the risk

(-) do not take into account the capital structure

(-) have not criterion value

(-) are affected by the method of accounting

(+) easy to calculate

(+) easy evaluation

(+) long tradition of use

### Average rate of return (ARR)

Definition: the ratio of the average profit (after tax) to the average value of investment assets. This method (also called „return on capital employed“) can be used to evaluate projects with different life-time, production quantity or prices and moreover it is possible, using this method, to decide whether is project acceptable or not. Basic formula is following:

* Formula:

ARR = Sum of profits / Capital expenditure \* 0.5 \* lifetime

ARR = average rate of return

ARN = annual profit from the investment project after taxation

Disadvantages:

* It does not take account of the timing of the profits from an investment
* It implicitly assumes stable cash receipts over time
* It is based on accounting profits and not cash flows. Accounting profits are subject to a number of different accounting treatments
* It is a relative measure rather than an absolute measure and hence takes no account of the size of the investment
* It takes no account of the length of the project
* It ignores the time value of money.

Adventages:

* Projects with different lifetimes can be evaluated

**ARR modification:**

The average value of fixed assets can be used. in this case the result is compared with the operating force (EBIT / Fixed assets)

* Formula:

ARR = Sum of profits / Capital expenditure \* 0.5 \* lifetime

Alternatively, ARR can be calculated without the effect of depreciation

* Formula:

ARR = Sum of profits / Capital expenditure \* useful life

Then the indicator is evaluated in comparison with the adjusted ROA (EBIT / Fixed assets + accumulated depreciation)

### Payback period

Definition: the period for which a project is paid for with cash receipts.

The sum of profit and depreciation is often used as cash income {instaed of Cash Flow}. Cash receipts are sometimes used in a discounted form (Discounted payback period), but the benefit of the adjustment is questionable

The payback period method is defined as 'the time it takes the cash inflow from a capital investment project to equal the cash outflows, usually expressed in years'. The accounting profit increased with depreciation serves as a cash inflow. When deciding between two or more competing projects, the usual decision is to accept the one with the shortest payback period. It is desirable that the expected payback period should be shorter than life-time of an investment.

General evaluation:

(-) has all the disadvantages of profitable methods

(-) It ignores the time value of money. Second mentioned disadvantage can be eliminated by discounting cash inflows.

(-) do not take into account cash flows after the payment period of the project. It ignores the timing of cash flows within the payback period, the cash flows after

(-) It may lead to excessive investment in short-term projects

(-) cannot be calculated for unconventional cash flows

(+) very simple evaluation in business practice

(+) is used as an auxiliary indicator in case of:

• high-risk projects (or for projects with increasing risk in the future)

• in fast-growing sectors

• in cases of high cost of capital or lack of external capital

Advantages of the payback method:

* Payback can be important: long payback period means capital tied up and high investment risk.
* Quick, simple calculation and an easily understood concept are few of number of advatages.

Despite the limitations of the payback method, it is the most widely used method in practice. There are a number of reasons for this:

* It is a particularly useful approach for ranking projects where a firm faces liquidity
* constraints and requires fast repayment of investments
* It is appropriate in situations where risky investments are made in uncertain markets that are subject to fast design and product changes or where future cash flows are particularly difficult to predict.
* The method is often used in conjunction with NPV or IRR method and acts as a first screening device to identify projects which are worthy of further investigation.
* It is easily understood by all levels of management.
* It provides an important summary method: how quickly will the initial investment be repaid?

## Methods where the criterion of the evaluation is cash flow from the investment (net cash flow from the investment)

General rules

* 1. Cash flow is based on incremental variables
	2. Price of investment enters into investment through capital expenditures, not operational depreciation. Depreciation, however, have an impact on the amount of taxable income.
	3. Interest is not part of cash flow (even their impact on the tax). The effect of interest and interest tax shields is taken into account in the discount rate.
	4. Cash flows must reflect taxation.
	5. Cash flows must reflect the indirect consequences of investing.
	6. "Drowned costs" are not part of cash flows.
	7. Discount rates must take into account alternative costs (opportunity costs).
	8. The effect of inflation must be calculated in the discount rate

Procedures

1. Definition of capital income and expenditure, determination of the required discount rate
2. Determination of the discount rate.
3. Methods of evaluation of investment efficiency

1) Net Present Value

2) Profitability Index (benefit-cost ratio)

3) Internal Rate of Return

4) Annual Annuity Equivalent

**Determination of Capital revenues and Capital expenditures**

* Formulas:

CE = IE + change NWC (+-) T

IN = EBIT + DE (+ -) change NWC + LP (+-) D

CE= capital expenditure

IE = investment expenditure

NWC = net working capital

T = tax effects

IN = income (annual cash flow)

DE = depreciation

LP = liquidation price

**Determination of the discount rate.**

The rate expresses the required profitability. Usually set at the Weighted average cost of capital (WACC). Theoretically, it is possible to use alternative profitability. Interest rate enters into calculation after tax

* Formulas:

WACC = i(eq) \* EQ/ CAP+ i(debt) \* D/ CAP

I(debt) = i \* (1-T)

EQ = Equity

D = DEBT

CAP = Capital

I(eq) = cost of ekvity

I(debt) = cost of debt

i = interest

t = tax rate)

### Net present value

Net present value is the difference between discounted income and (discounted) capital expenditure. Investments are accepted if the NPV is positive. NPV can not be used to determine the order in investments with different lifetime. The discounted capital expenditure is used in the case of gradual spending of funds.

Net present value is a dynamic method where all possible incomes from the investment are considered. Its basic formula is following:

* Formula:

NPV = ∑CFn/ (1+i)n -I

NPV = net present value

CFn = the net cash receipt at the end of year n

i = the discount rate/the required minimum rate of return on investment

N = the project/investment's duration in years.

I = the initial investment outlay

### Profitability Index (benefit-cost ratio)

PI is the share between discounted income and (discounted) capital expenditure.

For an investment to be acceptable, the PI must be greater than one.

PI indicates the order of investments (even in the case of different lifetimes)

* Formula:

NPV = ∑CFn/ (1+i)n / I

### Annual Annuity Equivalent

AAE indicates the NPV per one year of the life of the investment. For an investment to be acceptable, must be AAE positive. This is another method that allows you to rank investments with different lifetimes. It is often used in the case of sunk costs (deciding to replace an existing machine with a new type).

### Internal Rate of Return

The IRR indicates a discount rate at which the net present value is zero. For the investment to be acceptable, the value of IRR must be higher than the required rate of return. Cannot be used for unconventional cash flows. It does not indicate the order of projects. It is calculated by linear interpolation.

The IRR is found by trial and error. First, a random discount rate is used to calculate NPV. If the NPV is positive, higher discount rate is applied to reach negative NPV and vice versa. Next step uses the results from the first one to calculate final IRR by method of interpolation. IRR method is togerher with NPV frequently used method which guarantee the most precise results (based on assumption of precise prediction of investments´ cash flow) but there are few situations when it is limited or even not possible to use it. IRR cannot be used if mutually exclusive investments or investments with non-convensional cash flow are confronted.

# RISK

Respecting risk is a basic condition for making correct investment decisions. Risk policy is a business activity that manages and optimizes risk. This activity includes the following tasks.

* Risk identification
* Measuring the size of the risk and quantification of the impact of risk on the company
* Protection against risks
* Application of risk in investment decisions

## Risk identification

The basic term is Risk. The risk is the possibility that actual returns will differ from expected returns. Unlike management (which distinguishes risk and chance) in a company's finances, these differences can also be positive.

The possibility that the actual income can only be worse than expected is infrequent in the concept of finance. An example is the risk of fire, theft, floods, etc. This risk (which has only a negative component) is called: net risk.

Risk must be distinguished from uncertainty. Uncertainty is the inability to estimate future results.

Risk categories according to effect in company

* Operational risk: concerns the operation of the company (accidents, strikes)
* Investment risk: refers to fixed assets (inappropriate investment in fixed assets)
* Financial risk: refers to long-term liabilities (bank credit risk)
* market risk: relates to trade (drop in sales, adverse price changes)
* Innovation risk: concerns new products or technologies
* Total business risk: includes all previous groups

Risk categories according to possibility of influence

* Objective risk: uncontrollable, independent of the company's activities (natural events, political and macroeconomic changes, changes in duties, taxes, exchange rates)
* Subjective risk: controllable, dependent on the activities of the company, its management or owners.

Risk categories according to the source of risk

* Systematic risk: Systematic risk affects the entire economy (it is affected by the development of GDP or the stock market). This risk cannot be avoided and cannot be defended. Systematic risk affects all entities in the economy and is therefore not affected by diversification. The impact of this risk is measured by the beta coefficient
* Individual risk : Individual risk affects only some companies and industries (for this reason, it may be affected by diversification). Part of this risk can also be reduced by risk policy (it can be defended).

## Risk measurement

As stated above, the risk is the possibility that actual results will differ from expected results. Already from this definition it is clear that the basic indicator of risk is standard deviation. However, a relative risk indicator is needed to compare the two investments. This indicator is the coefficient of variation. In case of interaction of several types of risks, calculations must be performed over variances. The impact of systematic risk is measured by the **beta coefficient**.

* Absolute risk indicator = **standard deviation**
* Relative indicator of risk level = **coefficient of variation** (used to compare risks)
* Risk calculations: through variance

The risk can be calculated on the basis of estimated scenarios (ex ante procedure) or the risk can be estimated on the basis of past data (ex post procedure).

**Ex ante risk assessment procedure.**

First, scenarios of future development are estimated. Assume an optimistic, neutral and pessimistic variant. For each variant, it is necessary to estimate the casf flow and the probability of occurrence of this variant.

|  |  |  |
| --- | --- | --- |
|  | Cash flow (EUR) | Probability |
| Optimistic variant | 110 | 20% |
| Neutal variants | 100 | 55% |
| Pessimistic variant | 80 | 25% |

In the second step, the expected income is calculated from this data. (used as a weighted average).

110 \* 0,2 + 100\*0,55+80\*0,25 = 92. The expected return on this investment is 92 EUR

In the third step, the variance is calculated (based on the CF variant and the expected yield).

|  |  |  |  |
| --- | --- | --- | --- |
|   | diference | squared | Weighted average |
| Optimistic variant | =110-92 | 18 | 324 | 64,8 |  |
| Neutal variants | =100-92 | 8 | 64 | 32 |  |
| Pessimistic variant | =80-92 | -12 | 144 | 36 |  |
|  |  |  | Sum | 132,8 |  |

By square root of this value, we obtain the risk (standard deviation). In our case:11,5 EUR

**Ex post risk assessment procedure.**

Ex post risk measurement is based on the idea that risk characteristics do not change over time. The risk of the future period can thus be estimated on the basis of the risk measured in the past. A standardized methodology is used to measure the risk for the past 60 (alternatively 36) months. Yields are recalculated to revenues in%

Ex post

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date | Stock price | Yield | Diference yield – average yield | Squared |
| 01.01.2020 | 100 |  |  |  |
| 01.02.2020 | 102 | 2,00% | 0,36% | 0,000013 |
| 01.03.2020 | 104 | 1,96% | 0,32% | 0,000011 |
| 01.04.2020 | 106 | 1,92% | 0,29% | 0,000008 |
| 01.05.2020 | 108 | 1,89% | 0,25% | 0,000006 |
| 01.06.2020 | 112 | 3,70% | 2,07% | 0,000428 |
| 01.07.2020 | 107 | -4,46% | -6,10% | 0,003721 |
| 01.08.2020 | 104 | -2,80% | -4,44% | 0,001971 |
| 01.09.2020 | 106 | 1,92% | 0,29% | 0,000008 |
| 01.10.2020 | 107 | 0,94% | -0,69% | 0,000048 |
| 01.11.2020 | 111 | 3,74% | 2,10% | 0,000442 |
| 01.12.2020 | 115 | 3,60% | 1,97% | 0,000387 |
| 01.01.2021 | 121 | 5,22% | 3,58% | 0,001283 |
| x | x | x | sum | 0,008326 |
| x | Average yield | 1,64% | Standard deviation= RISK | 2,63% |

## Protection against risks

Risk policy consists of a set of measures leading to the minimization of risk or to the minimization of its consequences. Risk policy can be divided into defensive policy (which minimizes the consequences of risk) and offensive policy (which minimizes risk)

* offensive: the causes of the risk are eliminated (fire extinguisher)
* defensive: consequences are minimized (fire insurance)

Risk protection can involve a wide range of measures. In the beginning, it may already be the choice of the legal form of business: the partner of the business and capital company is not liable for the liabilities of the companies, the individual entrepreneur is liable indefinitely. Setting risk limits is also effective. The company sets risk limits, limits to how far it is possible to go without endangering the company. A common way to reduce risk is to create reserves. The risk can also be transferred to other entities (eg suppliers, customers, leasing companies). An example is factoring. A special method of transfer is insurance (it is: a special case of risk transfer for a fee). The division of risk consists in the division of risk into several participants: eg a banking consortium. Busssines flexibility is also considered to be an effective tool for defending against risk.

The main way to reduce risk in the case of securities is diversification. Division of funds into several investments.

Types of diversification:

* extension of the production program vertically: to the previous or next stage (production will be extended from milk production to cheese production)
* extension of the production program horizontally (production of more products)
* geographical diversification
* diversification of suppliers
* customer diversification
* diversification of financial investments

Additional term:

Secondary risk: arises from protection against the original risk (eg financial currency swap)

## Application of risk in investment decisions

The inclusion of risks in the investment project includes the following tasks:

1. Own projection of risk into project evaluation

2. Determination of critical factors of the project

3. Determination of the breakeven point (Alignment point)

4. Multifactor risk analysis (Computer simulation)

### Own projection of risk into project evaluation

The actual projection of risk into an investment project consists in including the risk in the Net Present Value. If we compare two projects with the same expected cash flow, then the project with the higher risk will have a lower Net Present Value. We know the so-called Direct Projection Methods and Indirect Risk Projection Methods.

**Direct Projection Methods**

The principle of Direct risk projection is the calculation of the size of the risk and the measurement of its value with the size of the NPV. The best known is the method called Net Present Value versus Variance.

* 1. **Net Present Value versus Variance.**

In this method, the NPV is first calculated, using a risk-free discount rate. (the risk will be assessed separately). In the second step, the risk is calculated as the sum of discounted variances adjusted for the time correlation between returns of individual years. The risk-free rate is again used for discounting. The ratio of these two values indicates the result. The method measures the relative effectiveness of the project (determines the order). A project with a higher NPV and lower Risk is more advantageous.

The big disadvantage of the method is the fact that it is necessary to know the correlation between individual years. This limits the limits of the possibilities of using the method.

Evaluation: NPV should be as high as possible, variance should be as low as possible, - the problem arises when is compared low-return and low-risk investments versus high-risk and high-return investments

**Indirect Projection Methods**

In the indirect projection of risk, the value of risk is not calculated directly, but its size affects the Net Present Value. The risk can be taken into account both in cash flow and in the discount rate.

* 1. **Security coefficients**

The method is based on the Net present value.Risk (probable) cash income is converted into a risk-free cash flow using a Security coeficients. Risk free cash flows are discounted at a risk-free rate. The coefficient ranges from 0 (unlikely cash flow) to 1 (certain cash flow)

* 1. **Discount rate adjustments**

The basic method of projecting risk into the evaluation of an investment project. The risk is reflected in the discount. Higher risk leads to a higher discount rate. There are many methods of calculation.

1. **Beta coefficient**

The most commonly used method. Beta indicates how much% my profitability will change when the average profitability in the economy changes by 1%

* Formula

Beta = Covariance between investment and market / Market variance

* Formula

Interest rate = Risk free return + Beta \* (Average return on the capital market – Risk free return)

1. **Adjusted beta coefficients.**

The calculation is not based on the covariance of capital markets, but on other values.

The adjusted beta can be calculated from the average beta of the industry adjusted by the influence of operating and financial leverage. In the case of higher fixed costs (than is usual in the industry), the beta of the company increases.

The adjusted beta can be estimated from the behavior of the company's customers. The beta obtained in this way explains the causes of development very well, but their predictive power is poor.

Another way to recalculate the beta coefficient is to use the statistical dependence of the company's development on macroeconomic factors.

The well-known creator of methods is professor Damodaran.

1. **Modular models**

The methods are based on the overall ris. (ie not systematic). This makes comparability to other methods difficult. First, the basic (risk-free) rate is determined (often set for individual sectors). Risk surcharges are added to this rate based on the results of the financial analysis. The most important examples in the Czech Republic: INFA model.

1. **Tabulated values**

The methods are also based on the overall risk. The origin of the procedures is in Germany. Due to the different definition of income (and the value of the company) is comparability with other models very limited.

1. **Risk categories**

The methods are based on the idea that it is necessary to monitor not only the situation of the company, but also the activity that the company intends to finance. Activities are sorted according to risk into the following risk pyramids (from the least risky to the most risky)

1. renewal of assets (by existing type of machinery)
2. new type of machinery
3. expansion of production
4. new product
5. new market
6. foreign market
7. research and development

As the risk increases, so does the discount rate.

### Determination of critical factors of the project

The method is called Sensitivity Analysis. The influence of selected factors is monitored. One specific factor changes by 1% (improvement / deterioration) and the impact on the net present value is monitored. The results are displayed in a tornado diagram. The aim is to identify threatening factors.

### Determination of the breakeven point

The method is called Breakeven point analysis. They indicate the limit of individual factors from which the Net present value is negative or from which a threat to the company is possible.

### Multifactor risk analysis (computer simulation)

Allows you to evaluate the change of several factors simultaneously. The most commonly used methods are Monte Carlo and VaR (EaR)

**Monte Carlo simulation**

Monte Carlo simulation is commonly used to evaluate the risk and uncertainty that would affect the outcome of different decision options. Monte Carlo simulation allows the business risk analyst to incorporate the total effects of uncertainty in variables like sales volume, commodity and labour prices, interest and exchange rates, as well as the effect of distinct risk events like the cancellation of a contract or the change of a tax law.

Monte Carlo methods in finance are often used to evaluate investments in projects at a business unit or corporate level, or other financial valuations. They can be used to model project schedules, where simulations aggregate estimates for worst-case, best-case, and most likely durations for each task to determine outcomes for the overall project. Monte Carlo methods are also used in option pricing, default risk analysis.

**VaR and EaR methods**

The Var and EaR methods measure the impact of risk on the value of the company (Value and Risk) or on the size of profit (Earnings and Risk).

Value at risk (VaR) is a measure of the risk of loss for investments. It estimates how much a set of investments might lose (with a given probability), given normal market conditions, in a set time period such as a day. VaR is typically used by firms and regulators in the financial industry to gauge the amount of assets needed to cover possible losses.

For a given portfolio, time horizon, and probability p, the p VaR can be defined informally as the maximum possible loss during that time after excluding all worse outcomes whose combined probability is at most p. This assumes mark-to-market pricing, and no trading in the portfolio. For example, if a portfolio of stocks has a one-day 5% VaR of $1 million, that means that there is a 0.05 probability that the portfolio will fall in value by more than $1 million over a one-day period if there is no trading. Informally, a loss of $1 million or more on this portfolio is expected on 1 day out of 20 days (because of 5% probability). More formally, p VaR is defined such that the probability of a loss greater than VaR is (at most) p while the probability of a loss less than VaR is (at least) 1−p. A loss which exceeds the VaR threshold is termed a "VaR breach".It is important to note that, for a fixed p, the p VaR does not assess the magnitude of loss when a VaR breach occurs and therefore is considered by some to be a questionable metric for risk management

# Internal sources of investment funding

Internal sources are created exclusively by company´s business activity. Internal sources together with owner´s or shareholder´s investment represent company´s equity.

Internal sources of investment funding are:

1. Depreciation
2. Retained earnings
3. long-term financial reserves

## Depreciation

Depreciation is considered as an internal source of funding because the long-term asset depreciation does not represent real money outflow therefore this money can be used for any purpose. Depreciation is part of working costs which influence profit but it is not money outflow so it can be used together with profit for investment funding. Depreciation differently from the profit is stable source of funding because it is not influenced as many factors as profit is. Depreciation can be used even if no profit is created. The amout of depreciation depends on amount and structure of long-term asset, its value, life-time and methods of depreciation itself.

## Retained earnings

For any company, the amount of earnings retained within the business has a direct impact on the amount of dividends. Profit re-invested as retained earnings is profit that could have been paid as a dividend. The major reasons for using retained earnings to finance new investments, rather than to pay higher dividends and then raise new equity for the new investments, are as follows:

1. The management of many companies believes that retained earnings are funds which do not cost anything, although this is not true. However, it is true that the use of retained earnings as a source of funds does not lead to a payment of cash.
2. The dividend policy of the company is in practice determined by the directors. From their standpoint, retained earnings are an attractive source of finance because investment projects can be undertaken without involving either the shareholders or any outsiders.
3. The use of retained earnings as opposed to new shares or debentures avoids issue costs.
4. The use of retained earnings avoids the possibility of change in control resulting from an issue of new shares.

A company must restrict its self-financing through retained profits because shareholders should be paid a reasonable dividend, in line with realistic expectations, even if the directors would rather keep the funds for re-investing. At the same time, a company that is looking for extra funds will not be expected by investors (such as banks) to pay generous dividends, nor over-generous salaries to owner-directors.

### Characteristics of profit as a source:

 it is an internal and own source: As an own resource, profit is expensive, but cheaper than traditional equity due to the absence of issuance costs. As an internal source, it is less flexible.

### Dividend policy.

Dividend policy is defined as the rules according to which a company will withhold profit or distribute it into dividends. The main task is to fulfill the basic goal of the company - maximizing the market value of the company.

### Types of dividend policy

* Maximum dividend policy: prefers dividends
* Passive residual dividend policy: dividends are paid only after investments and contributions to funds. The company pays dividends only if it does not have suitable investment opportunities. The policy changes every year depending on the investment opportunities. It is suitable for management, as it adapts the use of financial resources to the needs of the company.
* Constant percentage policy: dividend policy aimed at maintaining a constant dividend share (the same percentage of net profit). It is not used very often.
* The policy of low dividends during the year and extraordinary dividends at the end of the year - is suitable for companies with rapidly changing profits and investment opportunities.
* Stable dividend policy: Based on the following rules:

1. The dividend must grow

2. The payout ratio may not be exceeded

3. The dividend must not fall

4. The rule with the higher number takes precedence

### Attitudes towards dividend policy:

1. US right - (conservatives) - increasing dividends will increase the value of the company

2. US left (radicals) - an increase in dividends leads to a decrease in the value of the company

3. US center (centrists) dividend policy does not matter at all. Centrists are based on the theory of MM.

### Methods of dividend payment:

* Cash dividend. The vast majority of companies pay dividends in cash. This is the most frequently used and most transparent form of dividend distribution.
* Bond dividend (in the form of bonds): infrequent
* Share dividend: payment of a dividend in the form of newly issued own shares of the company (scrip dividends). For example, oil miners after 2014 (lack of cash). Beware, it often leads to lower market prices.
* Dividend reinvestment plan: Some companies offer the option of dividend reinvestment plan (DRIP), in which there is no capital increase, but new shares are bought for the investor on the market.
* Property dividend: Very rarely we may encounter a property dividend. Wrigley’s Gum distributed its chewing gum to shareholders, and Dundee Crematorium offered discounted cremation to its shareholders.

## Long-term financial reserves

This category consist of reserve funds and long-term reserves. The long-term reserves differentiate from reserve funds because it is included in liabilities as debt or residual capital and it is accounted as costs. Funds created from the profit can be used as investment source of funding if it is created for this purpose. Lawful reserve funds can never be used for investment funding. All above mentioned ways of financing are considered as self-financing through internally created sources. An advantage of self-financing is that it doesnt raise the amount of shareholders or creditors mantaining same level of risk indebtness.

#  External sources of investment funding

Division of external resources into own resources and debt resources. The most important and most used sources are marked in bold

1. **Ordinary shares (equity)**
2. **Preference shares (equity)**
3. Venture capital (equity)
4. **Bonds**
5. **Bank loans**
6. **Leasing**
7. Project financing
8. PPP
9. European Union funds

**Comparison of the most used sources of financing**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Ordinary shares  | Preference shares | Bonds | Bank loans | Leasing |
| Business risk  | Very low | Low | High | High | High |
| Nominal cost | Very high | High | Lower (depends on the type of bond) | Low | Medium |
| Issue costs. | Very high | High | Very high | Very low | Low |
| Tax shiels | No | No | Yes (interest) | Yes (interest) | Yes |
| Other disadvantages | High possibility of enemy takeover |  | Some possibility of hostile takeover (by blocking further debt financing)It is necessary to form a redemption fund |  | Transfer of some ownership risks to the tenantRestriction of the lessee's use rights by the leasing contractDifficulties in making property adjustmentsImpossibility of termination of the contract by the tenant |

## Ordinary shares

Ordinary shares are issued to the owners of a company. They have a nominal or 'face' value. Ordinary shareholders put funds into their company:

1. by paying for a new issue of shares
2. through retained profits.

A share is an indivisible unit of capital, expressing the ownership of shareholder. The denominated value of a share is its face value, and the total of the face value of issued shares represent the capital of a company. This value may not reflect the market value of those shares. As a result, "shares" and "stock" are commonly used interchangeably. The income received from the ownership of shares is a dividend. Shareholders may also enjoy capital gains if the value of the company rises. Common shares also come with voting rights, giving shareholders more control over the business. These rights allow shareholders of record in a company to vote on certain corporate actions, elect members to the board of directors, and approve issuing new securities or payment of dividends. Unlike debt capital, obtained through a loan or bond issue, equity has no legal mandate to be repaid to investors. Most companies have shares, but only the shares of publicly-traded companies are found on stock exchanges.

A dividend is a distribution of profits by a corporation to its shareholders. A dividend is allocated as a fixed amount per share, with shareholders receiving a dividend in proportion to their shareholding. When a corporation earns a profit or surplus, it is able to pay a proportion of the profit as a dividend to shareholders. Any amount not distributed is taken to be re-invested in the business (see chapter retained earnings).

Distribution to shareholders may be in cash (usually a deposit into a bank account) or, if the corporation has a dividend reinvestment plan, the amount can be paid by the issue of further shares or by share repurchase. In some cases, the distribution may be of assets.

The dividend frequency describes the number of dividend payments within a single business year. Most relevant dividend frequencies are yearly, semi-annually, quarterly and monthly. Some common dividend frequencies are quarterly in the US, semi-annually in Japan and Australia and annually in Europe.

The dividend received by a shareholder is income of the shareholder and is it subject to income tax. The corporation does not receive a tax deduction for the dividends it pays. For the joint-stock company, paying dividends is not an expense; rather, it is the division of after-tax profits among shareholders.

Simply retaining profits, instead of paying them out in the form of dividends, offers an important, simple low-cost source of finance, although this method may not provide enough funds, for example, if the firm is seeking to grow.

## Preference shares

Preference shares have a fixed percentage dividend before any dividend is paid to the ordinary shareholders. As with ordinary shares a preference dividend can only be paid if sufficient distributable profits are available, although with 'cumulative' preference shares the right to an unpaid dividend is carried forward to later years. The arrears of dividend on cumulative preference shares must be paid before any dividend is paid to the ordinary shareholders.

From the company's point of view, preference shares are advantageous in that:

* Dividends do not have to be paid in a year in which profits are poor, while this is not the case with interest payments on long term debt (loans or debentures).
* Since they do not carry voting rights, preference shares avoid diluting the control of existing shareholders while an issue of equity shares would not.
* The issue of preference shares does not restrict the company's borrowing power, at least in the sense that preference share capital is not secured against assets in the business.
* The non-payment of dividend does not give the preference shareholders the right to appoint a receiver, a right which is normally given to debenture holders.

However, dividend payments on preference shares are not tax deductible in the way that interest payments on debt are. Furthermore, for preference shares to be attractive to investors, the level of payment needs to be higher than for interest on debt to compensate for the additional risks.

For the investor, preference shares are less attractive than loan stock because:

* they cannot be secured on the company's assets
* the dividend yield traditionally offered on preference dividends has been much too low to provide an attractive investment compared with the interest yields on loan stock in view of the additional risk involved.

## Venture capital.

Venture capital is a special type of equity that is mostly used to finance innovative projects or to finance the development of start-ups.

Venture capital is one of the more risky, so the investor expects a large return on invested capital (at least 30%).

Companies that want to finance their activities with venture capital must offer investors an interesting project, a long-term sustainable competitive advantage, the potential for rapid growth in sales, profits and especially market value.

The return is linked to the company's ability to sell its shares to a strategic partner or enter the public stock market in the future.

Venture capital is therefore mainly used where there is high growth potential (eg information technology sector, technological innovation and patents)

We distinguish:

* Financing the early stages of business (for example, market research, product or service development, business plan creation, company establishment)
* Financing product development (eg marketing, commercial sales launch)
* Financing growth to accelerate the company's expansion (for example, increasing production capacity, entering new markets, increasing working capital)

More detailed breakdown:

* Seed financing, which finances the development of a product for which a company will only be established
* Start-up financing, when the company already has a product ready, including a sales strategy and it is necessary to finance production and distribution
* Early stage expansion, when a company that has existed for a maximum of three years has not yet made a profit, but has an interesting project
* Expansion financing intended to increase the company's working capital, introduce another product or service or enter foreign markets; acquisition financing, which is intended to finance business combinations
* Debt financing, where risky investors repay the debt on behalf of the company and in return acquire ownership shares in it
* Rescue financing designed to keep the company running
* Management buy-in / buy-out financing. the company is sold to management.

Both individuals, private individuals and specialized companies invest in the form of venture capital

* An angel investor (Angel investor, Business Angel) is a person, usually a former businessman, who invests his own money, the usual amount is 400 thousand - 2 million USD.
* Venture Capital Fund is a company that pooles the funds of individual investors and makes investment decisions for them, the usual amount is over 2 million USD

Risk financing procedure:

1) The entrepreneur submits and presents his business plan, which he tries to convince the investor

2) Negotiations on the conditions and signing of the so-called term sheet are in progress

3) The investor releases funds and the company submits the agreed outputs to him within the agreed deadlines

4) At the end of the decisive period, the investment will be terminated

Rating of venture capital:

* Classical financial analysis cannot be used
* Indicators based on operating outputs and operating cash flow are used.
* Operational indicators are often measured in physical units (number of items, customers, the number of users downloading program etc.)

The usual period for which venture capital operates in a given company, and thus the return on investment, is approximately 3-5 years. There is a relatively high risk associated with venture capital. In the event of liquidation, the share capital is also satisfied last.

Output from risk financing

The investor wants to increase the value of his invested money and thus, in the investment agreement, the set investment horizon, after which (if the company operates successfully) one of these options will occur.

* Sale of a stake in the company's management or to the original founders (so-called management buyout)
* Sale of the entire company to a strategic partner - meaning a larger company established in the field or a larger fund
* Exchange listing (IPO)

## Bonds

The bond is a debt security, under which the issuer owes the holders a debt and (depending on the terms of the bond) is obliged to pay them interest (the coupon) or to repay the principal at a later date, termed the maturity date. Interest is usually payable at fixed intervals (semiannual, annual, sometimes monthly). Very often the bond is negotiable.

**Nominal ammount**

Nominal, principal, par, or face amount is the amount on which the issuer pays interest, and which, most commonly, has to be repaid at the end of the term. The issuer is obligated to repay the nominal amount on the maturity date. As long as all due payments have been made, the issuer has no further obligations to the bond holders after the maturity date. The length of time until the maturity date is often referred to as the term or tenor or maturity of a bond. The maturity can be any length of time, although debt securities with a term of less than one year are generally designated money market instruments rather than bonds. Most bonds have a term shorter than 30 years

* short term (bills): maturities between zero and one year;
* medium term (notes): maturities between one and ten years;
* long term (bonds): maturities between ten and thirty years;
* Perpetual: no maturity Period.

**Coupon**

The coupon is the interest rate that the issuer pays to the holder. For fixed rate bonds, the coupon is fixed throughout the life of the bond. For floating rate notes, the coupon varies throughout the life of the bond and is based on the movement of a money market reference rate (often LIBOR).

Historically, coupons were physical attachments to the paper bond certificates, with each coupon representing an interest payment. On the interest due date, the bondholder would hand in the coupon to a bank in exchange for the interest payment. Today, interest payments are almost always paid electronically. Interest can be paid at different frequencies: generally semi-annual, i.e. every 6 months, or annual.

**Yield**

The yield is the rate of return received from investing in the bond. It usually refers either to:

* The current yield, or running yield, which is simply the annual interest payment divided by the current market price of the bond (often the clean price).
* The yield to maturity, or redemption yield, which is the internal rate of return earned by an investor who buys a bond at a given market price, receives all interest and principal payments on schedule, and holds the bond to maturity. Because it takes into account the present value of a bond's future interest payments, it is a more accurate measure of the return on a bond than current yield.

**Credit quality**

The quality of the issue refers to the probability that the bondholders will receive the amounts promised at the due dates. In other words, credit quality tells investors how likely the borrower is going to default.

Junk bonds or High-yield bonds are bonds that are rated below investment grade by the credit rating agencies. As these bonds are riskier than investment grade bonds, investors expect to earn a higher yield.

The market price of a tradable bond will be influenced, among other factors, by the amounts, currency and timing of the interest payments and capital repayment due, the quality of the bond, and the available redemption yield of other comparable bonds which can be traded in the markets.

The issue price at which investors buy the bonds when they are first issued will typically be approximately equal to the nominal amount. The net proceeds that the issuer receives are thus the issue price, less issuance fees. The market price of the bond will vary over its life: it may trade at a premium (above par, usually because market interest rates have fallen since issue), or at a discount (price below par, if market rates have risen or there is a high probability of default on the bond).

**Bond valuation**

The market price of a bond is the present value of all expected future interest and principal payments of the bond, here discounted at the bond's yield to maturity (i.e. rate of return). That relationship is the definition of the redemption yield on the bond, which is likely to be close to the current market interest rate for other bonds with similar characteristics, as otherwise there would be arbitrage opportunities. The yield and price of a bond are inversely related so that when market interest rates rise, bond prices fall and vice versa.

The bond's market price is usually expressed as a percentage of nominal value:

* price "at par" corresponds to a price of 100% nominal value;
* prices above par correspondent to price greater than 100% nominal value (is called as trading at a premium)
* price below par corespondent to price less than 100% nomional value (is called as trading at a discount)

**Types of bonds**

1. According to the stability of the coupon
* Fixed rate bonds have a coupon that remains constant throughout the life of the bond.
* Floating rate notes (FRNs, floaters) have a variable coupon that is linked to a reference rate of interest, such as Libor or Euribor. For example, the coupon may be defined as three-month USD LIBOR + 0.20%. The coupon rate is recalculated periodically, typically every one or three months.
1. According to the size of the coupon
* Bond with coupon: The most common type (see description above). The yield is determined by the size of the coupon payments and the difference between the market and the nominal price.
* Zero-coupon bonds (zeros) pay no regular interest. They are issued at a substantial discount to par value.
* High-yield bonds (junk bonds) are bonds that are rated below investment grade by the credit rating agencies. As these bonds are riskier than investment grade bonds, investors expect to earn a higher yield.
1. According to the method of registration
* Bearer bond is an official certificate issued without a named holder. In other words, the person who has the paper certificate can claim the value of the bond. Often they are registered by a number to prevent counterfeiting, but may be traded like cash. Bearer bonds are very risky because they can be lost or stolen.
* Registered bond is a bond whose ownership (and any subsequent purchaser) is recorded by the issuer, or by a transfer agent. It is the alternative to a Bearer bond. Interest payments, and the principal upon maturity are sent to the registered owner.
1. According to the issuer
* Corporate bonds. The most typical. They have highly variable conditions according to the financial situation of the company.
* A government bond, also called Treasury bond, is issued by a national government and is not exposed to default risk. It is characterized as the safest bond, with the lowest interest rate. A treasury bond is backed by the “full faith and credit” of the relevant government. For that reason, for the major OECD countries this type of bond is often referred to as risk-free.
* A supranational bond also known as a "supra" is issued by a supranational organisation like the World Bank. They have a very good credit rating like government bonds.
* Municipal bond is a bond issued by a state, city, local government, or their agencies.
1. Special and other types of bonds
* Convertible bonds let a bondholder exchange a bond to a number of shares of the issuer's common stock. These are known as hybrid securities, because they combine equity and debt features.
* Exchangeable bonds allows for exchange to shares of a corporation other than the issuer.
* Inflation-indexed bonds (linkers) (US) or Index-linked bond (UK), in which the principal amount and the interest payments are indexed to inflation. The interest rate is normally lower than for fixed rate bonds with a comparable maturity (this position briefly reversed itself for short-term UK bonds in December 2008). However, as the principal amount grows, the payments increase with inflation. The United Kingdom was the first sovereign issuer to issue inflation linked gilts in the 1980s. Treasury Inflation-Protected Securities (TIPS) and I-bonds are examples of inflation linked bonds issued by the U.S. government.

## Bank Loans

Borrowing from banks is an important source of finance for companies.

Loans may be in the form of:

a) Overdraft, which a company should keep within a limit set by the bank. Interest is charged (at a variable rate) on the amount by which the company is overdrawn from day to day;

b) Medium-term loans are loans for a period of from three to ten years. The rate of interest charged on medium-term bank lending to large companies will be a set margin, with the size of the margin depending on the credit standing and riskiness of the borrower. A loan may have a fixed rate of interest or a variable interest rate.

c) Longer-term bank loans where the loan takes the form of a mortgage.

When a banker is asked by a business customer for a loan or overdraft facility, he will consider several factors:

* Purpose (The purpose of the loan A loan request will be refused if the purpose of the loan is not acceptable to the bank)
* Amount (The amount of the loan. The customer must state exactly how much he wants to borrow. The banker must verify, as far as he is able to do so, that the amount required to make the proposed investment has been estimated correctly)
* Repayment (How will the loan be repaid? Will the customer be able to obtain sufficient income to make the necessary repayments?)
* Term (What would be the duration of the loan? Traditionally, banks have offered short-term loans and overdrafts, although medium-term loans are now quite common)
* Security (Does the loan require security? If so, is the proposed security adequate?)

## Leasing

A lease is an agreement between two parties, the "lessor" and the "lessee". The lessor owns a capital asset, but allows the lessee to use it. The lessee makes payments under the terms of the lease to the lessor, for a specified period of time.

Leasing is, therefore, a form of rental. Leased assets have usually been plant and machinery, cars and commercial vehicles, but might also be computers and office equipment. There are two basic forms of lease: "operating leases" and "finance leases".

**Basic types of leasing**

Operating lease is a short-term lease. The rental period is shorter than the economic life of the property and the rent paid in installments from one tenant includes only a certain part of the acquisition price.

 Financial leasing is a long-term lease. The lessor economically transfers some of the risks and rewards associated with the operation of the asset to the lessee. The term of the lease is the same as the economic life of the leased object and the lease payments cover the acquisition price of the leased property and the profit margin of the lessor. Through financial leasing, assets are permanently acquired in installments.

### Operating leases

Operating leases are rental agreements between the lessor and the lessee whereby:

* the lessor supplies the equipment to the lessee
* the lessor is responsible for servicing and maintaining the leased equipment
* the period of the lease is fairly short, less than the economic life of the asset, so that at the end of the lease agreement, the lessor can lease the equipment to someone else.

### Finance leases

Finance leases are lease agreements between the user of the leased asset (the lessee) and a provider of finance (the lessor) for most, or all, of the asset's expected useful life.

Suppose that a company decides to obtain a company car and finance the acquisition by means of a finance lease. A car dealer will supply the car. A finance house will agree to act as lessor in a finance leasing arrangement, and so will purchase the car from the dealer and lease it to the company. The company will take possession of the car from the car dealer, and make regular payments (monthly, quarterly, six monthly or annually) to the finance house under the terms of the lease.

Other important characteristics of a finance lease:

* ownership right to the subject of the lease is transfered from the lessor to the lessee at the end of lease period.
* the lease period must exceed 20% of depreciation period stated by law.
* a price of the subject of the lease at the end of lease cannot be higher than residual value after equal depreciation

Types of financial leasing

* Direct financial leasing. The tenant rents from the landlord the property he requires.
* Indirect financial leasing. The company sells the assets to the leasing company, which, however, immediately leases them back to the original company. The property is sold to the leasing company at the market price, the original company then pays the leasing company installments, through which not only the market price is repaid, but also the costs and profit of the leasing company.
* Leverage leasing. It is a leasing relationship in which a bank that provides a loan for the purchase of a leased asset to a leasing company participates to a large extent.

The attractions of leases to the supplier of the equipment, the lessee and the lessor are as follows:

* The supplier of the equipment is paid in full at the beginning. The equipment is sold to the lessor, and apart from obligations under guarantees or warranties, the supplier has no further financial concern about the asset.
* The lessor invests finance by purchasing assets from suppliers and makes a return out of the lease payments from the lessee. Provided that a lessor can find lessees willing to pay the amounts he wants to make his return, the lessor can make good profits. He will also get capital allowances on his purchase of the equipment.

Leasing might be attractive to the lessee:

* if the lessee does not have enough cash to pay for the asset, and would have difficulty obtaining a bank loan to buy it, and so has to rent it in one way or another if he is to have the use of it at all; or
* if finance leasing is cheaper than a bank loan. The cost of payments under a loan might exceed the cost of a lease.

Operating leases have further advantages:

* The leased equipment does not need to be shown in the lessee's published balance sheet, and so the lessee's balance sheet shows no increase in its gearing ratio.
* The equipment is leased for a shorter period than its expected useful life. In the case of high-technology equipment, if the equipment becomes out-of-date before the end of its expected life, the lessee does not have to keep on using it, and it is the lessor who must bear the risk of having to sell obsolete equipment secondhand.

**The lessee will be able to deduct the lease payments in computing his taxable profits.**

Disadvantages of leasing financing

* Acquisition of assets in the form of leasing is more expensive
* After the end of the lease, the less depreciated property becomes the lessee's property
* Transfer of some ownership risks to the tenant
* Restriction of the lessee's usage rights by a leasing contract
* Difficulties in making property adjustments
* Impossibility of termination of the contract by the tenant

### Deciding between leasing, buying in cash and a bank loan.

We decide on the basis of discounted payments reduced by tax savings.

In the case of a purchase, cash payments are an expense. Tax savings arise from depreciation. In the case of leasing, the expense is lease payments. Tax savings arise from payment (the entire payment is a tax deductible expense). In the case of a purchase with a bank loan, repayments are the expense. Tax savings arise from interest (we find out this part of the payment from the redemption schedule) and from depreciation.

The cost of debt capital is used as the discount rate. interest \* (1- tax rate)

## Energy Performance Contracting (EPC)

Financing includes the design of energy saving measures, preparation, implementation (most often operation) and securing financing for a project leading to energy savings.

The method works on the installment principle, so the customer does not need any own financial resources to implement it. The client gradually repays the implementation to the provider from the resulting and contractually guaranteed savings. The customer of the EPC project should not pay more than for energy at the time of concluding the contract and thus the beginning of the project.

All risks of the project are borne by the provider and in case the savings are not achieved according to a predetermined model, the provider also bears the financial consequences of this failure.

Investments in a project using the EPC method have a return of 6 to 10 years.

## PPP Public Private Partnership

A PPP is a long-term contractual relationship between a public and a private entity, with the private entity spending its own resources and bearing part of the risk associated with the investment. PPPs usually involve private financing, construction and management of the facility in exchange for the promise of future payments from the public sector.

Methods of financing (types of PPP)

* Operation and maintenance contract: A private economic entity manages a public building on the basis of a contract with a public entity for a given period of time.
* Construction-financing model: A private entity builds an object, finances the construction with its own resources, and transfers the asset to a public entity upon completion of the construction.
* Design-construction-financing-maintenance model: The private entity designs, builds, finances the building and, on the basis of a contract, takes care of its long-term maintenance.
* Design-construction-financing-maintenance-operation model: The private entity is responsible for the entire project, including financing, as well as the subsequent operation and maintenance of the building (eg transport structures). Usually, the public entity begins to pay rent for the use of the building after the construction is completed.
* Concession: The private sector concessionaire makes the investment and manages the object for a given period of time, at the end of which the object becomes back into public ownership.

Projects for the creation of some form of public property (infrastructure, etc.) can also be partly financed by a one-off public grant to ensure the economic viability of the project. The public sector can also support the project indirectly (through tax breaks).

The problem with PPP projects is that the private investor has a higher required return than the government bond rate, although the vast majority of the risk associated with the project is borne by the public sector.

## Project financing

Project financing is characterized by the separation of project financing from the existing business activities of the investing company. The provision and repayment of the loan are closely linked to the cash flows of the project.

It is a system of long-term financing, the basic characteristics of which are:

* The subject of financing is an extensive long-term investment project, where the repayment of loans is derived from the project's planned cash income.
* The aim is to separate the financing of the project from the existing activities of the company, while the goal is the risk protection of creditors.

Participants in project financing can be:

* shareholders (parent company, “sponsors” of the investment project);
* project company: a purpose-built company of the joint-stock company type, which concentrates resources, ensures technical and economic preparation of the project, arranges construction companies, technology suppliers, assembly and prepares for use, ensures future sales (most often on the basis of long-term contracts);
* engineering company (main contractor, subcontractors of construction and machine parts of the project);
* the operator (contractually ensures the operation and maintenance of the completed investment plan);
* a consortium of banks (creditors who provided the main source of financing);
* other entities such as insurance companies, suppliers, customers, experts, state authorities (eg in the case of environmental or other infrastructure projects).

## European Union funds

A use of European Funds is special and from the others different way of funding the investment. Since Czech Republic became a member of European Union there is a new yet unexplored possibility for czech investors to use other external source than just a bank borrowing, leasing or so.

There is a possibility to use European funds of various specialization. This kind of source is usually non-reversible and sometimes cover up to 75% of the initial investment.

Primarily a sufficient amount of quality projects must exist because Czech Republic could not draw any single euro without them.

A realization of policy of economic and social cohesion (ESC) is ruled by princible of programming when the projects are not chosen randomly but according to how they help to eliminate problems identified in the strategic documents.

The highest priority strategic document on the field of European Union for realization of ESC policy is „Community Strategic Guidelines for Cohesion policy (CSGCP)“ .

Besides that each member of European Union defines its own „National development plan (NDP)“ describing main developing problems of given country. Since the priorities of given country does not usually correspond to the ones defined by ESC on the supranational level, a joint agreement between CSGCP and NDP must be found.

A document representing the joint agreement and also defining a way of ESC policy implementation in the given EU member country is „National strategic reference framework (NSRF)“. Czech NSRF describes strategic objectives, the way of managing and co-ordination of ESC policy in Czech Republic. It represents a system of cash flow from EU funds into Czech Republic and introduces „operational programmes (OP)“ for ESC policy implementation.

In the system of programming documents, the operational programmes are the most important documents for investors because they are thematically and regionally defined and specify the objectives desired to be reached by the executed projects.